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Bound Tariffs, Unused Protection, and Agricultural Trade Liberalisation

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Abstract

Many quantitative assessments of the effects of agricultural trade liberalisation have relied on the assumption that trade policy reforms directly reduce applied tariffs in WTO member countries. However, in this paper it is argued that consideration of policy reforms applying to tariffs bound in Uruguay Round schedules rather than to the often much lower applied rates can have important consequences for analytical results. Using information on bound and applied tariffs from the Agricultural Market Access Database, and the Global Trade Analysis Project computable general equilibrium model, the effects of tariff reforms under alternative policy and parameter constellations are evaluated. The findings suggest that simulating negotiated tariff cuts as reductions in applied rates rather than in conditional applied rates, which are obtained as the minimum of bound rates after a negotiated tariff cut and initial applied rates, overestimates the benefits from agricultural trade liberalisation. The distortion of estimates is particularly pronounced for simulations that assume modest tariff cuts, as well as for countries and commodities where the differences between bound and applied rates are substantial. Hence, quantitative policy analysts that aim to inform decision makers on the likely impacts of negotiated tariff cuts should consider the relationship between bound and applied tariff rates in their assessments in order to avoid biased advice.

Keywords

Trade negotiations, Uruguay Round bindings, conditional applied tariffs, tariff reduction analysis, GTAP general equilibrium model.

1. Background

The Uruguay Round Agreement on Agriculture (URAA), signed in April 1994, brought trade in agricultural products for the first time within the ambit of GATT rules. Signatory countries committed themselves to reductions in border protection, export subsidies, and domestic support. Follow-up negotiations on further agricultural trade liberalisation were launched as part of the URAA's build-in agenda in March 2000. Moreover, as a result of the WTO Ministerial Meeting in Doha/Qatar in November 2001, the agriculture negotiations became part of a single undertaking in which virtually all the linked trade negotiations are to conclude before the end of 2004.

There have been a number of studies that have evaluated and quantified the effects of the URAA and prospective further reform steps on agricultural markets. These include descriptive accounts of the implementation of the existing Agreement (OECD, 2001a), as well as model-based analysis of impacts of agricultural trade liberalisation on production, consumption, and trade. Examples of the latter include Zhu, Cox, and Chavas (1999), who simulate the market equilibrium impacts of the URAA and full trade liberalisation in the world dairy sector; Blake, Rayner, and Reed (1999), who assess the effects of the URAA in the context of reforms of the European Union's Common Agricultural Policy; and Hertel, Anderson, Francois, and Martin (2002), who explore the extent to which multilateral liberalisation of both farm and non-farm policies would affect agricultural markets and welfare.

Given the complexity of the URAA, it is difficult to fully represent its features in economic models. Analysts therefore generally make simplifying assumptions regarding the process of trade liberalisation. One such assumption is that the tariff rates that were bound in the URAA and that form the basis for tariff reduction commitments equal the tariffs that are applied in WTO member countries. This assumption implies that a negotiated cut in the bound rates would translate into a similar reduction in applied rates across all countries and commodities. However, in this paper it is argued that taking into account that policy reforms apply to bound rather than applied rates can have important consequences for the modelling results. In particular, the existence of "unused protection" in the form of bound rates exceeding applied rates can considerably alter the magnitude and structure of the benefits from trade liberalisation.

The paper uses information on bound and applied tariffs from the Agricultural Market Access Database, and the Global Trade Analysis Project (GTAP) computable general equilibrium model to assess the effects of tariff reforms under alternative constellations. Conditional applied tariffs as the minimum of bound rates after negotiated tariff cuts and initial applied rates are calculated and integrated into the GTAP database. Based on this information, several trade policy reform scenarios are evaluated, comparing the outcome of model-runs in which tariff reductions are based on conditional applied rates with ones in which the reforms are represented through cuts in either initial applied or initial bound tariffs. The results highlight the circumstances under which a detailed representation of tariff structures in applied economic models seems particularly warranted.

The remainder of the paper is structured as follows. Section 2 briefly reviews the market access provisions of the URAA and reports on the level and structure of applied and bound agri-food tariffs in OECD countries. Section 3 presents the analytical framework for the liberalisation scenarios, and the results of the analysis are discussed in section 4. Finally, section 5 concludes this study.

2. Issues in agricultural tariff liberalisation

One central issue for trade in agri-food products concerns the rules that are governing market access. As an outcome of the URAA, import quotas and variable levies on agri-food products were converted into their tariff equivalents. Tariffs were bound and reduced by an average of 36 per cent (24 per cent for developing countries) over the implementation period 1995-2000 (1995-2004 for developing countries). In parallel, tariff rate quotas were established to allow imports of certain quantities of agri-food products at reduced tariff rates. The process of tariff liberalisation is likely to continue beyond the end of the URAA implementation period, as WTO ministers agreed in November 2001 to "substantial improvements in market access" as one of their objectives for the ongoing negotiations on agricultural trade.

2.1 Tariff liberalisation in the URAA

Yet, several analysts have pointed out that the tariff reductions under the URAA have not led to substantial improvements in market access (Hathaway and Ingco, 1995; Wainio, Hasha, and Skully, 1998). The limited effects of the URAA have thereby been attributed to several factors. One aspect has been that the practice of converting non-tariff measures into bound tariffs was not tightly administered, which has often resulted in bound tariffs being set at rates higher than their actual tariff equivalents. Hence, at least initially the scheduled tariff reductions under the URAA had to cut out the artificial protection generated through "dirty tariffication". Also, some countries have set their tariffs as a combination of specific (i.e. per unit) and *ad valorem* rates, which can be a means of protecting particular segments of markets very effectively (Bureau, Fulponi, and Salvatici, 2000).

Another factor concerns the method of allocating tariff cuts across commodities. Countries had considerable flexibility in applying tariff cuts, as the tariff-cutting formula was based on simple averages. Tariffs for agri-food products that were less important domestically or that were already set at low levels were often cut by above-average percentages, while tariffs on politically sensitive products were reduced only by the required minimum of 15 per cent. As a result, the expected effects of the tariff reductions were mitigated to a significant extent (Josling and Tangermann, 1994).

