Comparing market access formulas for US and EU

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Abstract
This paper studies the impacts of several tariff reduction formulas on market access to US and EU agricultural markets. The two main instruments for the definition of market access are tariffs and TRQs. A liberalization of these policy instruments does not automatically improve import opportunities as this depends on the interaction of MFN tariff cuts, and developments of domestic supply and demand. Therefore, in separate simulations the effect of these instruments on different commodity markets is assessed. The simulations are carried out within the framework of a partial-equilibrium, spatial, multi-commodity trade model. The results show that for most commodities only limited new market access opportunities are created. In TRQ regimes stronger MFN tariff reductions as implied by the use of the Swiss approach achieve similar market access results as a combination of TRQ expansion and lowered in-quota tariffs.

Keywords: Market access, tariff formulas, WTO negotiations, partial equilibrium model
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1 Introduction

Within the framework of the Doha Round of multilateral trade negotiations in the World Trade Organization (WTO), agricultural negotiations mainly focus on the three pillars of market access, export competition, and domestic support, even though growing importance is devoted to issues such as social or environmental implications of further liberalization and possible benefits resulting from improved South-South trade. However, one of the most contentious policy areas in the current negotiations is still market access for agricultural commodities. Trade statistics of the WTO show, for example, that in 2000 more than 50% of Asia's exports, 75% of Latin America's exports, and 70% of Africa's exports of tradable goods (manufacturing and agriculture) were directed to Western Europe, North America or Japan (WTO 2001). Therefore, the high-income countries are supposed to offer substantial market access as these countries provide sufficient income and market demand to absorb a wide variety of products produced in developing countries. However, in particular US and EU are also important agricultural producers (and exporters) trying to protect their own agricultural sectors and continue to seek ways to improve their own export opportunities. Though contrary to most of their counterparts in the negotiations, which are developing countries, the US and EU agricultural sectors play only a minor role in both the total national economy and employment and they have substantial financial possibilities (compared to the developing countries) to offset negative liberalization impacts.[1]

Even though the Uruguay Round provided a suitable methodology for future liberalization in market access, topics related to the assessment of tariff profiles, reduction formulas, degree of market liberalization resulting from the Uruguay Round, or provisions for special safeguards in sensitive markets, are all still highly controversial topics and are stumbling blocks in the current negotiations. Furthermore, in the course of preparation for the current round, among others, concerns about preference erosions, the legitimate protection of domestic agricultural sectors ("sensitive products"), and tariff

[1] Even though in both the US and EU recent agricultural policy reforms have been made with the objective to strengthen budget discipline in the agricultural sector.

rate quota (TRQ) implementation issues were addressed. In addition, proposals on broader market access issues have been submitted that address questions of food safety, consumer information and labeling, food quality, and geographical indications (WTO 2004a). Some of these increasing concerns regarding non-tariff issues were accounted for already in the Uruguay Round by the negotiation of new agreements (e.g. the SPS Agreement[2]) and clarification of existing ones (e.g. TBT Agreement[3], Safeguard Agreement).

The relevance of the market access topic and the number of different aspects raised a myriad of research studies that focus on methodological questions, country- or commodity-specific issues, or simulation scenarios for the impact analysis of different framework proposals. Therefore, we will restrict ourselves to a review of those studies relevant for background information and alignment of the objectives of the present paper. The evaluation of improvements in market access via tariff reductions negotiated in the Uruguay Round and the appropriate aggregation across tariff lines has raised attention by a number of researchers, where Bureau et al. 2000, and Bureau and Salvatici (various years) focus mainly on the tariff profile assessment by a theory consistent tariff aggregation index (Trade Restrictiveness Index) applied to bound tariff rates. Other studies employ more simple aggregation methodologies (Gibson et al. 2001, WTO various years) or argue that a tariff profile comparison based on bound tariffs is misleading and should be done by using applied tariffs (Mastrostefano 2003) and include as many preference agreements as possible in order to reflect a realistic picture of the tariff landscape (Chevassus-Lozza 2003, Gallezot 2003). Furthermore, the evaluation of future developments under different reduction formula proposals received significant attention with the emphasis on both the analysis of tariff formula proposals already on the table (Bureau and Salvatici 2003 and 2004, Martin et al. 2003, Francois and Martin 2003, Francois et al. 2005, Brockmeier et al. 2005) and the development of new or modified formulas as done by Konandreas (2003) or Francois et al. (2005). With the focus on tariff rate quotas, literature by de Gorter (2000), IATRC (2001), Abbott (2002), de Gorter et al. (2003), Moennich (2003), highlight a second issue relevant in the market access

[2] Agreement on the Application of Sanitary and Phytosanitary Measures
[3] Agreement on Technical Barriers to Trade

negotiations as this instrument, introduced in the Uruguay Round, has definitely not provided the new trade opportunities as expected (Moennich 2001, Abott 2002). The recent literature on the analysis of full framework proposals is impressive and can be best methodologically categorized by country and commodity coverage, implementation of policy instruments, and simulation horizon. Each is very distinct across all modeling systems. Hence, a classification of the literature in research work using econometric tools (FAPRI 2002, Fontagne 2004), general equilibrium models (Francois et al. 2003, Mensbrugghe and Beghin 2004), or partial equilibrium frameworks (Abler et al. 2001, OECD 2002, Wieck et al. 2003) is useful.

The contribution of this paper is the modeling of tariff reduction scenarios within an applied modeling system for two of the key players in the WTO negotiations, the US and EU. Focusing on tariffs and TRQs, the two main instruments for defining market access, this paper will assess separately the contribution of these two types of trade distortions rather than modeling the impact of a full negotiation proposal that covers all three pillars of the negotiations. The advantage of this instrument-specific analysis is that a better quantification of the impact of key policies in terms of trade flow and price development can be provided.

The analysis is embedded in the framework of the CAPRI model, a large-scale comparative-static, partial equilibrium modeling system that covers world trade within a spatial multi commodity module. Due to the spatial outlay of the model, it is well suited for the research questions as bilateral trade flows allow implementation of all important trade policy instruments, including bilaterally allocated TRQs and preferential trade agreements. Given that most of the current impact analyses are conducted within CGE frameworks[4], a further contribution of this paper is the extension of the research literature by an analysis that is conducted with a partial equilibrium modeling system.

The remainder of the paper is organized as follows: in the next section, background information on developments of agricultural market access will be provided. The third chapter deals with options for market liberalization and the reductions

[4] And here mainly with different versions of the GTAP model (see Hertel 1997).

proposals. Afterwards, simulation design, model layout and results of the simulation exercise will be given. Finally, in the last chapter, we summarize and conclude.

2 Development of market access

Global trade volumes increase steadily over time with international markets being increasingly integrated. In general, countries benefit from these trade growth in terms of increased incomes, a greater variety of products provided to consumers, and lower production costs and prices by concentration of production in areas with comparative advantages. Trade agreements, whether bi- or multilateral, contribute to this development via the increase of market integration between parties and herewith lowered transaction costs for the exchange of goods. The participation of a country in international trade depends on a number of factors. Additionally, having the opportunity to start trade relations with other nations by opening markets, or having historical trade relations, comparative advantages, domestic policies, or economic possibilities all matter and contribute significantly to trade relations between countries. However, open markets or reduced trade barriers might not automatically increase the market shares of export willing (developing) countries as infrastructure, technological skills, and handling capacities to take advantage of market opportunities must also be available. These limitations are especially relevant for a number of low income countries where the lack of knowledge and infrastructure adds to already low participation in trade. This lack of knowledge even further decreases trade participation in cases where additional barriers outside the WTO framework are set up by specific industries or for certain products in order to ensure product traceability or quality labeling.

Besides this general prospect of trade participation, there are several reasons why countries restrict, or completely deny, access to their markets. First of all, considerations of national self-sufficiency might contribute to countries restricting or denying access to their markets. Also, the objective to protect certain agricultural sectors from external competition might result in less or no openness of domestic markets. The degree of market access can be regulated by a country through the use of different trade policy instruments such as tariffs, TRQs, or non-tariff trade barriers under which all types of trade management instruments (e.g. state trading enterprises; regional monopolies;

possibility to implement special safeguards, antidumping rules, or countervailing duties) and sanitary, phytosanitary, or technical barriers can be accounted for (Gibson et al. 2001, Bureau and Salvatici 2003). However, when countries try to subsidize or protect their industries from foreign competitions, market distortions arise and lower trade benefits for all participating countries result.

What development took place toward more open markets?

Though the Uruguay Round agreement required all members to reduce their tariffs on average by 36%, significant flexibility in the allocation of the tariff cuts across commodities was allowed. This discretion was especially exploited by developed members who implemented the tariff reductions in a way that the average 36% cut was met with only minimal reductions in politically sensitive tariffs. In doing so, the obligation to convert non-tariff measures into tariffs ("tariffication") left a lot of leeway to the members. In addition, members can have their tariffs classified under thousands of different tariff lines.[5] These developments led to very distinct tariff profiles of WTO members in terms of tariff dispersion and tariff peaks across commodities. Therefore, according to their tariff profiles and priorities, members prefer different formulas for future tariff cuts.

However, aside from these rather limited developments from the reduction commitments of the Uruguay Round, one must note that there is a certain controversy about the *actual* average tariff protection and how meaningful the results about market access developments are. In a comparison of tariff profiles and average tariff protection rates, several studies come to very different results.[6] The critique, mainly raised by the EU, centers around the point that all of these measurements are based only on bound tariffs and not the rates actually applied[7] and do not take into account the preferential access agreements that are in place for some countries and commodities. A second point

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[5] This brought for example Bureau and Salvatici (2003) to the conclusion that tariffs should be generally defined on a HS-6 digit level.

[6] For applied methodology, detailed comparisons of country and commodity averages see Gibson et al. 2001, Galletzot 2003, Mastrostefano 2003, Bureau and Salvatici 2003.

[7] The current practice of some countries to use continuously applied tariffs that deviate from the bound ones, is a fact that is repeatedly criticized by the Trade Policy Review Body (TPR) of the WTO as it makes the trade policy of a country less predictable and transparent for other countries (see e.g. Chairperson's concluding remarks on the TPR to Turkey 2003, Belize and Suriname 2004, Brazil 2004).

in this controversy focuses on methodological questions related to the construction of these national averages (simple aggregation, weighting of tariff lines with some factor). Subsumed in this discussion is the question of how to convert specific components of the tariff lines into ad-valorem values.

Similar findings, with respect to the limited liberalization impact of tariff cuts, also apply to the newly introduced TRQs. The latter were introduced in the Uruguay Round in order to ensure a minimum access when the process of tariffication led to prohibitive tariff levels ("minimum access quota") or when existing preferential access should be maintained under the new system ("current access quota"). However, the designated import quantities under the low in-quota tariff often only represent a very small percentage of domestic consumption by themselves. In many cases the realized imports do not even exhaust these TRQ quantities (Josling and Tangermann 1999, Abott 2002). Over-quota tariffs are often set at a prohibitive level, effectively shielding the respective market from any foreign competition.

Hence, all in all, only very few new export opportunities to markets of the high-income countries have been created by the outcomes of the Uruguay Round (IATRC 1997, Bureau et al. 2000, Diakosavvas 2001, OXFAM 2002) and consequently, export oriented developing countries link overall success of the Doha Round to visible progress in the area of market access.[8]

3 Liberalization options for tariff and TRQ regimes

As mentioned before, the two main instruments for the definition of market access are tariffs[9] and TRQs. However, a liberalization of these policy instruments does not automatically improve import opportunities as market access depends on the relationship of domestic to world market price and imposed tariff duty. Therefore, in the following section we have separate discussions for tariffs and TRQs on what specific elements constrain imports and how a reform of those elements affects market access.

[8] However, one should note that for some countries and trade analysts the establishment of rules and disciplines for agricultural trade is *per se* a positive outcome of the Uruguay round and rather see "real" market access opportunities as a second step for future negotiations (Diakosavvas 2001).
[9] Tariffs refer always to the, in WTO terminology called, most-favored-nation tariffs (MFN).