A further important reason for the limited impact of the URAA tariff reductions is the downright level of border protection for some agri-food products. Agri-food tariffs have remained much higher than those in the manufacturing sector, amounting not infrequently to several hundred per cent (OECD, 1999). Many tariffs have indeed been prohibitively high, and have remained so even after the URAA cuts. These cuts have often merely squeezed out some of the existing "water in the tariffs".

2.2 Tariff protection in the agri-food sector

The global average of MFN-bound agri-food tariffs has been estimated to amount to 62 per cent (Gibson, Wainio, Whitley, and Bohman, 2001). The regions with the highest levels of tariff protection were found to be South Asia and non-EU Europe, while North America had the lowest average bound tariffs. Developing countries generally tended to have higher bound rates than developed countries. Across commodities, tobacco, meat, dairy, sugar, and sweetener products showed the highest average tariff rates, while horticultural products and fruit were relatively least protected. However, there is considerable variation in tariffs across countries and commodities, so that region-wide and world-wide averages should be interpreted with care.

MFN-bound tariffs represent the maximum allowable tariffs that WTO members have scheduled as part of their Uruguay Round commitments. These rates are used as the basis for the negotiated tariff reductions. Application of import duties above bound rates is not allowed, unless trading partners adversely affected by the tariff change are compensated.

On the other hand, countries are free to apply import duties that are lower than the bindings. Indeed, all OECD countries, except for the EU and Switzerland, and many non-OECD countries apply tariffs that are below their bindings. Unlike bound tariffs, applied rates may be changed without formal notice to the WTO or compensation of trading partners as long as they do not exceed the bindings.

2.3 Bound versus applied tariff rates

For analytical purposes, it is important to distinguish between bound and applied rates. Bound tariffs are at the centre of discussion in trade negotiation and form the benchmark for negotiated tariff cuts. In comparison, applied rates are the import duties that traders face and that determine trade flows. As applied tariffs can be lower than bound tariffs, a negotiated cut in bound rates does not necessarily translate into a corresponding cut in applied rates. There can be no impact on applied rates, a reduction by a smaller percentage than in the bound rate, or a cut of the same proportion as in the bound rate, depending on the difference between bound and applied rates and the size of the negotiated tariff cut. The conditional applied tariff after a negotiated tariff cut is determined by equation (1):

$$(1) \qquad AR_{t+1} = \begin{cases} BR_t - TC & \forall \quad BR_t - TC < AR_t \leq BR_t \\ AR_t & \forall \quad BR_t - TC \geq AR_t \end{cases} \quad ;$$

where *AR* and *BR* stand for the applied rate and bound rate, respectively, and *TC* is the tariff cut that has been negotiated in the base period *t* to be implemented in the later period *t+1*.

Conditional applied tariffs can be calculated from data on bound and applied tariffs. Such information is available from the Agricultural Market Access Database (AMAD). This database contains tariff data for a large number of WTO members, including all OECD countries. The database is publicly available and can be accessed through its internet site "www.amad.org".

AMAD contains data on bound tariffs in the base URAA implementation period (i.e. 1995) and the final implementation period (i.e. 2000; for developing countries 2004). As countries have been required to reduce their tariffs in equal steps, it is possible to derive the bound rates for any year during the implementation period by weighting the base and final bound rates appropriately. In addition, AMAD reports information on applied tariff rates in most countries for selected years during 1995-2000.

One major challenge when analysing applied and bound tariffs for agri-food products across commodities and countries is to express the tariff rates in a comparable format. Some countries rely exclusively on *ad valorem* (i.e. percentage) tariff rates, while other use specific tariffs, expressed for example in USD per kg, or compound rates that combine an *ad valorem* and a specific element. A methodology for converting these specific and compound tariffs into their *ad valorem* equivalents using AMAD information has been described in Gibson, Wainio, Whitley, and Bohman (2001).

This study follows the procedure outlined in Gibson *et al*. to calculate *ad valorem* equivalents for bound and applied tariffs in all OECD countries in 1997. The year 1997 was chosen as to coincide with the base year of the GTAP-5 database. Where AMAD did not contain information on applied tariffs in particular countries for 1997 (Czech Republic, Iceland, Korea, Norway, Poland, Turkey), corresponding information for 1996 was used, and in cases where the 1996-applied rates exceeded the 1997-bound rates, the applied rates were adjusted to equal the corresponding bindings. Moreover, to correct for the fact that Japan and Korea did not schedule and report tariffs for rice, rice market protection in the two countries was estimated by using information on differences between border and domestic prices from the OECD's PSE/CSE database (OECD, 2001b).

The information on agri-food tariffs at the six or eight digit commodity level of the Harmonised System was aggregated into nine product groups (grains; oilseeds and vegetable oils; sugar; fruit and vegetables; dairy; beef and sheep; pork and poultry; fibre and wood; prepared food) by taking the mean of the tariff lines within the group. The correspondence of the nine aggregates with the GTAP Sectoral Classification is given in Annex table 1. The results concerning tariff protection for different products and the relationship between bound and applied rates in OECD countries are shown in Table 1.

There is considerable diversity of agri-food market protection among OECD countries, but tariff rates and structures vary considerably even within countries. For example, in Korea average bound and applied tariffs for grains exceed 200 per cent, while average import duties on fibre and wood are lower than 15 per cent. Moreover, the ratio of applied to bound rates varies widely, with average applied tariffs for dairy products in Korea being less than 10 per cent lower than bound tariffs, while the applied rates on sugar are more than two-thirds lower than bound rates. This means that a negotiated tariff cut of 10 per cent would already force reductions in applied tariffs on beef & sheep and open the corresponding markets, while the "concession" would have to be bigger than 65 per cent before forcibly lowering tariff protection in the Korean sugar market. Hence, uniform reductions of bound tariffs have the potential to affect agri-food sectors very differently.