3.1.1 The impact of market liberalization

In markets dominated by tariffs

In the case where border protection is realized on the basis of a tariff regime, two different situations might dominate a market:

1) The tariff is prohibitive, i.e. it leads to an import price which is equal or higher than the domestic market clearing price. All market demand is hence satisfied by domestic supply and no imports occur in the initial situation.
2) The tariff is set in a way that import prices are somewhere below the market equilibrium price without trade, so that market clearing includes imports.

Given these two initial market situations, in the first case, new market access compared to the reference situation only arises if the future tariff cut is strong enough to reduce import prices so that they undercut the autarky equilibrium price. This would lead to a substitution of domestically produced goods by imported ones. In the second case, each tariff cut will effectively increase market access as imports are directly linked to market demand. However, the reaction in each market depends on the shape of demand and supply curves and substitution elasticities between imported and domestically produced goods. Note that tariffs might be defined on a specific or ad-valorem basis or as a composite of these two types.

In markets dominated by TRQ regimes

In the case where market access is restricted by a TRQ regime, three elements affect on the liberalization scenario.[10] A TRQ is defined by a low in-quota tariff that is applied to a certain quantity ("quota") and an over-quota tariff. All imports above this quota are subject to the over-quota tariff which is normally the standard MFN tariff. Hence, depending on the initial import and demand situation in a market regulated by a TRQ, the following options for liberalization can be distinguished:

1) Lowering the over-quota tariff (MFN):
    a) If no MFN imports in the initial situation (i.e. the quota is underfilled or binding): As in the case of a tariff regime the size of the MFN tariff reduction determines if

[10] A broader on liberalization options for TRQ regimes can be found in Skully (2001).

imports can become competitive in the market. Therefore, after the tariff cut, the resulting import price must undercut the existing autarky market price to reduce supply, increase demand and allow imports.

b) Over-quota imports in the reference situation (i.e. the quota is filled): All tariff reductions provide further market access opportunities.

2) Increasing the quota size:

a) If over-quota imports occur in the reference situation: Allows more imports to enter under the preferential in-quota tariff, i.e. the quota rent generated by the TRQ regime increases.[11] Depending on the size of the quota increase (and demand and supply elasticities), the quota might become underfilled or binding. If the increased quota is underfilled, the in-quota tariff becomes the restricting instrument of additional market access.

b) If the quota is binding in the initial situation: The increase of the quota size allows more imports to enter the market compared to the reference situation and leads to a decrease of the related quota-rent. If the new quota is underfilled, the in-quota tariff becomes the binding instrument as in 2a).

3) Lowering in-quota tariffs with no changes in quota size or over-quota tariff:

a) If the quota is underfilled: Increase in market access; however only for those countries that qualify for the preferential quota access. This implies a decrease of the tariff revenues for the tariff imposing country and an increase in quota rent if the quota is binding.

One should note that several problems are related to the granting of the preferential access within TRQ regimes as the allocation of import certificates often do not occur on a competitive basis but within intransparent procedures or "historical" trade relations leading to trade bias and the infringement of the most-favored-nation principle of the WTO.

[11] Note that we abstain from a discussion of problems related to the generation and allocation of quota rents. Further discussion on that can be found in de Gorter (2000), Skully (2001), and Moennich (2003).

3.1.2 Specific formulas for further trade liberalization

In the following, several formulas proposed for the specification of the tariff liberalization will be presented and discussed. The choice of the formula itself is very important because, depending on the formula, it may or may not imply strong liberalization commitments for specific markets. Consequently, some countries may defend or promote certain tariff liberalization scenarios in line with their strategic import and export interests.

At the moment, two tariff formulas which are supported by a broader range of members and a number of other formulas which are proposed by single members (e.g. proposals from India, Japan, South Korea)[12] are on the table. The two broadly supported ones include: the previously used Uruguay Round formula (as preferred by e.g. the EU, Norway, Switzerland, South Asian Countries, Venezuela, Mauritius) and the Swiss formula (lobbied for by e.g. US, CARINS Group countries). A third tariff cut approach was proposed by the first modality draft of the chairman of the special session of the Committee on Agriculture. This approach relies on a three tier system of tariff cuts dependent on the initial tariff level (WTO 2003b). Given the long deadlock in the negotiations, several other formulas have been proposed that might overcome some of the shortcomings related to the ones presented above or could serve as a compromise. Here, we rely on the proposals by Konandreas (2003) and Francois et al. (2005) as they present suitable alternatives to the tiered approach. In the following, specific formula design and characteristics will be discussed. All tariff cuts relate to reductions of MFN bound tariffs.

A linear tariff cut is realized within the *Uruguay Round formula* where each single tariff line *i* had to be cut by a minimum of a = 15% and overall a (simple average) tariff reduction of 36% must have been met (WTO 2003a and Konandreas 2003):

$t_{1i} = (1 - a_i)t_{0i}$ for all i = 1, …, I,

subject to $a_i \geq 0.15$ (15%) and $\frac{1}{I}\sum_i a_i = 0.36$ (36%) where t_0 and t_1 indicate the initial and final tariff respectively. If it is applied on a line-by-line basis, it provides a progressive tariff cut where higher tariffs are slightly stronger cut than lower ones (in

[12] For further details see WTO (2003a).

absolute values). However, as the parameter *a* is independent of the initial tariff rate, no special attention to peak tariffs or the reduction of tariff dispersion is given. Furthermore, if implemented as in the Uruguay Round, the high level of flexibility in the assignment of the tariffs do not meet the expectations of a number of members regarding significant improvements in market access. A major disadvantage of that approach is the fact that it creates an incentive to distribute larger cuts to less important tariff lines, favoring countries featuring a highly diversified tariff classification system that have the necessary resources to analyze impacts of different tariff profiles in line with the proposal. Further on, an ex-ante analysis of the outcome is almost impossible given the room to maneuver.

The problem of remaining tariff peaks is exactly what is overcome by the *Swiss formula* as it is reduces high tariffs much more than lower ones and thereby compresses the overall national tariff profile. The specification of the *a*-coefficient is the crucial element in this formula. A low value of *a* implies higher tariffs cuts than a lower value. With the choice of the coefficient *a*, an upper limit is implicitly assigned to all resulting tariffs making the formula rather inflexible to accommodate certain members' concerns about the protection of 'sensitive' commodities. However, it would be possible to differentiate the *a*-coefficient for members or product categories.

$$t_{1i} = \frac{a t_{0i}}{(a + t_{0i})} \quad \text{for all i = 1, …, I,}$$

Given the very adverse impacts of these two approaches, the WTO draft paper for the agricultural modalities paper contains a compromise formula (*Harbinson formula*) that has the following outset (WTO 2003b):

For $t_{1i} \geq 0.9$: $a_i \geq 0.45$ and $\frac{1}{I}\sum_i a_i = 0.6$

For $0.15 \geq t_{1i} > 0.9$: $a_i \geq 0.35$ and $\frac{1}{I}\sum_i a_i = 0.5$

For $t_{1i} < 0.15$: $a_i \geq 0.25$ and $\frac{1}{I}\sum_i a_i = 0.4$

The formula is leading to a certain reduction of tariff peaks as higher tariffs are cut steeper, but it also provides some flexibility in the composition of the average tariff reduction as long as the minimum cut is met for each product line.

Konandreas (2003) developed his formula with the three objectives of reducing average tariff levels and tariff dispersion, while, in relative terms, keeping some equivalence in the tariff cuts. Starting from the evaluation of the tariff distribution in the base year, he yields the following formula (named "*Panoply*"):

$$t_{1i} = (1-\alpha)m_0 + (1-\beta)(t_{0i} - m_0) \qquad \text{for all i = 1, …, I}$$

Where m_0 is the initial un-weighted average tariff level and α represents the reduction of the same, and β indicates the reduction in the standard deviation of the tariff dispersion. In order to have the new tariff distribution be less dispersed than the initial one, the additional restriction of $\beta > \alpha$ must hold, and $t_{1i} \leq t_{0i}$ should be imposed, ensuring that no final tariff is larger than the initial one.[13]

Francois et al. (2005) propose a *modification of the Swiss formula* that leads to more flexibility of the function so that different preferences, tariff maxima, and rates of reduction can be accommodated under it. This is done by the introduction of an additional (tariff independent) parameter *b* that further shapes the relationship between the initial and final tariff.

$$t_{1i} = \frac{a\frac{t_{0i}}{b}}{a + \frac{t_{0i}}{b}} \qquad \text{for all i = 1, …, I,}$$

Similar to the Konandreas proposal, an additional restriction on *b* must be imposed ($b \geq 1$) to ensure that no tariff values increase. A certain drawback remains in the proposal as one of the (controversial) key features of the Swiss formula is retained with

[13] This restriction results from the fact that small tariffs will be increased by the first term of the formula. A problem that is especially relevant for strongly dispersed tariff profiles. However, the imposing of the restriction means that for the final implementation, the targeted tariff reduction in level and dispersion will not be met exactly. Given these imprecise definition of the final reduction rate and the fact that depending on the tariff profile this might result not only in a "slightly smaller α or greater β" but a deviation from the objective by up to 10%, it is rather improbable that this though appealing formula will find its way into the negotiations.

the fact that all final tariffs cannot exceed the parameter *a*. However, if the parameter *b* is subject to national interpretation it allows for a scope of trade offs between high and low tariffs in the country specific tariff profile so that the overall reduction in simple or weighted tariff average is met.

Nothing has been said until now about future options for the definition of the TRQs. Within this instrument, points for reform lie in the change of the in- or out-of quota (MFN) tariffs or the quota size. With respect to the tariff element, it depends very much on the outcome of the tariff reduction formula. Depending on the reduction factors, it might be that some out-of quota tariffs undercut the in-quota tariffs and therefore eliminate the need for quotas at all. An increase of the quota volume, as proposed in the WTO compromise proposal, would provide immediate additional market access opportunities within the limitations that already apply to the current TRQ management[14].

Finally, in the August 2004 framework of the Doha negotiations (WTO 2004b), consensus on the use of a "tiered and progressive" tariff reduction formula was reached, i.e. some formula similar to the one proposed in the draft modalities paper. Though an agreement on the broad objective was found, all details related to level and number of tiers, type of reduction in every tier, and the questions of upper tariff ceilings or exemptions for sensitive products should be introduced, were left for further negotiation. Even though in line with past implementation provisions, further drawback for effective market liberalization lie in the decision to start all reductions from bound rates. Due to "water" in some tariff lines, i.e. applied tariffs being much lower than bound ones, it is not unrealistic to assume that regardless of the agreed tariff reduction formula, some small new access opportunities evolve in some markets as the gap between bound and applied tariffs might still hold.[15]

[14] And that are considered to be so severe that some analysts call for a complete phasing-out of this instrument (Abott 2002).
[15] A problem that would be addressed by a proposal of Josling and Rae (2004) in reducing all bound tariffs to applied ones.

4 Evidence on the impact of different tariff reductions on US and EU markets

4.1 Scenario layout

In order to analyze how the different proposed tariff reduction formulas improve market access to the US and EU markets and how their markets are affected by this in terms of price and production development, several simulations with an applied modeling system will be done. All tariff changes will only be applied to US and EU tariff profiles. The specific implementation will be the following:

1) **Uruguay round tariff cut**: MFN tariffs for each tariff line will be cut by 36%, a rather naïve implementation of the proposal, but here, the only feasible one.
2) **Swiss formula**: MFN tariffs for each tariff line will be cut according to the Swiss formula with the a-coefficient set to 25 (as done by Pohl Nielsen et al. 2004, Konandreas 2004).
3) **Harbinson formula (WTO draft proposal)**: MFN tariffs falling in the highest tier will be cut by 60%; in the second tier by 50%, and in the lowest tier by 40%. The same rule is applied for MFN tariffs defined in specific duties. In order to compare the specific tariff with the ad valorem ones, they were converted to ad valorem equivalents (AVE).[16]
4) **Konandreas proposal ("Panoply")**: MFN tariffs in each tariff line will be cut by 36% while jointly reducing the MFN tariff dispersion by 60% (as proposed by the author).
5) **Modified Swiss formula**: MFN tariffs in each tariff line will be cut with the a-coefficient set to 25, and the b-coefficient set to 2 (as done in Francois et al. 2005).

[16] Given the data in the model, we made these conversions by using the average import prices in the country as the weight. The average import price was calculated as an aggregation of the trade flows from the different origins weighted by their respective import prices. However, note that this point had been a critical issue for several months in the negotiation as depending on data source and methodology, considerable differences in the resulting import prices arise (see WTO 2004c).

These tariff cuts also apply to the over-quota (MFN) tariffs of the TRQs. Simulation year for all scenarios is 2009 and all scenarios will be compared against a counterfactual scenario where the commitments made within the Uruguay Round are extended to the year 2009.

4.2 Model description

The simulations will be done with the market module of the CAPRI model, a spatial multi-commodity model. The CAPRI model (*C*ommon *A*gricultural *P*olicy *R*egional *I*mpact model) as a whole was originally designed as a regional simulation and forecasting tool for domestic policy scenarios of the EU, but experienced several methodological extensions over time: the extension towards a detailed, spatial, gross-trade, stand-alone market component for international trade analysis; development of an environmental module covering a complete range of activity indicators related to nutrient and water balances and global warming potentials; and the integration of spatial bio-physical regional information into the EU supply framework of the model for better analysis of land-use impacts and related multifunctional indicators. Development and maintenance of the model is coordinated by the Institute of Agricultural Policy, Bonn University, and is done within a network of research groups from several EU universities. Funding for this project results mainly from consecutive research programs of the European Commission.

General model layout[17]

The market module breaks the world down the world into 12 country aggregates[18], each featuring a system of functions for supply, human consumption, feed, and processing demand. The parameters of these functions are derived from elasticities of other studies and modeling systems and calibrated to projected quantities and prices in the simulation year, where the choice of the functional form (normalized quadratic for supply and feed,

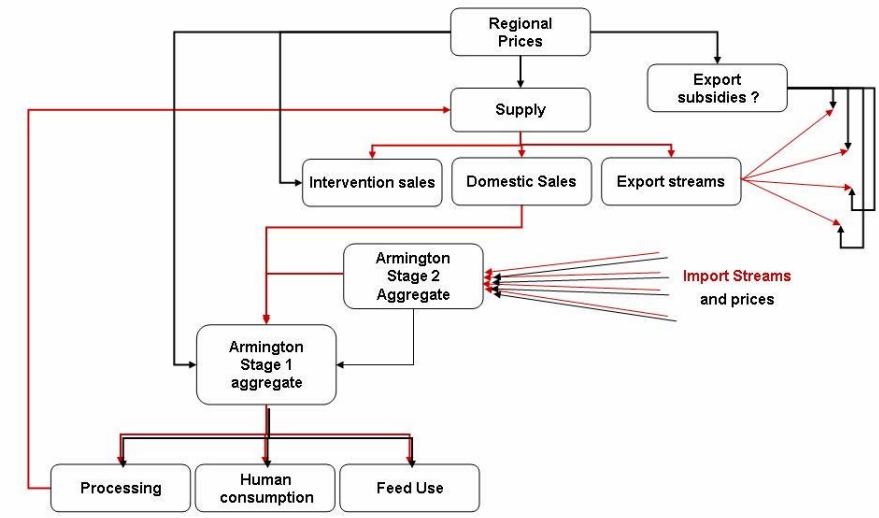
[17] A detailed model description can be found in Britz et al. (2003) and on the model website http://www.agp.uni-bonn.de/agpo/rsrch/capri/capri_e.htm.

[18] EU, (New) East European EU Countries, Mediterranean countries, US, Canada, Australia & New Zealand, Developing countries of the CAIRNS group, High tariff traders (as Japan), India, China, ACP countries, Rest of the World (e.g. Russia, Ukraine)

Generalized Leontief Expenditure function for human consumption) and further restrictions (homogeneity of degree zero in prices, symmetry, correct curvature) ensure regularity. Accordingly, the system allows for the calculation of welfare changes for producers, consumers, processing industry and public sector. Several accounting identities, for the closure of the commodity balances as well as equations for the identification of the respective prices complete the (squared) equation system of the market module. For the EU, the modeling system additionally features the processing stage of dairy products with explicit restriction on fat and protein balances incorporated in a normalized quadratic profit function framework. Based on a similar functional framework, furthermore, the processing of oilseeds into cakes and oils is represented for the EU.

Besides the multi-commodity definition of the market model, the model has a separate supply component which allows very detailed modeling of production activities (circa 50 activities) and policy of the EU on a regional base. The resulting EU supply quantities are aggregated and used in the spatial market module. These two model components are iteratively coupled to allow for a feasible computation of the model.

Graph 2. Graphical presentation for a regional market in the spatial market model



Source: Own presentation

The Armington assumption (Armington 1969) drives the composition of demand from domestic sales and different import origins depending on price relations and determines bilateral trade flows between all country aggregates. The model comprises a two stage Armington system: On the top level, the composition of total demand from imports and domestic sales is determined, as a function of the relation between internal market price and the average import price. The lower stage determines the import shares from different origins. The substitution elasticity on the top level stage is smaller then for the second one, i.e. we assume that consumers will be less responsive regarding substitution between domestic and imported goods compared to changes in between imported goods. Product markets for different regions are hence directly linked by import flows and prices. Accordingly, no uniform world market price is found in the system.

The model provides a standard welfare analysis that composes the welfare measure into the sum of i) agricultural income (welfare gain of producers), ii) equivalent variation (welfare gain of consumers), and iii) profits by processing activities (welfare gain of the agro-industry), and subtracts the budgetary expenses (welfare loss from taxpayers). Given the partial equilibrium nature of the model the welfare measure accounts only for changes resulting from the agricultural sector. But in order to close the demand system of the respective country aggregates, the consumption of "all other goods" is included in the market model, though its price is held fixed during simulations.

Trade policy representation

Due to the Armington approach, policy instruments in the market module can be modeled on a bilateral basis. The policy representation for the country aggregates comprise the following elements: Bilateral tariffs (ad-valorem and specific), Producer/Consumer Subsidy Equivalent price wedges (PSE/CSE), and important bilateral agreements[19] as well as globally or bilaterally allocated TRQs for the EU and the 12 country aggregates. For the EU, intervention sales and subsidized exports under WTO commitment restrictions are explicitly modeled.[20]

[19] Including Double-Zero Agreements with Central and Eastern European Countries, preferential aggrements of the EU with the ACP countries, and certain bilateral sugar quotas.
[20] Further details can be found in Junker et al. (2003).

Base year data (quantities, trade flows, prices) relating to the non-EU regions is based on data provided by the FAO and the @2030 modeling system (Bruinsma 2003). For the EU, all base year data result from EUROSTAT. Data for ad valorem and specific tariffs (MFN and preferential tariffs) as well as TRQ information stem from several sources: Information on tariffs and TRQs for US and EU is found in the legal texts (WTO 2004d, WTO 2005), for other OECD countries they mainly come from the AGLINK Model; and for non-OECD countries, national data originate from the AMAD data base[21] which were manipulated to get to the actual country aggregation used in the model. The model works with commodities aggregated to HS 2-3 level. Commodity coverage and base year tariff profile can be found in Appendix 7.1 and 7.2. All tariffs are applied duties and are aggregated to the HS level by simply averaging over the respective tariff lines.

Reference run specification

The base year data of the market module is shifted to the year 2009 based on supply and demand projections from the @2030 framework of FAO's global perspective unit. The price framework relies on trend forecasted long-term time series for world market prices of major raw and processed agricultural products. These trends were compared and partially revised to medium term forecasts by FAPRI and the EU Commission (FAPRI 2005, EU Commission 2005). Developments of domestic prices are based on these world market price developments using domestic policy definitions. Inflation is set to 1.9 % p.a.

The domestic policy representation in the EU covers all regulations related to the CAP 2003 reform proposal for the implementation of decoupled payments, as well as provision for milk and sugar quotas. For the US, the domestic policy representation is not as detailed since it is based on the calculation of activity related PSE/CSE estimates from the OECD. For both countries, the trade policy is implemented as agreed in the Uruguay Round and extended unchanged until the year 2009. Additionally, for the EU, export subsidies as notified to the WTO, are in place.

[21] Agricultural Market Access Database, see http://www.amad.org/.

4.3 Results

4.3.1 Simulation results for the different tariff approaches

The presentation of results in this section will cover three issues: First, an overview on tariff profiles and relevant policy instruments under the different proposals will be presented and afterwards the development of import shares and lastly the resulting price pressure will be discussed.

Tariff profiles and binding policy instruments

The analysis of tariff profiles and changes in the binding policy instruments, due to the different tariff liberalization scenarios, will be part of this section. In Table 1 the tariff profiles are presented. For the US, we find an average tariff level of 15% ad valorem in the reference situation with a variance in the tariffs of around 700. Contrary to this, for the EU we find both a much higher average tariff (72% ad valorem equivalent) as well as much stronger dispersion in the tariff profile. In the reference run, the binding instruments are mostly MFN tariffs in the case of the US whereas in the EU, most markets are regulated by TRQ regimes. However, most of these European TRQs are not filled; hence the in-quota tariff is the relevant instrument. Contrary to this, the US holds that when a quota is present, it is mainly filled (binding) or in some cases even over-quota imports can be observed.

The analysis of the different tariff reduction scenarios reveals that for both countries the modified Swiss formula, as proposed by Francois et al., leads to the lowest average tariffs whereby the EU reduces its tariffs in a much stronger proportion than the US. The opposite to this peak-reducing formula is realized with a tariff reduction according to the Uruguay approach where average tariffs remain more than roughly twice as high for both countries as compared to the Swiss formula. The Harbinson and Konandreas proposals ("Panoply") result in tariff levels that are somewhere in between these two extreme cases and could serve as compromises. Except for the Uruguay formula approach, all formulas reduce significantly the dispersion in the tariff profiles. As mentioned in Section 3.1.2, the Panoply formula leads in some cases to very limited or almost no tariff reductions. This must be certainly seen as a disadvantage of this formula.

Table 2 and Table 3 contain an overview on the relevant policy instruments restricting imports in the different markets. In Appendix 7.3 a detailed description of the tariff duties in the reference run can be found.

Table 1 Tariff profiles under the different scenarios

	United States			European Union		
	Average tariff (%)	Variance	Standard Deviation	Average tariff (%)	Variance	Standard Deviation
Reference	15.63	695.78	26.38	72.42	1781.43	42.21
Uruguay	10.00	284.99	16.88	46.35	729.68	27.01
Swiss	6.10	39.76	6.31	17.30	13.14	3.63
Harbinson	6.88	129.15	11.36	33.43	283.48	16.84
Panoply	8.49	131.45	11.47	45.49	333.39	18.26
Mod. Swiss	4.15	24.78	4.98	13.63	15.32	3.92

Note: In order to calculate the tariff profile, all specific tariffs were converted to ad valorem equivalents using the average import prices in the country as the weight.
Source: CAPRI Modeling system.

For the US, we find an average tariff level of 15% ad valorem in the reference situation with a variance in the tariffs of around 700. Contrary to this, for the EU we find both a much higher average tariff (72% ad valorem equivalent) as well as much stronger dispersion in the tariff profile. In the reference run, the binding instruments are mostly MFN tariffs in the case of the US whereas in the EU, most markets are regulated by TRQ regimes. However, most of these European TRQs are not filled; hence the in-quota tariff is the relevant instrument. Contrary to this, the US holds that when a quota is present, it is mainly filled (binding) or in some cases even over-quota imports can be observed.

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or almost no tariff reductions. This must be certainly seen as a disadvantage of this formula.

Table 2 Binding policy instruments for the US

	United States					
	Reference	**Uruguay**	**Swiss**	**Harbinson**	**Panoply**	**Mod. Swiss**
Wheat	MFN	MFN	MFN	MFN	MFN	MFN
Barley	MFN	MFN	MFN	MFN	MFN	MFN
Maize	MFN	MFN	MFN	MFN	MFN	MFN
Rice	MFN	MFN	MFN	MFN	MFN	MFN
Oilseeds/cakes/ oils	MFN	MFN	MFN	MFN	MFN	MFN
Sugar	binding quota	binding quota	binding quota	binding quota	binding quota	binding quota
Beef	over-quota t.	over-quota t.	over-quota t.	over-quota t.	over-quota t.	over-quota t.
Pork meat	MFN	MFN	MFN	MFN	MFN	MFN
Poultry meat	MFN	MFN	MFN	MFN	MFN	MFN
Cheese	binding quota	binding quota	binding quota	binding quota	binding quota	binding quota
Butter and cream	in-quota t.	in-quota t.	in-quota t.	in-quota t.	in-quota t.	in-quota t.
Skimmed milk powder	binding quota	binding quota	binding quota	binding quota	binding quota	binding quota

Source: CAPRI Modeling system.