Table 1: Average tariffs for agri-food products in OECD countries, 1997 (in per cent)

	Grains	Oilseeds & veg. oil	Sugar	Fruit & vegetables	Dairy	Beef & sheep	Pork & poultry	Fibre & wood	Prepared food
***Applied rates (ad valorem* equivalents)**									
ANZCERTA	0.2	1.1	5.0	1.2	8.4	0.8	1.5	0.3	4.5
CAN	11.6	8.6	5.8	2.2	126.4	27.4	30.2	0.9	14.3
CSEEC	33.7	10.1	51.2	23.7	69.4	28.3	21.4	7.2	27.4
EFTA	46.1	56.3	57.1	39.8	141.5	139.5	92.1	4.0	55.3
E15	64.1	12.1	126.8	14.1	122.5	78.7	37.1	1.2	40.3
JPN	142.2	11.6	81.1	12.0	77.6	19.8	8.5	5.9	20.7
KOR	227.5	30.2	6.9	91.7	77.9	24.7	13.7	6.8	72.2
MEX	31.6	14.6	7.4	13.3	42.4	32.6	16.6	8.9	15.0
USA	2.0	3.2	20.9	2.3	15.6	1.7	0.6	1.7	4.4
***Bound rates (ad valorem* equivalents)**									
ANZCERTA	1.0	2.4	10.2	3.5	12.8	3.6	5.0	1.3	10.7
CAN	12.0	9.0	8.8	2.6	136.0	51.7	39.3	1.2	16.8
CSEEC	57.5	19.6	77.3	29.6	87.6	40.8	29.7	11.4	43.9
EFTA	163.0	136.6	129.5	89.3	357.8	303.1	169.7	17.8	126.8
E15	64.1	12.1	126.8	14.1	122.5	78.7	37.1	1.2	40.3
JPN	175.1	24.4	115.2	35.4	280.0	46.9	51.4	14.6	54.4
KOR	263.2	44.0	22.9	102.1	85.3	27.9	24.4	13.5	90.3
MEX	60.4	46.8	102.3	41.5	67.1	80.7	39.7	40.8	54.1
USA	3.3	7.6	23.6	4.5	48.0	4.6	2.4	3.1	10.8

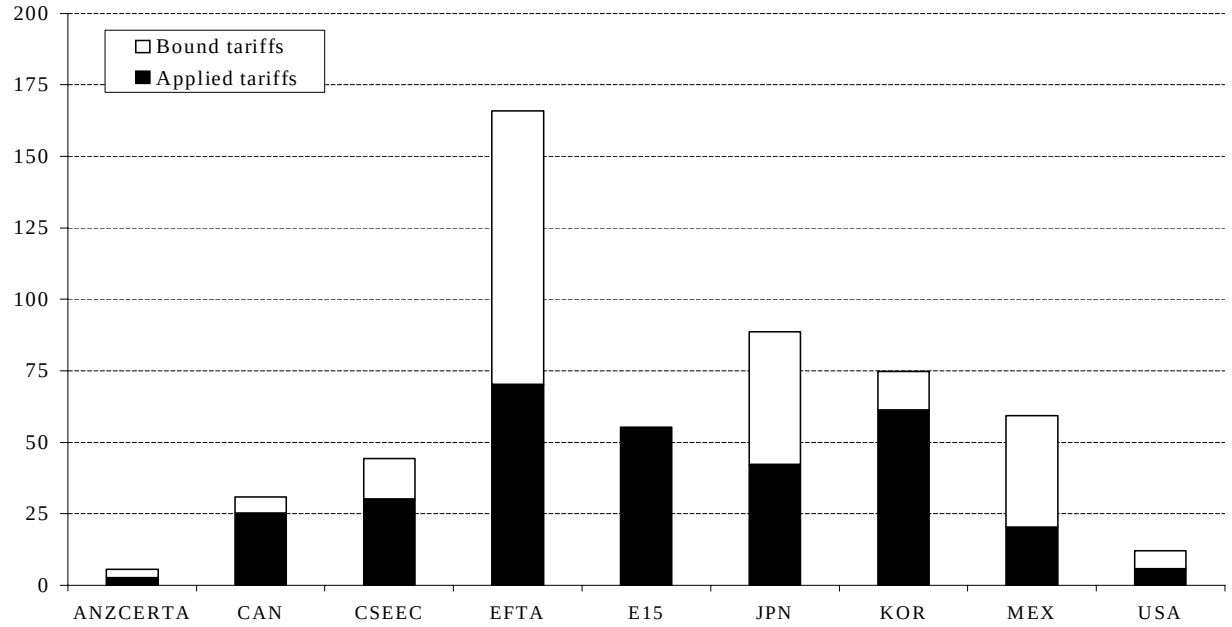
Note: "ANZCERTA": Australia and New Zealand Closer Economic Relations Trade Agreement; "CSEEC": Central and South-Eastern European Countries (Czech Republic, Hungary, Poland, Turkey); "EFTA": European Free Trade Area (Iceland, Norway, Switzerland). See text for explanation of methodology.
Source: Authors, based on AMAD information.

Figures 2 and 3 provide a summary of average applied and bound agri-food tariffs by OECD country/region and product group, respectively. The country comparison highlights the relatively low tariff protection in Australia, New Zealand and North America, compared to the high import duties in Japan, Korea, and the EFTA members. It also illustrates the substantial variety in applied to bound tariff ratios in different countries. For example, in the European Union MFN-applied tariffs equal bound rates, while in Mexico applied rates are on average two-thirds below bound rates.

Across commodities, the highest average tariffs in OECD countries are used on dairy products and the lowest ones on fibre & wood. The commodity-specific averages of applied rates are all more than 40 per cent below bound rates. The largest divergence between the average rates occurs for fibre & wood (applied rates 62 per cent below bound rates) and the smallest for fruit & vegetables (applied rates 41 per cent below bound rates).