Even though all formulas lead to a strong reduction in average tariffs and dispersion, the above tables on the overview of the binding policy instruments shows that for most formulas and commodities only few (EU) or no (US) changes in the design of the border protection arise. All markets that are driven by in-quota tariffs or show binding TRQs are not affected by MFN tariff cuts. Only markets with either over-quota imports or imports under a "normal" MFN regime are suspect to further market liberalization. But as we will see later on, overall, the impact of tariff cuts is rather small. This is a result of the fact that these "MFN markets", especially in the US, already show very low MFN rates (0.2%-5% on average). This implies that regardless of the reduction formula additional tariff cuts in these MFN tariffs will be rather small. Prices in these markets are already closely linked to world prices, and little change in import demand can be expected under the given production conditions.[22]

[22] Subsequent simulations will support this argumentation. In order to increase foreign competition in these markets, distortion arising from domestic support should be addressed.

Table 3 Binding policy scenarios for the EU

	European Union					
	Reference	**Uruguay**	**Swiss**	**Harbinson**	**Panoply**	**Mod. Swiss**
Wheat	in-quota t.	in-quota t.	in-quota t.	in-quota t.	in-quota t.	in-quota t.
Barley	in-quota t.	in-quota t.	in-quota t.	in-quota t.	in-quota t.	in-quota t.
Maize	in-quota t.	in-quota t.	in-quota t.	in-quota t.	in-quota t.	in-quota t.
Rice	over-quota t.	over-quota t.	abolition of quota	over-quota t.	over-quota t.	abolition of quota
Oilseeds/cakes/ oils	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sugar	binding quota	over-quota t.	abolition of quota	over-quota t.	over-quota t.	abolition of quota
Beef	in-quota t.	in-quota t.	in-quota t.	in-quota t.	in-quota t.	in-quota t.
Pork meat	in-quota t.	in-quota t.	abolition of quota	in-quota t.	in-quota t.	abolition of quota
Poultry meat	binding quota	abolition of quota	abolition of quota	abolition of quota	abolition of quota	abolition of quota
Cheese	in-quota t.	in-quota t.	in-quota t.	abolition of quota	in-quota t.	abolition of quota
Butter and cream	in-quota t.	in-quota t.	abolition of quota	in-quota t.	in-quota t.	abolition of quota
Skimmed milk powder	in-quota t.	in-quota t.	abolition of quota	in-quota t.	in-quota t.	abolition of quota

Note: For EU and the butter/cream market, the overall TRQ is not filled whereas the bilaterally allocated TRQ with Australia/New Zealand is filled and binding.
Source: CAPRI Modeling system.

Changes in the border regime for the EU are only found in the two Swiss formula approaches for rice, sugar, pork meat, cheese, butter/cream, and skimmed milk powder. Given the over-proportional tariff cuts of the Swiss formula which especially targets tariff peaks, the results for the EU may explain the strong opposition of the EU to the Swiss approach. In several markets the Swiss formula leads effectively to an abolition of the quota where in-quota tariffs beforehand were applied. This means that at least some of the countries lose preferential access to the European market and now face competition with other export nations from around the world. For the commodity cheese, the Harbinson proposal also has the potential to reduce border protection and allows for a tariff-only regime instead of TRQ mechanisms. On the contrary, the Panoply formula does not contribute much to a change in the layout of the border protection. Note that in the cases of over-quota imports the reduction of the MFN tariffs implies a decrease in quota rents and hence, welfare losses for beneficiaries of the regimes.

Development of imports shares

The development of the imports under the different reform proposals are presented in the following two tables.[23] We can see that in the reference situation, the US has already an import penetration of 10% or more for the products wheat, barley, rice, sugar, beef, whereas for the EU we can find only two products with imports higher than 10%: Sugar and soy bean products. Import penetration is very low in dairy markets for both countries which are considered sensitive and shielded by TRQ regimes featuring very high out-of-quota tariffs.

With respect to the impact of the different tariff liberalization formulas in the US, stronger import increases can be observed only in rice (6-34%) and beef (12-26%) markets. The changes are in both cases triggered by the MFN tariffs, once applied in a tariff-only regime, once as a decrease of the over-quota tariff within a TRQ regime. Independent of the binding tariff instruments, import shares in all other markets are hardly affected with changes in the range of 0.3-2.5%, and decreasing imports shares in poultry and pork markets due to substitution effects with beef demand.

[23] Given the high amount of information available in such a modeling system and the number of simulations performed, a result selection must be done. Therefore, we refrain from the presentation of full market balances and the full set of prices (import, export, and consumer prices) but they are available upon request from the authors.

Table 4 Import shares for the US

	United States					
	Reference	Uruguay	Swiss	Harbinson	Panoply	Mod. Swiss
	Import share	Import share	Import share	Import share	Import share	Import share
Wheat	11.77%	11.91% 1.19%	11.81% 0.39%	12.01% 2.06%	11.77% 0.03%	11.99% 1.88%
Barley	14.67%	14.68% 0.09%	14.68% 0.07%	14.69% 0.13%	14.68% 0.09%	14.70% 0.17%
Maize	0.22%	0.22% 0.26%	0.22% 0.02%	0.22% 0.33%	0.22% -0.06%	0.23% 0.43%
Rice	9.87%	11.16% 13.14%	12.07% 22.33%	12.37% 25.35%	10.53% 6.70%	13.24% 34.21%
Sugar	12.14%	12.19% 0.41%	12.35% 1.70%	12.25% 0.90%	12.24% 0.80%	12.37% 1.88%
Soya	0.52%	0.52% 0.00%	0.52% 0.06%	0.52% 0.01%	0.52% 0.00%	0.52% 0.08%
Beef	10.08%	11.39% 12.96%	12.02% 19.22%	12.43% 23.31%	11.79% 16.93%	12.76% 26.58%
Pork meat	6.40%	6.38% -0.38%	6.37% -0.58%	6.36% -0.72%	6.36% -0.61%	6.36% -0.67%
Poultry	0.02%	0.02% -0.59%	0.02% -0.77%	0.02% -0.97%	0.02% -0.79%	0.02% -1.19%
Cheese	2.66%	2.67% 0.34%	2.67% 0.27%	2.68% 0.57%	2.67% 0.40%	2.68% 0.47%
Butter and cream	1.17%	1.19% 1.53%	1.20% 2.73%	1.20% 2.47%	1.19% 1.83%	1.20% 2.45%
Skimmed milk powder	0.47%	0.47% 0.46%	0.47% 1.37%	0.47% 0.90%	0.47% 0.94%	0.48% 2.39%

Source: CAPRI Modeling system.

For the EU, compared to the reference situation we observe strong and formula independent changes in the import regimes for the commodities rice, sugar, and butter/cream. Poultry meat and skimmed milk powder markets are affected in the Uruguay and Harbinson scenario with changes between 5% and 10% respectively, whereas both Swiss formula scenarios and the Harbinson scenario imply stronger reactions for poultry meat with up to 44% increases. However, in particular for the dairy products and poultry meat, import penetration still remains on a very low level with shares in the range of 0.5-7%.

Table 5 Import shares for the EU

	European Union					
	Reference	Uruguay	Swiss	Harbinson	Panoply	Mod. Swiss
	Import share	Import share	Import share	Import share	Import share	Import share
Wheat	1.80%	1.80% 0.38%	1.81% 0.62%	1.81% 0.60%	1.80% 0.41%	1.81% 0.88%
Barley	0.57%	0.57% 0.09%	0.56% -0.69%	0.57% -0.02%	0.57% 0.05%	0.56% -0.91%
Maize	6.37%	6.33% -0.72%	6.20% -2.75%	6.28% -1.47%	6.31% -1.03%	6.17% -3.17%
Rice	27.75%	34.11% 22.90%	57.19% 106.07%	41.33% 48.93%	37.24% 34.18%	58.73% 111.63%
Sugar	13.43%	18.11% 34.82%	48.07% 257.83%	28.35% 111.02%	22.81% 69.77%	50.10% 272.94%
Soya	94.97%	94.94% -0.03%	94.87% -0.10%	94.91% -0.06%	94.93% -0.05%	94.87% -0.11%
Beef	3.62%	3.62% -0.02%	3.62% -0.11%	3.62% 0.00%	3.62% -0.06%	3.61% -0.20%
Pork meat	0.25%	0.25% 0.16%	0.29% 14.18%	0.25% 0.24%	0.25% 0.15%	0.31% 25.84%
Poultry	0.45%	0.49% 7.84%	0.59% 29.70%	0.55% 20.24%	0.46% 0.41%	0.66% 44.08%
Cheese	0.30%	0.31% 1.66%	0.32% 4.43%	0.31% 3.59%	0.31% 2.84%	0.36% 19.23%
Butter and cream	2.44%	3.61% 47.74%	6.40% 161.99%	4.39% 79.45%	3.79% 54.95%	6.77% 176.91%
Skimmed milk powder	4.83%	5.05% 4.58%	6.42% 32.83%	5.19% 7.44%	5.09% 5.43%	6.90% 42.88%

Note: The import increase for butter/cream results mainly from over-quota imports originating from Australia/New Zealand. This holds for all scenarios, except Swiss and modified Swiss where the quota is abolished.
Source: CAPRI Modeling system.

In general, EU results are in line with the expectations on import reactions within different import regimes. Most cases with stronger reaction imply a regime switch from a binding TRQ to a MFN tariff regime. However, import reaction depends on the steepness of the tariff cuts. As revealed by the tariff details in the appendix, both Swiss approaches lead to much deeper tariff cuts than the Harbinson proposal and this is reflected in the rank of the import reaction due to the different formulas. For those commodities protected by a TRQ regime where the in-quota tariff is the relevant instrument in the reference, we observe only very limited import reactions since in-quota tariffs are not affected by the tariff proposals.

Price development

Given the limited impact of the different formulas on market access, price developments in most markets are very moderate (see Table 6 and Table 7). In particular for the US, most price changes range between 0% and -1%, with somewhat stronger price depression for the two Swiss approaches. The only exceptions are rice where increasing exports, mainly directed towards to the EU, can outweigh the additional imports and lead to producer price increases; and beef, where light market pressure leads to price decreases somewhat more pronounced (in the rage -1.1% to -2.2%).

Table 6 Price developments for the US

	United States					
	Reference	Uruguay	Swiss	Harbinson	Panoply	Mod. Swiss
	Producer price Euro / t	Producer price Euro / t	Producer price Euro / t	Producer price Euro / t	Producer price Euro / t	Producer price Euro / t
Wheat	122.61	122.57 -0.03%	122.55 -0.05%	122.56 -0.04%	122.58 -0.02%	122.53 -0.07%
Barley	141.72	141.62 -0.07%	141.48 -0.17%	141.54 -0.13%	141.59 -0.09%	141.43 -0.20%
Maize	127.01	126.89 -0.09%	126.82 -0.15%	126.81 -0.16%	126.86 -0.12%	126.76 -0.20%
Rice	351	352.82 0.52%	360.2 2.62%	355.39 1.25%	355.37 1.25%	359.53 2.43%
Sugar	740.63	739.63 -0.14%	737.16 -0.47%	738.75 -0.25%	738.94 -0.23%	736.82 -0.51%
Soya	209.03	208.93 -0.05%	208.79 -0.11%	208.85 -0.09%	208.91 -0.06%	208.73 -0.14%
Beef	1866.55	1846.07 -1.10%	1836.56 -1.61%	1830.89 -1.91%	1840.19 -1.41%	1826.09 -2.17%
Pork meat	1505.36	1501.76 -0.24%	1500.13 -0.35%	1499.17 -0.41%	1500.8 -0.30%	1498.45 -0.46%
Poultry	1316.42	1312.15 -0.32%	1310.15 -0.48%	1308.98 -0.57%	1310.92 -0.42%	1307.98 -0.64%
Cheese	3755.28	3757.51 0.06%	3760.65 0.14%	3759.32 0.11%	3758.2 0.08%	3762.16 0.18%
Butter and cream	2141.76	2147.11 0.25%	2160.99 0.90%	2151.61 0.46%	2147.97 0.29%	2162.6 0.97%
Skimmed milk powder	1661.32	1660.17 -0.07%	1657.86 -0.21%	1658.59 -0.16%	1660.08 -0.07%	1660.11 -0.07%

Source: CAPRI Modeling system.