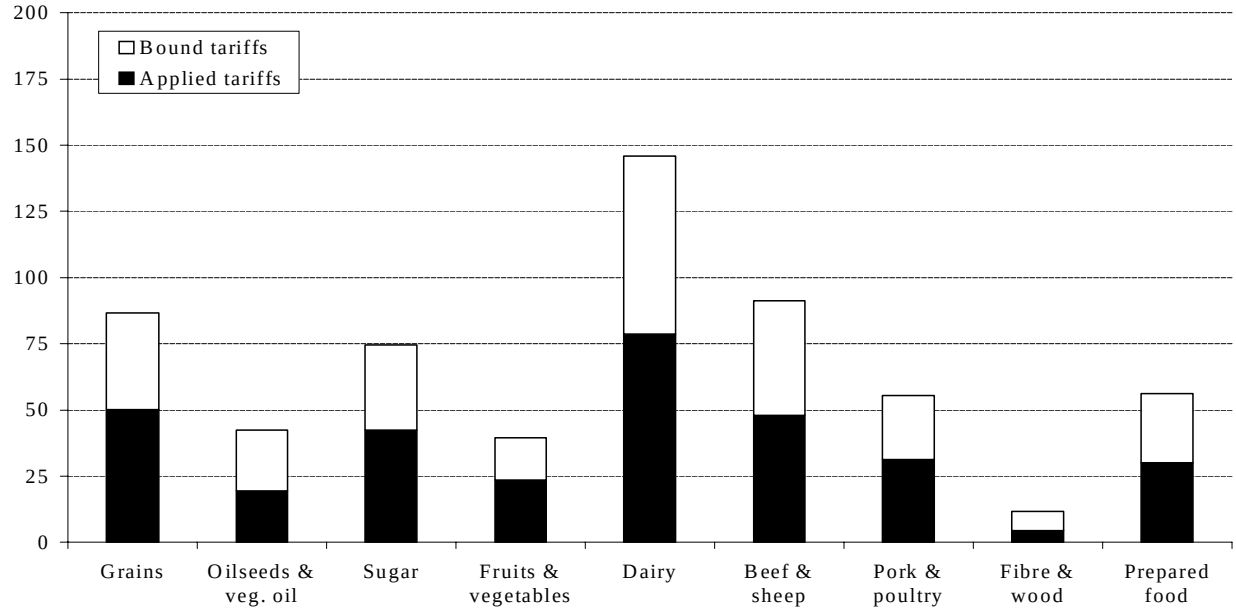
It should be noted that the differences between bound tariffs and the duties actually paid at the border will in practice tend to be bigger than those shown in Table 1, because many countries allow imports under preferential trading arrangements at tariffs below the MFN rates. An example is the General System of Preferences that facilitates access of developing country exporters to developed countries' markets. The difference between bound and MFN-applied rates has, therefore, to be seen as a lower bound for the amount of "unused protection" in existing tariff schedules.

Figure 1: Average tariffs for agri-food products in OECD countries, 1997 (in per cent)



Note: "ANZCERTA": Australia and New Zealand Closer Economic Relations Trade Agreement; "CSEEC": Central and South-Eastern European Countries (Czech Republic, Hungary, Poland, Turkey); "EFTA": European Free Trade Area (Iceland, Norway, Switzerland). The country/region-wide averages were calculated as simple means of average tariffs in the nine agri-food product groups listed in Annex table 1.
Source: Authors, based on AMAD information.

Figure 2: Average tariffs for agri-food products in the OECD by product group, 1997 (in per cent)



Note: The product group-wide averages were calculated as simple means of average tariffs in the corresponding product groups in the nine countries/regions shown in Table 1.

Source: Authors, based on AMAD information.

The preceding discussion highlighted the differences between bound and applied tariffs for agri-food products in OECD countries. These differences are, in principle, well known and analysts are aware that negotiated tariff cuts do not necessarily translate into corresponding cuts in actual border protection. For example, Harrison, Rutherford, and Tarr (1995) assume zero tariff reductions in the EU as an outcome of the URAA, arguing that the new bindings are above the existing tariff levels. Yet, the considerable diversity of bound to applied tariff ratios across commodities and countries makes it virtually impossible to assess the implications of negotiated tariff cuts on an *ad hoc* basis. This is all the more the case as complementarity and substitutability between products, the importance of international agri-food trade, and general equilibrium effects, including changes in terms of trade, create linkages across products and countries that are difficult to evaluate without the help of applied economic models.

3. Modelling the impact of agricultural tariff liberalisation

Most computable general equilibrium models can cope with prohibitively high applied tariffs, i.e. the existence of "water in the tariffs", and accurately reflect the non-impact of small tariff changes. On the other hand, the existence of a dual tariff system of trade policy relevant bound rates and trade flow relevant applied rates, which can give rise to "unused protection", requires adjustments to the underlying model database. In the following, such adjustments are described and undertaken in order to evaluate how consideration of differences between bound and applied tariffs alters the results of applied economic research.

3.1 Model specification and data

The quantitative analysis is carried out by using the well-established GTAP database and model. The latter is a static, multi-region, computable general equilibrium model that operates under assumptions of perfect competition and constant returns to scale. The model reflects bilateral trade flows, international transport margins, and country and sector-specific rates of import protection. GTAP thereby makes it possible to determine changes in production, consumption, trade, and economic welfare for particular trade policy reform scenarios. A full description of the model can be found in Hertel (1997).

The following investigation uses information from the GTAP-5 database to specify ten regions and ten sectors. Nine of the ten regions refer to OECD country groupings, and the tenth to an aggregate of non-OECD countries. Of the ten sectors, nine represent agri-food product groups, while mining, non-food manufacturing, and services are aggregated into the tenth one. The correspondence of the regions and sectors modelled and their GTAP-5 components is given in Annex Tables 1 & 2.

The data on agri-food tariffs in the GTAP-5 database consists for some countries of the rates that were applied in 1997 or 1998, while for others the final bound rates of the URAA were used. For the trade liberalisation scenarios described below, this GTAP-5 data was adjusted to reflect either initial applied or initial bound rates given in Table 1. For the non-OECD country aggregate as well as for the non-agri-food sector, the GTAP-5 tariff information was kept unchanged. Also, the existing data on non-tariff protection was left unaltered in all countries and sectors.

3.2 Simulation scenarios

Several experiments are carried out to analyse the differences in impacts of simulating tariff liberalisation under a unique tariff system compared to a dual system of bound and applied rates. The experiments concern exclusively tariff reductions, abstracting from particular post-URAA features, like the existence of tariff rate quotas, or reduction commitments concerning export subsidies and domestic support. Also, the simulated tariff cuts are hypothetical and not directly related to the implementation of the URAA.

The tariff data for the selected regions presented in Table 1 was introduced into GTAP using the "Altertax" option, which makes it possible to change tariff rates in the model database. This procedure is designed to incorporate additional information on policy variables into existing GTAP data aggregations (Malcolm, 1998). Tariffs were adjusted, while maintaining the internal consistency of the database and minimising the impact of the tariff change on the value of commodity and financial flows. The two updated databases containing the applied and bound tariff rates form the basis for the policy experiments.