For the EU markets the picture is somewhat more divers. As for the US, for most of the commodities (cereals, soy, meat markets) price reactions are very modest. Strong

producer price reactions can be observed in the rice[24] market and to a lower extent in the sugar market. These markets are heavily protected by a mix of trade instruments and therefore rather sensitive to changes in trade instruments and the resulting pressure from increased imports. Effects for the sugar market depend very much on the selected tariff formula, and higher tariff cuts as in the Swiss and modified Swiss scenario, that even remove the TRQ regimes lead to much more pronounced price drops than the Uruguay or Panoply approach.

Table 7 Price developments for the EU

	European Union					
	Reference	Uruguay	Swiss	Harbinson	Panoply	Mod. Swiss
	Producer price Euro / t	Producer price Euro / t	Producer price Euro / t	Producer price Euro / t	Producer price Euro / t	Producer price Euro / t
Wheat	112.99	112.95 -0.04%	112.8 -0.17%	112.89 -0.09%	112.94 -0.04%	112.75 -0.21%
Barley	107.98	107.94 -0.04%	107.73 -0.23%	107.87 -0.10%	107.93 -0.05%	107.64 -0.31%
Maize	127.29	127.08 -0.16%	126.55 -0.58%	126.86 -0.34%	127 -0.23%	126.4 -0.70%
Rice	305.25	256.42 -16.00%	177.62 -41.81%	221.05 -27.58%	237.45 -22.21%	175.21 -42.60%
Sugar	665.54	634.66 -4.64%	519.16 -21.99%	581.28 -12.66%	607.84 -8.67%	514.61 -22.68%
Soya	201.99	201.71 -0.14%	201.11 -0.44%	201.43 -0.28%	201.59 -0.20%	201.01 -0.49%
Beef	2488.98	2489.17 0.01%	2486.47 -0.10%	2488.97 0.00%	2489.66 0.03%	2485.11 -0.16%
Pork meat	1384.57	1384.09 -0.03%	1382.38 -0.16%	1383.49 -0.08%	1384.05 -0.04%	1381.22 -0.24%
Poultry	1252.04	1251.32 -0.06%	1248.36 -0.29%	1250.08 -0.16%	1251.7 -0.03%	1246.49 -0.44%
Cheese	6613.57	6619.65 0.09%	6623.17 0.15%	6624.96 0.17%	6621.42 0.12%	6619.33 0.09%
Butter and cream	4260.21	4187.86 -1.70%	4060.17 -4.70%	4146.98 -2.66%	4177.84 -1.93%	4049.42 -4.95%
Skimmed milk powder	2258.63	2280.38 0.96%	2258.19 -0.02%	2292.18 1.49%	2284.14 1.13%	2231 -1.22%

Source: CAPRI Modeling system.

[24] The rice market in the EU, even though strongly protected, is only of minor significance in overall agricultural production. Production is concentrated in some regions of the Southern EU.

Due to closed fat and protein balances and the EU milk quota constraint, total milk production in the EU is not reduced in any of the proposals, but substitution between the different dairy products take place favoring the production of high value added commodities as cheese. Additionally, as export subsidies are not removed, subsidized exports for cheese and butter/cream are increased mitigating somewhat the market pressure. However, given that export subsidies are envisaged to be eliminated over the following years, stronger market reactions than calculated here might be expected.

Conclusion

Conclusion from this simulation exercise is that overall, only limited new import options into the US and EU markets are created by the different tariff proposals. Markets dominated by either low MFN tariffs or in-quota tariffs within a TRQ regime are not much affected by the proposals which attack MFN tariffs only. Low tariffs link these domestic markets to world markets and, given unchanged high levels of domestic support, significantly impact production decisions, even while supply does not react strongly to changes in these lower tariffs. However, opposite effects can be found in some sensitive markets, both in the EU and the US. For sugar, rice, beef, or dairy products, strong market reactions, due to steep cuts in MFN tariffs, can be observed in some cases. Nevertheless, in particular for the EU, import shares even in these markets still remain low.

As anticipated, the Swiss and modified Swiss formulas attacking tariff peaks lead to the strongest tariff cuts in both the US and EU, whereas the Uruguay approach promises only very limited new market access. The Harbinson, and to a lower extent the Panoply formula, may be seen as good compromise to reduction approaches and thus may provide guidance for further liberalization steps in the negotiations.

Given the very limited new market access opportunities in these two countries, a thorough analysis of beneficiaries of these opportunities is redundant. However, the few options that are provided are generally used by the strong export oriented nations as represented in the model by Australia/New Zealand and in the country block CAIRNS, which includes Brazil, Argentina, and others. The EU and US can also mutually benefit in trade from lowered MFN tariffs.

4.3.2 Liberalization of TRQ regimes

The previous analysis showed that liberalization of MFN tariffs alone does not contribute much to improving market access. The liberalization of the TRQ regime provides a second starting point for the development of market access, and proposals to change TRQs were included in some members' negotiation proposals. In the following, first the results for a quota increase and second quota expansion combined with a lowered in-quota tariffs will be presented.

Increase in size

In the following, the results for the simulations resulting from the expansion of TRQs to 10% of domestic production are presented. Table 8 presents changes in import shares for two of the five scenarios as compared to the reference. The scenarios selected combine a TRQ expansion with MFN tariff cuts according to either the Harbinson or the modified Swiss formula. The Harbinson proposal was chosen as it may be understood as a kind of intermediate summary of the negotiations as seen by the WTO, and thus may be close to the final outcome of the round, whereas the modified Swiss formula provoked the strongest tariff decreases in the scenarios presented above and illustrate what very ambitious outcomes could result in.

As the TRQ expansion did not change any regime switches, all findings presented in the context of the binding policy instruments in the previous section hold for the present scenarios as well. In the two cases (rice, sugar) where over-quota imports occur in the EU and a quota increase had the potential to lower import prices, no quota expansion is applied as import share in domestic consumption is already far above the requested 10%.

Table 8 Import shares under TRQ expansion for US and EU

TRQ expansion	United States			European Union		
	Reference	Harbinson	Mod. Swiss	Reference	Harbinson	Mod. Swiss
	Import share	Import share	Import share	Import share	Import share	Import share
Wheat	11.77%	12.02% 2.11%	11.99% 1.90%	1.80%	1.84% 2.47%	1.83% 2.04%
Barley	14.67%	14.69% 0.16%	14.70% 0.18%	0.57%	0.57% 0.29%	0.56% -0.66%
Maize	0.22%	0.22% 0.29%	0.23% 0.39%	6.37%	6.29% -1.35%	6.18% -3.06%
Rice	9.87%	12.37% 25.35%	13.24% 34.22%	27.75%	41.33% 48.93%	58.73% 111.63%
Sugar	12.14%	12.25% 0.90%	12.37% 1.88%	13.43%	28.34% 111.00%	50.09% 272.91%
Soya	0.52%	0.52% 0.02%	0.52% 0.08%	94.97%	94.91% -0.06%	94.87% -0.11%
Beef	10.08%	12.62% 25.24%	12.78% 26.81%	3.62%	3.62% -0.06%	3.61% -0.21%
Pork meat	6.40%	6.35% -0.78%	6.36% -0.67%	0.25%	0.25% 0.19%	0.31% 25.77%
Poultry	0.02%	0.02% -1.20%	0.02% -1.18%	0.45%	0.55% 20.17%	0.66% 44.03%
Cheese	2.66%	2.73% 2.62%	2.72% 2.00%	0.30%	0.31% 3.68%	0.36% 19.05%
Butter and cream	1.17%	1.20% 2.64%	1.20% 2.45%	2.44%	4.79% 95.84%	6.77% 176.93%
Skimmed milk powder	0.47%	0.79% 68.67%	0.76% 63.93%	4.83%	5.22% 7.95%	6.86% 41.87%

Source: CAPRI Modeling system.

Table 8 shows that for the EU, in some of the more sensitive markets as rice, sugar, poultry, and butter, increases in imports occur but that they are still not very different from what was observed under the tariff-only liberalization scenarios. The EU poultry market was characterized in the reference situation by a binding quota with prohibitive over-quota tariffs, and both formulas imply an abolition of the TRQ as the MFN tariff becomes the binding instrument. Accordingly, no effects of a TRQ expansion can be studied. For the US, as for the EU, the sugar quota was not expanded due to already sufficient imports in the reference run according to the chosen criteria. However, the expansion of the cheese TRQ in the EU, binding in the reference situation, leads to a situation with an unfilled quota where imports are now bound by the in-quota tariffs. The

quota underfill is due to a rather inelastic demand and limited substitution with domestic production.

Table 9 Selected results for further TRQ liberalization for the US

TRQ expansion and lowered in-quota tariffs	United States			
	Harbinson		Mod. Swiss	
	Producer price Euro / t	Import share	Producer price Euro / t	Import share
Cheese	3756.01 0.02%	2.77% 4.20%	3757.06 0.05%	2.76% 3.71%
Butter and cream	2155.43 0.64%	1.33% 13.84%	2158.15 0.77%	1.33% 13.73%
Skimmed milk powder	1662.17 0.05%	0.79% 70.38%	1658.67 -0.16%	0.80% 71.22%

Source: CAPRI Modeling system.

Additional liberalization of in-quota tariffs

Since some of the negotiation proposals comprised, as a second element, the lowering of in-quota tariffs where the fill rate of the TRQ is below a certain percentage, as in the following simulation block, all TRQ expansion scenarios are repeated with lowered in-quota tariffs when the fill rate was below 65% in the reference situation. From Table 9, the overview on binding policy instruments in the previous section, we detect that in the reference situation in-quota tariffs are the relevant instruments in the following markets:

- US: all dairy markets
- EU: all cereals, maize, all meat and dairy product markets

Therefore, in the next tables (Table 9 and Table 10), import shares and prices will be presented for these markets. With respect to the development of border protection in the markets under review, the finding is that no relevant changes against the tariff-only change scenario occur as tariff reductions are rather small. In the above mentioned cases, where in-quota tariffs where lowered, these remain the binding instrument as in none of the markets' demand is sufficiently elastic in order to render quotas binding.

Table 10 Selected results for further TRQ liberalization for the EU

TRQ expansion and lowered in-quota tariffs	European Union			
	Harbinson		Mod. Swiss	
	Producer price Euro / t	Import share	Producer price Euro / t	Import share
Wheat	112.58	2.20%	112.47	2.19%
	-0.36%	22.73%	-0.46%	21.97%
Barley	107.78	0.76%	107.57	0.75%
	-0.19%	33.59%	-0.38%	32.15%
Maize	126.86	6.29%	126.45	6.18%
	-0.34%	-1.34%	-0.66%	-2.99%
Beef	2486.53	3.72%	2482.84	3.72%
	-0.10%	2.77%	-0.25%	2.61%
Pork meat	1382.15	0.33%	1380.75	0.31%
	-0.17%	30.92%	-0.28%	25.61%
Poultry	1249.57	0.55%	1246.11	0.65%
	-0.20%	20.08%	-0.47%	43.89%
Cheese	6617.65	0.32%	6619.79	0.36%
	0.06%	5.31%	0.09%	18.87%
Butter and cream	4059.42	6.48%	4049.99	6.77%
	-4.71%	165.02%	-4.93%	176.84%
Skimmed milk powder	2227.56	6.98%	2228.78	6.85%
	-1.38%	44.54%	-1.32%	41.75%

Source: CAPRI Modeling system.