Three scenarios were evaluated that use differing data on agri-food tariff rates to simulate negotiated tariff cuts in consecutive 10 per cent steps from zero to 100 per cent:

- Conditional applied tariffs: The agri-food tariffs used in the simulations are the minimum of the initial bound rates after a negotiated tariff cut and the initial applied rates (see equation (1)). Hence, the analysis considers both initial bound and initial applied rates and their relationship. The tariff cuts are, in general, non-linear with respect to the negotiated tariff reductions. Annex table 3 provides examples of how reductions in bound tariffs translate into cuts in initial applied tariffs.

- Tariffs derived from initial applied rates: The tariffs used in the simulations are derived from the initial applied rates by applying the negotiated tariff cuts. The analysis considers only initial applied tariffs. The tariff cuts are linear with respect to the negotiated tariff reductions.

- Tariffs derived from initial bound rates: The tariffs used in the simulations are derived from the initial bound rates by applying the negotiated tariff cuts. The analysis considers only initial bound tariffs. The tariff cuts are linear with respect to the negotiated tariff reductions.

3.3 Discussion of simulation results

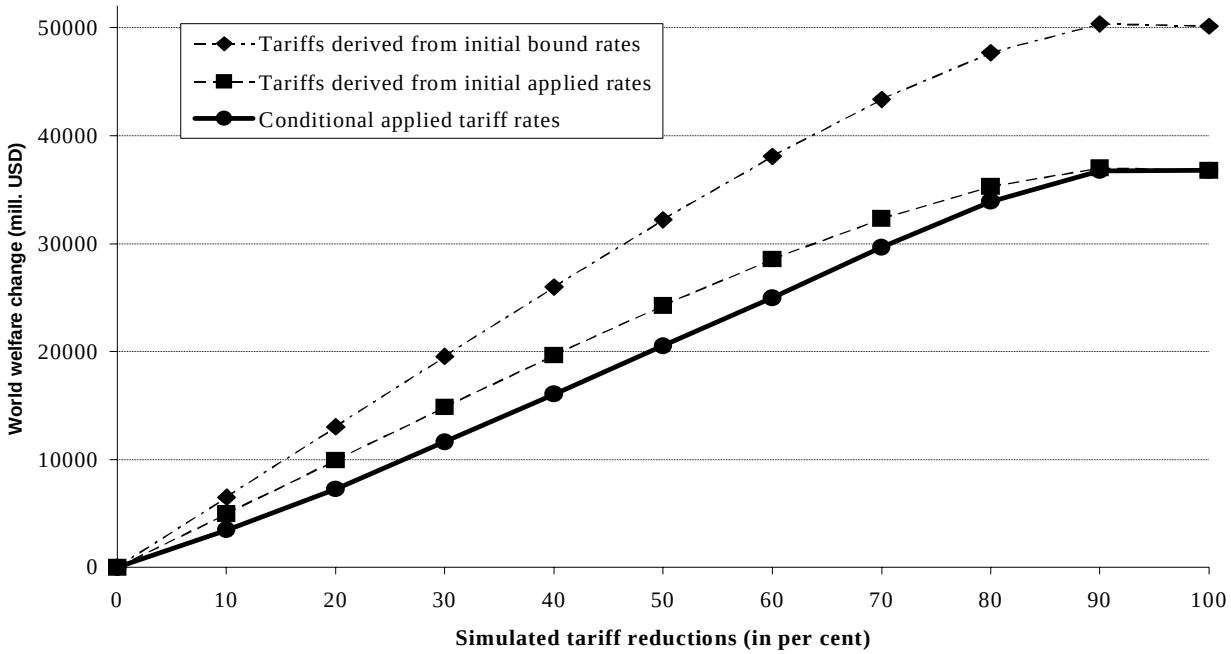
The results from the simulations reveal considerable differences among scenarios. Figure 3 shows the predicted welfare gains under the three tariff liberalisation scenarios in absolute terms, as well as a relative comparison between the scenarios. World income would increase if agri-food tariffs were to be reduced and full liberalisation would result in welfare gains of more than 35 billion USD.

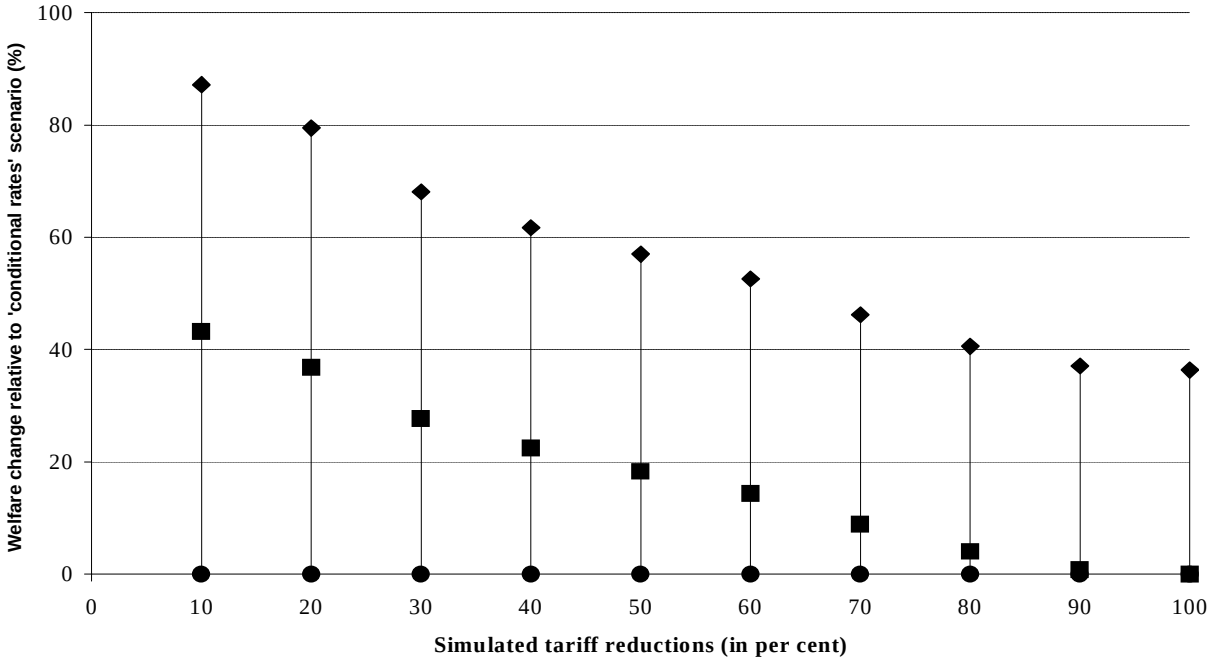
The largest welfare gains are predicted in the scenario in which the tariffs modelled are derived from bound rates. This finding was to be expected. Bound tariffs are higher than applied ones, so that their use in the modelling analysis implies higher levels of initial protection and consequently larger distortions in the economy. Removing these distortions through tariff reductions will naturally result in bigger welfare gains than corresponding tariff cuts in the scenarios that were calibrated on the lower applied rates.