For the US dairy markets, overall import shares remain small even though for butter/cream in particular, a substantial increase occurs. However, all dairy TRQs (as in the expansion-only scenarios) are far from being binding, indicating that either the domestic dairy industry is highly competitive or production levels are sustained due to a fair amount of subsidies. Given these small import changes and slight increases in exports, no market pressure arises and prices are almost not affected.

For the EU, we observe strong increases (in both presented scenarios) in import shares for wheat, barley, pork and poultry meat, butter/cream, and skimmed milk powder. However, overall, import shares remain in all markets below 10%. In opposite to the US, market prices become slightly depressed.

Conclusion

We can conclude that the liberalization of TRQ regimes, in combination with reduction of in quota and MFN tariff, show only limited impact on market developments. The main reasons are low demand elasticities for agricultural commodities in the EU and US and, despite higher substitution elasticities of imported compared to domestically produced ones, no significant market penetration can be achieved as the liberalization effort start from rather low import shares in the reference run. A general expansion of TRQs hence does not contribute much to improve market access. If, additionally, the in-quota tariffs are lowered in the presence of underfilled quota, market access for these products can be improved but probably will not be substantive enough to provoke strong changes in domestic supply.

4.4 Discussion

4.4.1 What must be done in order to create "substantial" market access improvement?

The previous result presentation showed that the presented proposals only have limited potential to create further market access opportunities into the EU and the US, and these small effects are found in selected markets, only. As the framework agreement from August 2004 of the WTO calls for "substantial[25]" market access improvement (WTO 2004b), tariff reductions have to be done that go beyond the proposals currently on the table.[26]

Market impact of even stronger tariff reductions

In order to illustrate the effects that could results from further and probably more substantial market access opportunities, additional simulations were performed with the objective to reduce tariffs until at least 10% of import penetration in total demand has been reached or tariffs are reduced to 5% ad valorem or ad valorem equivalent. It is

[25] However, at no place in that document a further elaboration of the meaning of the term "substantial" is provided in terms of numerical specification for this market access improvement.

[26] One must remark that impacts of the tariff reductions analyzed here are done on the basis of *applied* tariff duties. Hence, it is to expect that all tariff formulas that start from *bound* tariffs, as agreed in the negotiations will even provide less departure from the current situation of market access.

obvious that these figures are arbitrarily chosen by the authors, but they serve well the objective to evaluate the impacts of stronger liberalization steps. The simulations were performed for all five tariff cut proposals, however, since all scenarios result at very comparable tariff levels due to the iterative decrease of tariffs until sufficient import penetration has been reached, we only report results for the Harbinson tariff cut scenario.

Table 11 Tariff profile for more progressive liberalization scenarios for US and EU

	USA			EU		
	Average tariff (%)	Variance	Standard Deviation	Average tariff (%)	Variance	Standard Deviation
Reference	15.63	695.78	26.38	72.42	1781.43	42.21
Import adjustment	4.05	88.51	9.41	14.05	420.71	20.51

Note: In order to calculate the tariff profile, all specific tariffs were converted to ad valorem equivalents using the average import prices in the country as the weight.
Source: CAPRI Modeling System.

With respect to the resulting tariff profile (Table 11), average tariffs decrease to a level already observable in the modified Swiss scenario presented above, however, with higher variances as stronger tariff reductions are only selectively applied to the markets with low import shares.

Table 12 Binding policy instruments in progressive liberalization scenario

	United States		European Union	
	Import adjustment		Import adjustment	
	Reference	Harbinson	Reference	Harbinson
Wheat	MFN	MFN	in-quota t.	abolition of quota
Barley	MFN	MFN	in-quota t.	abolition of quota
Maize	MFN	MFN	in-quota t.	abolition of quota
Rice	MFN	MFN	over-quota t.	over-quota t.
Oilseeds/ Cakes/ Oils	MFN	MFN	n.a.	n.a.
Sugar	binding quota	binding quota	binding quota	over-quota t.
Beef	over-quota t.	over-quota t.	in-quota t.	abolition of quota
Pork meat	MFN	MFN	in-quota t.	abolition of quota
Poultry	MFN	MFN	binding quota	abolition of quota
Cheese	binding quota	in-quota t.	in-quota t.	abolition of quota
Butter and cream	in-quota t.	in-quota t.	in-quota t.	abolition of quota
Skimmed milk powder	binding quota	over-quota t.	in-quota t.	abolition of quota

Source: CAPRI Modeling System.

Table 12 presents the overview on the use of binding trade instruments, and highlight that in particular for the EU, most TRQs are abolished and replaced by MFN regimes as MFN tariff undercut the former in-quota tariffs (except for the commodities rice and sugar as these are traditionally markets with high import shares). In the case of the US, all TRQs regime remain in place. This is due to the fact that the relation of in-quota to over-quota tariff is in such a way that even when over-quota tariffs are reduced to 5% ad valorem (or AVE) these over-quota tariffs do not undercut the in-quota ones. Hence, the quotas are not abolished.

Table 13 Import share and price developments in progressive liberalization scenario

Tariff reduction until 5% ad valorem or 10% import share	United States		European Union	
	Harbinson		Harbinson	
	Producer price Euro / t	Import share	Producer price Euro / t	Import share
Wheat	122.82 0.17%	12.08% 2.62%	112.39 -0.53%	2.39% 32.96%
Barley	141.96 0.17%	14.87% 1.38%	107.64 -0.31%	0.85% 49.90%
Maize	126.83 -0.14%	0.23% 0.37%	126.79 -0.39%	6.27% -1.65%
Rice	355.35 1.24%	12.37% 25.31%	221.02 -27.59%	41.32% 48.89%
Sugar	738.61 -0.27%	12.25% 0.91%	581.15 -12.68%	28.34% 110.95%
Soya	208.79 -0.11%	0.52% 0.04%	201.34 -0.32%	94.91% -0.07%
Beef	1830.56 -1.93%	12.44% 23.41%	2487.45 -0.06%	3.65% 0.72%
Pork meat	1500.06 -0.35%	6.37% -0.55%	1381.32 -0.23%	0.40% 59.87%
Poultry	1309.04 -0.56%	0.02% -0.97%	1247.23 -0.38%	0.77% 70.05%
Cheese	3762.44 0.19%	2.69% 0.89%	6605.57 -0.12%	0.41% 35.10%
Butter and cream	2165.58 1.11%	1.19% 1.90%	4019.11 -5.66%	7.64% 212.64%
Skimmed milk powder	1666.19 0.29%	0.66% 40.91%	2176.6 -3.63%	8.38% 73.36%

Source: CAPRI Modeling System.

The development of import shares (Table 13) show that in the case of the US, these exercise only impact significantly in the skimmed milk powder market compared to the reference run and results from other scenarios, but however, also here the import share level remains very low with only 0.66% of imports in domestic consumption. For the EU we have a similar picture: we observer strong increases in import shares, however the significance of the imports in total domestic consumption are not very distinct from what we have observed already in other scenarios (e.g. tariff reductions according to one of the Swiss formulas). Hence, market pressure results limited and in some cases, in particular for the US we observe rather slightly increasing prices. This results from partially new export opportunities that mitigate the effect of increased imports. A fact that is especially pronounced in the trade between EU and US which are mutually important trading partners. For example in the case of wheat in the EU, the market pressure resulting from the 33% import increase, equaling around 0.5 Mio t, can easily be reduced by increased exports (+2.6%, equaling +0.3 Mio t) which almost offsets the increase in imports

A further explanation for these rather sticky trade developments results may be the fact that only tariff protection has been altered while keeping all domestic support (and exports subsidies) in place. A removal of all or part of this domestic policy support will certainly lead to strong (negative) reactions on the supply side increasing the competitiveness of foreign imports on the domestic markets.

Table 14 Beneficiaries of additional market access to the US (1000 t)

Region : USA	Harbinson I difference to : Reference [2009]							
	EU	Australia/New Zealand	Free trade developing	USA	ACP	High tariff traders	Canada	Other countries
Wheat	360.17 55.99	3.84 0.45	56.63 6.13	29320.9 -151.11	297.32 32.41	15.66 1.43	2968.04 -35.2	285.74 29.92
Rice	27.93 16.81	3.26 0.52	321.51 55.17	3051.13 -101.3	0.43 0.09	0.38 0.07	1.83 -0.35	14.72 2.56
Beef	14 6.08	844.36 210.91	256.58 95.47	11276.89 -257.39	0.05 0.02	6.09 2.35	369.83 -47.42	111.6 44.61
Skimmed milk powder	0.61 0.21	0.05 0.02	0.7 0.23	438.44 -1.4	0.08 0.02	0	0.07 -0.01	0.53 0.07

Source: CAPRI Modeling System.

As a last point for analysis we want to look at the beneficiaries of these (small) additional market access opportunities. In the two following tables (Table 14 and Table 15) main importing nations/trade blocks for both countries are depicted for the commodities with the most important trade developments. Note that absolute differences in 1000 t are presented this time. For the US, mainly the EU (wheat), Australia/New Zealand (beef), CAIRNS countries (rice, beef), and the group of other countries, e.g. Ukraine and Russia can benefit from the tariff reductions.

Table 15 Beneficiaries of additional market access to the EU (1000 t)

Region : European Union	Harbinson I difference to : Reference [2009]									
	EU	India	Australia/ New Zealand	Free trade developing	USA	ACP	Mediterr. Countr.	High tariff traders	Canada	Other countr.
Wheat	86029 -474.7	0.69 0.17	54.61 18.21	36.52 9.52	805.47 257.51	3.01 0.79	343.72 78.97	97.37 20.94	53.81 17.4	454.78 116.92
Rice	1411.97 -423.96	25.42 -107.7	46.43 27.42	303.8 180.15	482.28 279.46	15.55 -127.18	9.43 5.64	0.95 0.57	0.79 0.45	140.05 82.99
Sugar	9321.07 -1919.22	44.47 24.24				3252.57 1611.89				393.96 310.91
Pork meat	17000 -24.22		9.25 4.85	1.79 0.92	15.91 8.79	2.44 1.33	0.55 0.29	3.7 2.02	0.11 0.06	13.29 6.92
Poultry	9164.14 -30.67			32.67 18.32	0.5 0.3	0.02 0.01	17.51 9.75	0.08 0.05		1.02 0.6
Cheese	7280.92 -2.85		1 0.28	0.3 0.09	0.69 0.21	0.26 0.08	2.63 0.79	0.75 0.23	7.56 2.27	4.48 1.29
Butter and cream	3387.68 -104.74		267.7 189.55	0.17 0.02	0.03 0.01	0.26 0.1	0.19 0.06	1.34 0.39	0.19 0.07	5.24 1.63

Source: CAPRI Modeling System.

For the EU much more commodities are affected by the simulated tariff scenario. Here the main beneficiaries are: US (wheat, rice, pork meat), Australia/New Zealand (butter/cream), CAIRNS group (rice, poultry), ACP (sugar), Mediterranean countries (*durum* wheat, poultry), and the group of remaining countries (wheat, rice, sugar).

How to value these small changes: Welfare gains from multilateral tariff reductions

Finally, as a lot has been said about increased import shares in the EU and US and eventual pressure on their domestic markets, we want to stress that the negotiations within the Doha Round are not only about the market liberalisation of US and EU markets but that they are undertaken in a multilateral framework. Hence it is to expect

that the markets of both US and EU are not only negatively affected by additional imports that developing countries claim for themselves but that also new export opportunities for these two players will arise. In order to underpin these potentials welfare gains for US and EU and to move away from the somewhat "synthetic" simulation approach towards a more realistic analysis, in a last simulation, a comparison of scenarios is undertaken where tariff cuts take place in a multilateral undertaking.