The lowest impact from tariff reductions occurs in the scenario that is based on conditional applied tariffs. Again, this was to be expected, as reductions in bound rates do not necessarily translate

into corresponding cuts in applied tariffs, but first merely squeeze out unused protection. Indeed, it might seem surprising that a modest cut of, for example, 10 per cent generates substantial welfare gains at all in the "conditional applied tariff scenario". But a large share of these welfare gains comes from adjustments in non-OECD countries, in which by assumption bound tariffs were taken to equal applied rates.

Figure 3: Predicted world welfare gains from tariff reductions



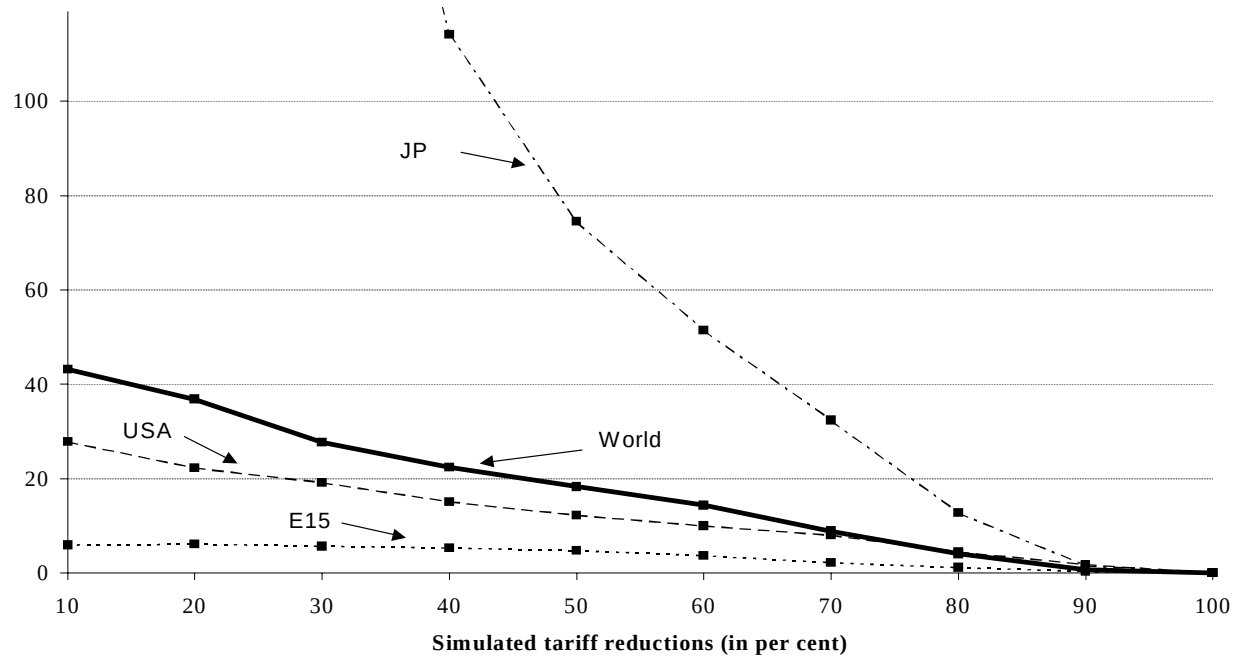


Source: Authors.

The difference between the scenarios becomes even more apparent when the gains are compared in relative terms, as in the lower part of Figure 2. The predicted welfare increases of a 10 per cent tariff cut under the scenario "tariffs derived from initial applied rates" are more than 40 per cent larger than if conditional applied tariffs are used in the modelling analysis. The difference between these two scenarios becomes smaller in relative terms as larger tariff cuts are simulated, but still remains bigger than 10 per cent up to simulated tariff cuts of about two-thirds.

The over-estimation of welfare gains is not uniform across countries. Figure 4 illustrates the variation of liberalisation outcomes from tariff cuts in the "conditional applied rates scenario" compared to the "initial applied rates scenario" in selected countries. It shows that for the EU the difference in welfare estimates between the scenarios is small. This finding is a result of the EU's bound rates equalling its applied rates, so that the same tariff cuts are generated in both scenarios. The small difference in welfare effects is, therefore, exclusively triggered through feedback effects from adjustments in other countries. By contrast, in Japan, where important differences between bound and applied rates exist, predicted welfare gains from tariff cuts in the "initial applied rates scenario" significantly exceed the predictions in the "conditional applied rates scenario".

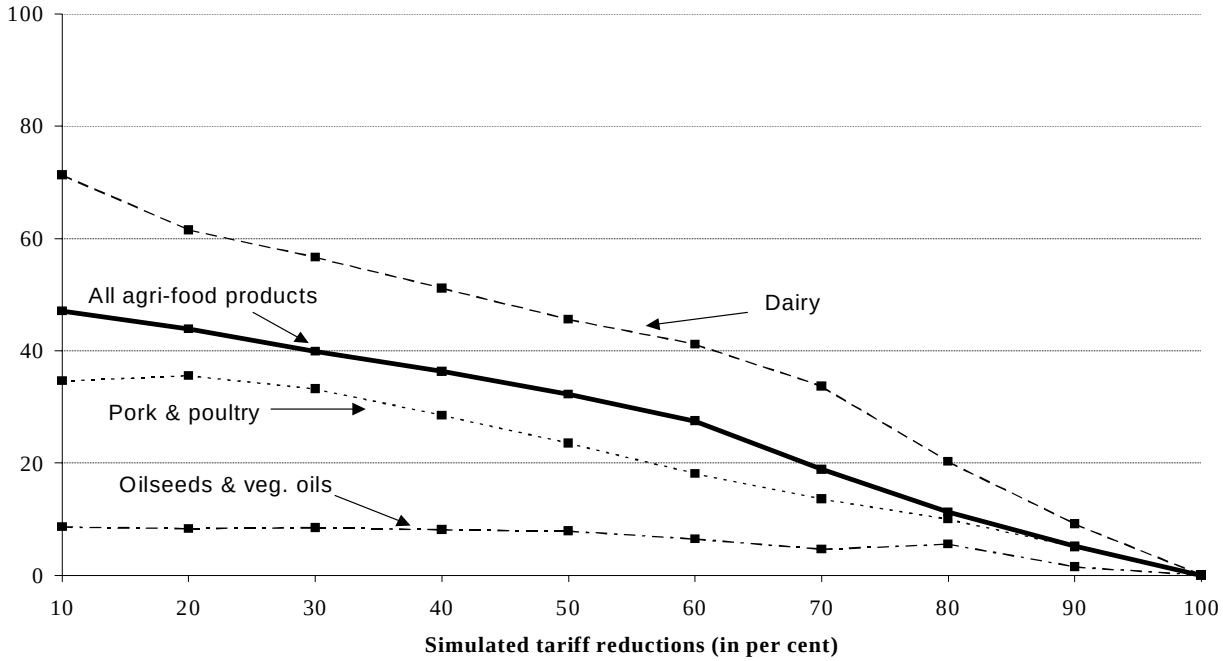
Figure 4: Deviation of predicted welfare gains in selected OECD countries in the "tariffs derived from initial applied rates scenario" from the results of the "conditional applied tariffs scenario" (%)



Note: see text for explanation.
Source: Authors.

A similar dispersion of results is observable across commodities. Figure 5 presents the variation of predicted increases in exports following tariff reductions as modelled in the "conditional applied rates scenario" and the "initial applied rates scenario". It shows that the divergence in predictions is very pronounced for dairy products, while for pork and poultry as well as for oilseeds and vegetable oils, the degree of overestimation of impacts is below average.

Figure 5: Deviation of predicted welfare gains for selected commodities in the "tariffs derived from initial applied rates scenario" from the results of the "conditional applied tariffs scenario" (%)



Note: see text for explanation.
Source: Authors.

The results from the modelling analysis suggest that simulating negotiated cuts in agricultural tariffs solely as a reduction from initial applied tariff rates significantly overestimates the resulting welfare gains and trade effects. The distortion of estimates is particularly pronounced for simulations that assume modest tariff cuts, as well as for countries and commodities where the differences between bound and applied rates are substantial. In order to obtain more realistic predictions on the impact of potential WTO negotiation outcomes, both bound and applied tariffs and their relationship need to be considered.

4. Conclusions

This paper used AMAD data on agri-food tariffs and the GTAP model to assess the effects of tariff reforms under alternative assumptions concerning bound and applied tariff rates. In many countries, bound tariff rates exceed applied rates, so that negotiated tariff cuts that apply to bound rates are not necessarily fully translated into the tariffs that traders face at the border. The analysis in this study investigated how important it is to consider the differences between bound and applied rates when simulating the impact of negotiated tariff cuts.

Several trade policy reform scenarios were evaluated, comparing the outcome of model-runs in which tariff reductions are based on conditional applied rates, which are obtained as the minimum of bound rates after a negotiated tariff cut and initial applied rates, with ones in which the reforms are represented through linear cuts in either initial applied or initial bound tariffs. The results show that consideration of relationships between bound and applied tariff rates in applied economic models can improve impact estimates considerably and seems particularly warranted if modest negotiated tariff cuts are evaluated. Moreover, when applying tariff cuts directly to initial applied rates or initial bound rates,

the scenario analysis reveals that trade and welfare effects tend to be substantially overestimated for countries, such as Japan, and commodities, such as dairy products, for which marked differences between initial bound and applied rates exist.

Even though the results of the analysis differ considerably across scenarios, such that the welfare effects of a 10 per cent tariff cut in the "tariffs derived from initial applied rates scenario" are more than 40 per cent larger than in the "conditional applied tariffs scenario", the findings have to be seen as lower bounds of the actual estimation errors. This qualification is motivated by two features of the analysis in this paper. First, many countries allow imports at tariff rates lower than the MFN-applied rates under preferential trading arrangements. Hence, the difference between bound rates and actually applied import duties is larger than the one between bound and MFN-applied rates, modelled in this paper. Second, in the scenario analysis it was assumed that there was no "unused protection" in the form of bound rates exceeding applied rates in non-OECD countries. Hence, negotiated tariff cuts were assumed to translate directly into improvements of market access in non-OECD countries and into corresponding trade and welfare increases. As in fact bound and applied tariff rates differ in many non-OECD countries, the reported results from the "conditional applied tariffs scenario" overstate the welfare improvements in this scenario and, hence, reduce the difference to the other scenarios.

This study does not show that it is wrong to simulate a reduction in agri-food tariffs as a cut in applied tariff rates. Such investigations seem entirely appropriate, if the underlying question concerns the effects of reducing protection in agri-food markets. However, if the research question is related to how a tariff reduction agreed in WTO trade negotiations will affect countries and sectors, calculating conditional applied tariffs and using these in the analysis seems desirable.

Further research on the subject of unused protection in agri-food markets might first of all focus on determining *ad valorem* equivalents of bound and applied tariffs in non-OECD countries and integrating these into modelling analysis. Enlarging the number of countries that are explicitly considered with their particular bound and applied tariff structures will make it possible to get more realistic results concerning the effects of negotiated cuts in agri-food tariffs. Many developing countries have expressed a certain ambivalence with respect to further steps of trade liberalisation. This stance is in part motivated by disappointed expectations concerning the gains from implementation of the URAA. Quantitative policy advice that takes into account the dichotomy of policy relevant bound tariff rates and trade flow relevant applied rates can contribute to improved estimates of the prospective impacts of trade policy reform and thereby help to avoid inflated expectations concerning the gains from WTO agreements on tariff cuts.