Table 16 Welfare development under selected scenarios (Mio Euro)

Mio. Euro	Applied tariff formula	Reference [2009]	Tariff reduction only	with quota expansion	with quota expansion + lowered in-quota t.	Tariff adjustment according to import share	Multilateral tariff reductions
			difference to : Reference [2009]				
United States	Uruguay	587665.04	587717.99 52.95	587759.16 94.12	587776.58 111.54	587730.89 65.85	588360.22 695.18
	Harbinson	587665.04	587743.12 78.08	587718.37 53.33	587738.46 73.42	587757.55 92.51	587675.52 10.48
	Swiss	587665.04	587746.22 81.18	587743.67 78.63	587765.38 100.34	587772.92 107.88	588218.21 553.17
European Union	Uruguay	6508876.1	6509268.23 392.13	6509271.82 395.72	6509252.17 376.07	6509225.13 349.03	6509585.32 709.22
	Harbinson	6508876.1	6510022.02 1145.92	6510023.26 1147.16	6510009.54 1133.44	6509981.4 1105.3	6510085.59 1209.49
	Swiss	6508876.1	6511059.25 2183.15	6511059.04 2182.94	6511048.5 2172.4	6511020.08 2143.98	6511691.55 2815.45

Note: Except from the last scenario (depicted in the columns), all tariff reduction are only applied to US and EU markets.
Source: CAPRI Modeling System.

Table 16 presents a compilation of welfare changes according to different scenarios. For the US, high welfare gains compared to the reference run under multilateral tariff reductions are found with the Uruguay and Swiss formula, whereas the effect of Harbinson is very limited. The EU shows more significant gains in all scenarios, increasing in the tariff reductions (Swiss > Harbinson > Uruguay).

These welfare improvements disclose that within the framework of a "single undertaken" in the Doha Round even stronger overall welfare increases are possible. However, at the same time these income increases will not be evenly distributed over countries, markets, and society groups, but depend very much on the specification of the liberalization steps and which markets are mostly targeted. Therefore, detailed impact analysis of future commitments should accompany the negotiations and possible trade-

offs and compensation options for affected countries as a whole or agents in the market should be discussed.[27]

4.4.2 Reflection of the estimated results in the light of the chosen methodological approach

Related to modeling decisions

Given the complex and detailed tariff profile and trade protection of many nations, some simplifications must be done when trying to model this landscape. A key issue in each modeling system is the aggregation of tariff lines and TRQ commitments to the HS 2 or 3 digit level product definitions typically used in multi-market or CGE models. Naturally, due to the high aggregation level of the model, the strategic use of nuisance tariffs (Bureau and Salvatici 2003) and tariff dispersions to keep the border system as intransparent as possible, cannot be reflected. Furthermore, models based on bound tariffs often overestimate gains from trade liberalization as already existing bilateral liberalization or preferential access agreements are neglected. However, the use of applied tariffs introduces some incertitude as these rates can be subject to change every time. Nevertheless, the use of applied tariffs provides a much more realistic picture of trade relations and prospects and should be preferred.

The modeling of TRQs is in some cases affected by the level of product aggregation since different (derived) product types within one product group are converted into raw product equivalents and aggregated. In these cases our data base indicates over-quota imports whereas in reality the situation is characterized by an underfilled or binding TRQ in combination with imports in a MFN-only tariff regime under a different tariff line. Our calibration point would apply the MFN tariff and calibrate to often rather high import prices. Reducing the MFN tariff would then provoke reactions in the market whereas the real-world reaction probably would be limited to the tariff lines not covered by the TRQs. Therefore, TRQ fill rates were carefully checked

[27] Here most prominent figure the current discussion about possible problems due to preference erosion for the least developed countries, and their herewith related loss of export opportunities and income (Gallezot 2003).

and where necessary manually adjusted in the reference run results in order to achieve a plausible picture.

As the Armington assumption drives in our model the composition of demand from imports and domestic sales, price differences between domestically produced and import goods are possible and reflect consumer preferences. Compared to a net trade model, the Armington assumption differentiates by origin and introduces a certain rigidity in the results. The effect is twofold: Firstly, demand reactions are driven by a weighted average between import and producer prices. Reducing import tariffs clearly reduces import prices; the effect on internal market prices is however depending on the import share. Highly protected markets in the base year lead to a situation of high degrees of self sufficiency and thus even drastic relative increases in the small imports quantities have hence a limited effect on that weighted average price, and consequently, demand reactions.

As a last point, it is worth to mention that we worked with a fixed exchange rate that is derived from a three-year average around the base year (2001). Based on this, all monetary values are projected and inflated to the simulation year. Hence, any changes in terms of trade due to exchange rate developments are neglected in the analysis.

Related to issues beyond the framework of this model

Additionally, there are other issues related to market access that cannot be considered in such a modeling framework but certainly impact on status and prospects of trade relations. These will be briefly reviewed in this section. The issues of preference erosion through market liberalization and tariff escalation, both highly relevant for developing countries are only partially addressed. Though the model tries to capture as much preferential trade as possible, significant shares of this and related welfare implications are not thoroughly evaluated. With respect to tariff escalation holds that due to the focus on primary agricultural commodities large part of these market access barriers cannot be captured. Along the same lines go import impediments originating from non-tariff barriers, i.e. all types of technical and phytosanitary requirements, as these provisions are often very product specific or of seasonal nature and difficult to address in such a global

framework as presented here.[28] The implementation of these requirements might lead to product differentiation with respect to product quality, an attribute that is normally assumed to be homogenous and not altering over time. Furthermore, it must be mentioned that any consideration of dynamic or economy-wide effects resulting from income developments or changed trade patterns trade are also withhold from the modeling approach.

5 Conclusions

This work addresses the liberalization of agricultural market access for the US and EU as proposed in the context of the WTO negotiations. After a theoretical review of liberalization options within tariff and TRQ regimes, the impact of the different tariff reduction and TRQ expansion formulas is evaluated in the framework of a large-scale, partial equilibrium modeling system. The analysis allows drawing the following conclusions:

1) Conclusions with respect to the analyzed formulas:

- The Uruguay approach does not significantly reduce average tariff levels and dispersion of the given tariff profiles.
- Contrary to this, the Swiss formula levels out most of the tariff peaks and results in lower average tariff level. Additionally, as proposed in a modified version of the Swiss formula, certain flexibility can be incorporated in the formula and allows targeted reduction provision for certain (sensitive) markets or countries.
- In particular the Harbinson formula leads to tariff levels that could be seen as a compromise between the two before mentioned approaches. Due to the tiered and progressive design of this formula, it has the potential to address the concerns of some members with respect to tariff peaks and dispersion of tariffs. At the same time, this proposal leaves enough freedom to accommodate needs of members with regard to sensitive commodities.

[28] A detailed discussion of issues related to the quantitative analysis of these measures can be found in Beghin and Bureau (2001).

2) Conclusions related to the overall impact on the liberalization of market access

- For most markets and scenarios, liberalization of border regimes and related improvements in market access has been low.
- Markets with high domestic price levels compared to world market prices and low self-sufficiency grades react much stronger to changes in the border regime than markets with a similar system of border protection (e.g. dairy markets in both countries) but with strong domestic supply and high degrees of self-sufficiency.
- These low import reactions are regardless of the size of the tariff cuts. Inelastic domestic demand and low substitution between domestically produced and imported goods mainly influence on this result.
- In TRQ regimes stronger MFN tariff reductions as implied by the use of the Swiss approach achieve similar market access results as a combination of TRQ expansion and lowered in-quota tariffs.

3) Recommendations for the shape of policies:

- One-size-fit-all negotiations in the area of market access do not address the trade reality in the different markets.
- New market opportunities will depend on the interaction of MFN tariff cuts, development of domestic supply and elasticities of demand. The results from negotiations on overall AMS reductions and changes in blue and green box policy definitions will influence significantly on market access developments.
- A multilateral negotiation round that simultaneously addresses as much trade barriers as possible provides more likely a win-win situation for the participating member.

6 References

Abler, D., Blandford, D., Bohman, M., Dixit, P., Stout, J. (2001). Development of and Initial Results from the ERS/Penn State WTO Model, Paper prepared for the IATRC Meeting 2001.

Abott, P.C. (2002). Tariff-rate quotas: failed market access instruments?, *European Review of Agricultural Economics 29*: 109 – 130.

Armington, P. S. (1969). A Theory of Demand for Products Distinguished by Place of Production, *IMF Staff Papers* 16, pp. 159-178.

Beghin, J.C., Bureau, J.-C. (2001). Quantitative Policy Analysis of Sanitary, Phytosanitary and Technical Barriers to Trade, *Éonomie Internationale 87*: 107 - 130.

Britz, W., Wieck, C., Perez, I. (2003). CAPRI Model Description. Institute for Agricultural Policy, Bonn University: Bonn.

Brockmeier, M., Kurzweil, M., Pelikan, J., Salamon, P. (2005). WTO Agricultural Negotiations, A Comparison of the Harbinson Proposal and the Swiss Formula, Working Paper 12, ENAPRI.

Bruinsma, J. (ed.) (2003). World agriculture: towards 2015/2030, An FAO perspective, Earthscan Publications, London.

Bureau, J.-C., Fulponi, L., Salvatici, L. (2000). Comparing EU and US trade liberalisation under the Uruguay Round Agreement on Agriculture, *European Review of Agricultural Economics 27*: 259 – 280.

Bureau, J.-C., Salvatici, L. (2002). WTO negotiations on market access in agriculture: a comparison of alternative tariff cut scenarios for the EU and the US, Working Paper 20/02.

Bureau, J.-C., Salvatici, L. (2003). WTO negotiations on Market Access: What We Know, What We Don't and What We Should, Paper presented at International Conference; "Agricultural Policy reform and the WTO", Capri (Italy).

Bureau, J.-C., Salvatici, L. (2004). WTO Negotiations on Market Access in Agriculture: a Comparison of Alternative Tariff Cut Proposals for the EU and the US", *Topics in Economic Analysis & Policy 4*: Article 8.

Diakosavvas, D. (2001). The Uruguay Round Agreement on Agriculture in Practice: How Open are OECD Markets?, Paper presented at the World Bank Conference "Leveraging Trade, Global Market Integration, and the New WTO Negotiations for Development", Washington D.C.

European Commission (2005). Prospects for Agricultural Markets and Income for 2004-2011 and the Impact of Enlargement, Directorate for Agriculture, Luxembourg: Office for Official Publications of the European Communities.

Chevassus-Lozza, E., Gallezot, J. (2003). Preferential Agreements – Tariff Escalation: What are the Consequences of the Multilateral Negotiations for the Access of Developing Countries to the European Market, Paper presented at International Conference; "Agricultural Policy reform and the WTO", Capri (Italy).

Fontagne, L., Mayer, T., Zignago, S. (2004). Trade in the Triad: How Easy is the Access to Large Markets?, Working Paper No 2004 – 04, CEPII.

Francois, J., Meijl, H.v., Tongeren, F.v. (2003). A Forward Looking Analysis of the Doha Round: Agriculture, Manufacturing and Services, Paper presented at International Conference; "Agricultural Policy reform and the WTO", Capri (Italy).

Francois, J., Martin, W. (2003). Formula Approaches for Market Access Negotiations, *The World Economy 26*: 1 – 28.

Francois, J., Martin, W., Manole, V. (2005). Choosing Formulas for Market Access Negotiations: Efficiency and Market Access Considerations, Working Paper 3474, World Bank: Washington D.C..

FAPRI (2002). Global Agricultural Liberalization: An In-Depth Assessment of What Is At Stake, CARD Working paper 02-WP 317, Iowa State University: Ames (Iowa).

FAPRI (2005). U.S. and World Agricultural Outlook. Iowa State University – University of Missouri-Columbia: Ames (Iowa).

Gallezot, J. (2003). Real access to the EU's Agricultural Market, INRA Paris (France).

Gibson, P., Wainio, J., Whitley, D., Bohman, M. (2001). Profiles of Tariffs in Global Agricultural Markets, ERS, Agricultural Economic Report No. 796, Washington DC.

Gorter, H.d. (2000). Issues in the Administration of Tariff-Rate Import Quotas in the Agreement on Agriculture in the WTO: An Introduction, *Agricultural and Resource Economics Review* 29, pp. 54 - 57.

Gorter, H.d., Falk, J., Hranaiova, J. (2003). The Economics of Administering Import Quotas with Licenses-on-Demand in Agriculture, Paper presented at International Conference; "Agricultural Policy reform and the WTO", Capri (Italy).

Hertel, T.W. (1997). Global Trade Analysis: Modelling and Applications. Cambridge: Cambridge University Press.