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Annex table 1: Product groups defined by reference to the GTAP Sectoral Classification (GSC2)

Product group	GSC2 number	GSC2 description
Grains	1	Paddy rice
	2	Wheat
	3	Cereal grains not elsewhere covered
	23	Processed rice
Oilseeds & vegetable oils	5	Oilseeds
	21	Vegetable oils and fats
Sugar	6	Sugar cane, sugar beet
	24	Sugar
Fruit & vegetables	4	Vegetables, fruit, nuts
	8	Crops not elsewhere covered
Dairy	11	Raw milk
	22	Dairy products
Beef & sheep	9	Bovine cattle, sheep and goats, horses
	19	Bovine meat products
Pork & poultry	10	Animal products not elsewhere covered
	20	Meat products not elsewhere covered
Fibre & wood	7	Plant-based fibers
	12	Wool, silk-worm cocoons
	13	Forestry
Prepared food	25	Food products not elsewhere covered
Mining, industry & services	14-18	Mining and quarrying
	26-42	Manufacturing (other than food production)
	43-57	Services

Source: Authors.

Annex table 2: Regions defined by reference to the GTAP-5 regions

Region	GTAP code	Country
ANZCERTA	AUS	Australia
	NZL	New Zealand
CAN	CAN	Canada
CSEEC	HUN	Hungary
	POL	Poland
	XCE	Rest of Central European Associates
	TUR	Turkey
EFTA	CHE	Switzerland
	XEF	Iceland, Liechtenstein, Norway
E15	AUT	Austria
	BEL	Belgium
	DNK	Denmark
	FIN	Finland
	FRA	France
	DEU	Germany
	GRC	Greece
	IRL	Ireland
	ITA	Italy
	LUX	Luxembourg
	NLD	Netherlands
	PRT	Portugal
	ESP	Spain
	SWE	Sweden
	GBR	United Kingdom
JPN	JPN	Japan
KOR	KOR	Korea
MEX	MEX	Mexico
USA	USA	United States of America
ROW		All countries/regions not mentioned above

Note: "ANZCERTA": Australia and New Zealand Closer Economic Relations Trade Agreement; "CSEEC": Central and South-Eastern European Countries; "EFTA": European Free Trade Area; "ROW": Rest of World.
Source: Authors.

Annex table 3: Derivation of conditional applied tariffs: examples

	Negotiated cut in initial bound rate	Resulting cut in intial applied tariff								
		Grains	Oilseeds & veg. oils	Sugar	Fruit & Veg.	Dairy	Beef & sheep	Pork & poultry	Fibre & forestry	Prepared food
ANCZERTA	10 %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	30 %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	50 %	0.0	0.0	0.0	0.0	23.5	0.0	0.0	0.0	0.0
	70 %	0.0	33.5	38.8	9.6	54.1	0.0	1.9	0.0	28.6
	90 %	34.9	77.8	79.6	69.9	84.7	57.3	67.3	54.2	76.2
CAN	10 %	7.4	6.0	0.0	0.0	3.2	0.0	0.0	0.0	0.0
	30 %	27.9	26.9	0.0	14.5	24.7	0.0	9.0	5.1	17.7
	50 %	48.5	47.8	23.9	38.9	46.2	5.7	35.0	32.2	41.2
	70 %	69.1	68.7	54.3	63.3	67.7	43.4	61.0	59.3	64.7
	90 %	89.7	89.6	84.8	87.8	89.2	81.1	87.0	86.4	88.2
CSEEC	10 %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	30 %	0.0	0.0	0.0	12.8	11.6	0.0	3.2	0.0	0.0
	50 %	14.5	2.5	24.5	37.7	36.9	27.9	30.9	20.6	19.8
	70 %	48.7	41.5	54.7	62.6	62.1	56.7	58.5	52.3	51.9
	90 %	82.9	80.5	84.9	87.5	87.4	85.6	86.2	84.1	84.0
EFTA	10 %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	30 %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	50 %	0.0	0.0	0.0	0.0	0.0	0.0	7.8	0.0	0.0
	70 %	0.0	27.2	31.9	32.7	24.1	34.8	44.7	0.0	31.3
	90 %	64.6	75.7	77.3	77.6	74.7	78.3	81.6	55.9	77.1
E15	10 %	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	30 %	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
	50 %	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
	70 %	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
	90 %	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0
JPN	10 %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	30 %	13.8	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0
	50 %	38.4	0.0	29.0	0.0	0.0	0.0	0.0	0.0	0.0
	70 %	63.1	36.7	57.4	11.6	0.0	29.0	0.0	26.1	21.2
	90 %	87.7	78.9	85.8	70.5	63.9	76.3	39.2	75.4	73.7
KOR	10 %	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0
	30 %	19.0	0.0	0.0	22.1	23.4	21.1	0.0	0.0	12.4
	50 %	42.1	27.1	0.0	44.3	45.3	43.7	10.7	0.6	37.4
	70 %	65.3	56.3	0.7	66.6	67.2	66.2	46.4	40.4	62.5
	90 %	88.4	85.4	66.9	88.9	89.1	88.7	82.1	80.1	87.5
MEX	10 %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	30 %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	50 %	4.4	0.0	0.0	0.0	20.8	0.0	0.0	0.0	0.0
	70 %	42.6	3.9	0.0	6.0	52.5	25.8	28.4	0.0	0.0
	90 %	80.9	68.0	0.0	68.7	84.2	75.3	76.1	54.2	64.0
USA	10 %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	30 %	0.0	0.0	21.2	0.0	0.0	0.0	0.0	0.0	0.0
	50 %	18.4	0.0	43.7	2.7	0.0	0.0	0.0	10.4	0.0
	70 %	51.0	29.4	66.2	41.6	7.8	17.5	0.0	46.3	25.5
	90 %	83.7	76.5	88.7	80.5	69.3	72.5	57.6	82.1	75.2

Source: Authors.