IATRC (1997). Bringing Agriculture into the GATT: Implementation of the Uruguay Round Agreement on Agriculture and Issues for the Next Round of Agricultural Negotiations. Commissioned Paper, CP-12, IATRC.

IATRC (2001). Issues In Reforming Tariff-Rate Import Quotas In The Agreement On Agriculture In The WTO, Commissioned Paper, CP-13, IATRC.

Josling, T., Rae, A. (2004). Options for Enhanding Market Access in a New Round. in: Agriculture and the New Trade Agenda, eds: M.D. Ingco, L.A. Winters, Cambridge University Press: Cambridge (UK).

Josling, T., Tangermann, S. (1999). Implementation of the WTO Agreement on Agriculture and developments for the next round of negotiations, *European Review of Agricultural Economics 26*: 371 – 388.

Junker, F., Wieck C., Jansson, T., Perez, I. (2003): Policy Representation in the CAPRI Model. CAPRI Working paper 03-03, Bonn.

Konandreas, P. (2003). A Compromise Formula for Tariff Cuts in Agriculture, *Food Policy 28*: 1 – 11.

Konandreas, P. (2004). Tariff Negotiations in Agriculture: A Dynamic Blended Formula, Working Paper.

Martin, W., Mensbrugghe, D.v.d., Manole, V. (2003). Is the Devil in the Details? Assessing the Welfare Implications of Agricultural Trade Reforms, Paper presented at International Conference; "Agricultural Policy reform and the WTO", Capri (Italy).

Mastrostefano, M. (2003). Comparison of MFN Tariff Profiles among selected WTO Countries. Does a Methodological Junlge allow for wild Results?, Paper presented at International Conference; "Agricultural Policy reform and the WTO", Capri (Italy).

Mensbrugghe, D.v.d., Beghin, J.C. (2004). Global Agricultural Liberalization: An In-Depth Assessment of What Is At Stake, CARD Working paper 04-WP 317, Iowa State University: Ames (Iowa).

Moennich, C. (2001). Zollkontingente im Agrarsektor: Wie viel Liberalisierungsfortschritt, Paper presented at GeWiSoLA Conference, Braunschweig (Germany).

Moennich, C. (2003). Tariff Rate Quotas: Does Administration Matter?, Paper presented at International Conference; "Agricultural Policy reform and the WTO", Capri (Italy).
OECD (2002). Agriculture and Trade Liberalisation, Extending the Uruguay Round Agreement, OECD: Paris.
OXFAM (2002). Rigged Rules and Double Standards: Trade, Globalisation, and the Fight Against Poverty. Oxfam International.
Pohl Nielsen, C., Jensen, H.G., Brockmeier, M. (2004) Scenarios for Examining General Trade Agreements, Working Paper 8, ENAPRI.
Skully, D.W. (2001). Liberalizing Tariff Rate Quotas, in: The Road Ahead: Agricultural Policy Reform in the WTO, ed: M. E. Burfisher, AER 797, pp. 59 - 67.
Wieck, C., Perez, I., Britz, W. (2003). New Challenges for the European Agriculture: Modelling agricultural reform under the WTO proposals, Paper presented at International Conference; "Agricultural Policy reform and the WTO", Capri Italy).
WTO (various years). World Trade Report. WTO: Geneva.
WTO (2001). International Trade Statistics 2001. WTO: Geneva.
WTO (2003a). Formula Approaches to Tariff Negotiations. Note by the Secretariat, TN/MA/S/3/Rev.2, WTO: Geneva.
WTO (2003b). Negotiations on Agriculture: First Draft of Modalities for further Commitments, Revision. TN/AG/W/1/Rev.1, WTO: Geneva.
WTO (2004a). WTO Agriculture Negotiations: The Issues, and where we are now. WTO Briefing Document, Version 1 December 2004, WTO, Geneva.
WTO (2004b). Doha Work Programme, Decision Adopted by the General Council on 1 August 2004. WT/L/579, WTO: Geneva.
WTO (2004c). Calculation of *Ad Valorem* Equivalents AVEs. Data Requirement and Availability. TN/AG/S/11, WTO: Geneva.
WTO (2004d). Notification: Market Access European Communities. G/AG/N/EEC/48, WTO: Geneva.
WTO (2005). Notification: Market Access United States of America. G/AG/N/USA/54, WTO: Geneva.

7 Appendix

7.1 Commodity coverage

	Commodity coverage in CAPRI market module								
Cereals	Wheat	Barley	Maize	Other cereals	Rice				
Oilseeds/cakes/oils	Rape seed	Sunflower seed	Soya	Rape oil	Sunflower oil	Soya oil	Rape cake	Sunflower cake	Soya cake
Other vegetable commodities	Sugar	Starchy products	Pulses						
Meat products	Beef	Pork	Poultry	Other meat (mainly sheep)					
Dairy products	Cheese	Butter/ cream	Skimmed milk powder	Fresh milk and whole milk products					
Other animal produts	Eggs								

7.2 Tariff profiles in base year

United States

Region : USA	Base year[2001]								
	TRQ open to	Quota 1000t	Imports 1000t	Ad val. pref %	Ad val. MFN %	Ad val. applied %	Spec. pref Euro/t	Spec. MFN Euro/t	Spec. applied Euro/t
Wheat			3652.66		2.6	2.6			
Barley			945.16						
Maize			451.65		0.6	0.6			
Rice			318.76		5.1	5.1			
Sugar	World	1144.3	1055.96				22	348	22.14
Soya			214.07						
Sunflower seed			46.74						
Rape seed			294.33		1.8	1.8			
Soya oil			46.25		13.1	13.1			
Sunflower oil			44.57		5.9	5.9			
Rape oil			438.47		3	3			
Soyameal and cake			56		1.7	1.7			
Sunflower cake			6.63		3.1	3.1			
Rape cape			1123.55		1.1	1.1			
Beef	World	1659.7	1235.23	4	28	4	18.9		
Pork meat			551.84		0.2	0.2			
Poultry			3.52					4	4
Cheese	World	113	105.77	1	12.1	1.02		1588.7	2.64
Butter and cream	World	7	6.5	4.5	5	4.5	61.5	1803.3	62.79
Skimmed milk powder	World	2.3	2.16				33	916	35.09

Notes: The term "-1" indicates that duty free access is in place for that country. The term "World" represents global TRQs. TRQs do not include quantities reserved for Mexico under NAFTA.
Source: CAPRI Modeling System

European Union

Region : European Union	Base year[2001]								
	TRQ open to	Quota 1000t	Imports 1000t	Ad val. pref %	Ad val. MFN %	Ad val. applied %	Spec. pref Euro/t	Spec. MFN Euro/t	Spec. applied Euro/t
Wheat	World	2371.6	859.04				12	95	12
	ANZ	38	36.56				12	95	13.83
	USA	572	566.29				12	95	34.36
	CAN	38	36.29				12	95	12.91
Barley	World	350	158.74				16	93	16
Maize	World	2000	1920.61					147	2.72
Rice	World	160.8	581.87				88	416	416
	IND	135	133.06				14	416	91.33
	ACP	145	142.68				88	416	143.04
Sugar	IND	20	8.52				83.3	510	83.3
	ACP	1618.7	1615.92					510	233.18
	ROW	82	82.82				98	510	399.27
Soya			17123.28						
Sunflower seed			1982.27						
Rape seed			1313.62						
Soya oil			27.65						
Sunflower oil			251.98						
Rape oil			6.54						
Soyameal and cake			16174.54						
Sunflower cake			1722.29						
Rape cape			320.5						
Beef	World	248.4	245.92				169	2381	764.34
Pork meat	World	45.4	42.47				304	890	304.91
Poultry	World	29.9	29.6				205	641	322.47
Cheese	World	34	23.54				755	2630	755
Butter and cream	World	10	10.06				948	2962	2236.52
	ANZ	76.7	76.7				868.8	2962	1915.49
Skimmed milk powder	World	39.8	39.97				475	1485	1088.6

Notes: The term "-1" indicates that duty free access is in place for that country. The term "World" represents global TRQs.
Source: CAPRI Modeling System

7.3 Tariff profiles in reference run

United States

Region : USA	Reference [2009]								
	TRQ open to	Quota 1000t	Imports 1000t	Ad val. pref %	Ad val. MFN %	Ad val. applied %	Spec. pref Euro/t	Spec. MFN Euro/t	Spec. applied Euro/t
Wheat	CAN	-1	927.74		2.6	2.6			
			3003.24		2.6				
Barley			969.5						
Maize	CAN	-1	107.73		0.6	0.6			
			349.35		0.6				
Rice	CAN	-1	342.79		5.1	5.1			
			2.18		5.1				
Sugar	World	1144.3	1101.45				22	348	29.53
	CAN	-1	48.29					348	
Soya			262.91						
Sunflower seed			58.51						
Rape seed	CAN	-1	10.75		1.8	1.8			
			380.97		1.8				
Soya oil	CAN	-1	9.4		12.7	12.7			
			43.85		12.7				
Sunflower oil	CAN	-1	53.28		5.9	5.9			
			0.15		5.9				
Rape oil	CAN	-1	0.94		3	3			
			527.94		3				
Soyameal and cake	CAN	-1	29.59		1.7	1.7			
			40.92		1.7				
Sunflower cake	CAN	-1	16.47		3.1	3.1			
					3.1				
Rape cape	CAN	-1	22.22		1.1	1.1			
			1368.62		1.1				
Beef	World	697	875.57	5	26	26			
	CAN	-1	417.25		26				
Pork meat	CAN	-1	195.29		0.2	0.2			
			380.59		0.2				
Poultry	CAN	-1	0.72					4	4
			3.28					4	
Cheese	World	110	105.68	0.9	12.1	1.12		1500.3	29.07
	CAN	-1	7.26		12.1			1500.3	
Butter and cream	World	9.2	5.44	4.3	5	4.3	61.5	1703	61.5
	CAN	-1	1.35		5			1703	
Skimmed milk powder	World	2	1.97				33	865	204.26
	CAN	-1	0.08					865	

Notes: The term "-1" indicates that duty free access is in place for that country. The term "World" represents global TRQs. TRQs do not include quantities reserved for Mexico under NAFTA.
Source: CAPRI Modeling System

European Union

Region : European Union	Reference [2009]								
	TRQ open to	Quota 1000t	Imports 1000t	Ad val. pref %	Ad val. MFN %	Ad val. applied %	Spec. pref Euro/t	Spec. MFN Euro/t	Spec. applied Euro/t
Wheat	World	2371.6	732.9				12	95	12
	CEE	-1	228.66					95	
	ANZ	38	36.4				12	95	13.22
	USA	572	547.96				12	95	13.22
	CAN	38	36.41				12	95	13.23
Barley	World	350	152.81				16	93	16
	CEE	-1	69.91					93	
Maize	World	2831	2021					94	
	CEE	-1	434.27					94	
Rice	World	160.8	407.56				88	264	264
	CEE	-1	0.24					264	
	IND	135	133.12				14	264	63.74
	ACP	145	142.73				88	264	118.47
Sugar	CEE	-1						510	
	IND	20	20.23				83.3	510	408.21
	ACP	1618.7	1640.68					510	405.66
	ROW	82	83.05				98	510	420.5
Soya			17322.19						
Sunflower seed			2163.14						
Rape seed			1694.02						
Soya oil			28.21						
Sunflower oil			263.72						
Rape oil			7.51						
Soyameal and cake			15051.66						
Sunflower cake			1564.6						
Rape cape			85.03						
Beef	World	245.4	190.23				112	1855	112
	CEE	-1	56.21					1855	
Pork meat	World	89.4	26.3				304	727	304
	CEE	-1	16.35					727	
Poultry	World	29.9	29.89				205	410	305.64
	CEE	-1	12.12					410	
Cheese	World	102.2	13.63				755	1510	755
	CEE	-1	8.43					1510	
Butter and cream	World	10	5.79				948	1986	948
	CEE	-1	3.57					1986	
	ANZ	76.7	78.15				868.8	1986	1839.87
Skimmed milk powder	World	68	30.41				475	1188	475
	CEE	-1	11.65					1188	

Note: The term "-1" indicates that duty free access is in place for that country. The term "World" represents global TRQs.
Source: CAPRI Modeling System