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**CENTRE
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INTERNATIONALES**

No 2005 – 15
September

Consequences of Alternative Formulas for Agricultural Tariff Cuts

Sébastien Jean, David Laborde & Will Martin

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Support from the CIREM is gratefully acknowledged

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CONSEQUENCES OF ALTERNATIVE FORMULAS FOR AGRICULTURAL TARIFF CUTS

SUMMARY

The purpose of this working paper is to assess the impacts of alternative approaches to liberalizing market access within the broad guidelines provided by July 2004 Framework Agreement for the Doha Development Agenda. We consider several alternative formulas, all of which follow the framework goal of cutting higher tariffs by more than lower tariffs but do so to different degrees. We also consider the implications of different ways of designating products as sensitive or special; such products are subject to smaller reductions in protection.

Analysis of approaches to market access expansion must confront some key methodological challenges. One of these is inherent in the nonlinear nature of a tiered formula, calling for analysis at a disaggregated level. For this reason, we have based our analysis on applied and bound tariffs at the finest level available on an internationally comparable basis: the six-digit level of the Harmonized System. Another important condition for well-founded analysis is that it includes the effects of tariffs that are not ad valorem. The most restrictive tariffs in developed countries are typically nontransparent specific, compound, or mixed tariffs.

The implications of tariff preferences also need to be addressed. The effects of tariff cuts on market access may be quite different for countries receiving effective tariff preferences than for countries subject to most favored-nation status. For a country receiving MFN status, tariff cuts generally increase market access and raise the prices its producers receive for their exports. For countries receiving preferential status, the result may be an erosion in preference margins and a reduction in prices received for exports.

An important complication for the evaluation of agricultural tariff reform is the frequent, wide divergence between the bound tariff and the tariff rate actually applied. This binding overhang means that reductions in bound tariffs will not always bring about corresponding reductions in applied rates and hence increases in market access. The binding overhang can change radically the outcome of a given tariff-cutting formula. To the extent that the gap between MFN and bound tariffs is far from uniform across products (especially in developed countries), it is difficult to gauge a priori how much it would interfere with the application of a given formula.

This work draws on the most detailed available data on applied tariffs, the MAcMap-HS6 data set, prepared by the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) and the International Trade Centre (ITC), combined with an equally detailed data set on bound duties, using a methodology consistent with MAcMap (Behir, Jean and Laborde, 2005). These data are used to examine the implications of various liberalization options for the level and dispersion of tariffs, both bound and applied. It also examines the

consequences of these formulas for the market access facing countries and groups of countries.

Our work points to a critical design issue in the tiered formula, namely, the discontinuities involved in a simple tiered formula with higher rates for higher tariff reductions. Literal application of a formula with higher proportional cuts in higher tariffs would lead to discontinuities in the tariff schedule with, for instance, tariffs just over 90 percent ending up close to 10 percentage points below tariffs of 90 percent. One possible solution to this problem is examined: implementation of a tiered formula that works like a progressive income tax schedule, with higher marginal rates of reduction on tariffs in higher tariff bands.

Scenarios analyzed include tiered formulas, a tiered formula with exceptions for sensitive and special products, a proportional cut approach, and varying extents of special and differential treatment. Examination of the tiered formulas shows that only formulas that bring about very deep cuts in bound rates will have a substantial impact on applied tariffs and hence on market access, particularly when allowance is made for slippage due to smaller cuts on sensitive and special products. A progressive tariff reduction formula with cuts of 45, 70, and 75 percent in bound tariffs in developed countries would, for instance, reduce the average tariffs facing developing countries from 15 percent to 10 percent - an important gain in market access, but only one-third of the way to complete liberalization. Large cuts such as this would be required for there to be a major impact on market access.

Another key finding from the Scenarios is the extraordinary sensitivity of the results to self-selected sensitive and special products. We made the assumption that countries would put into these categories products that are important in trade, subject to high tariffs, and have relatively little binding overhang. Under this assumption, we found that even allowing 2 percent of products in developed countries to have this treatment (and 4 percent in developing countries) would dramatically reduce the effectiveness of tariff reductions as a means of increasing market access. The reduction in the tariff barriers facing developing countries fell from 5 percentage points without sensitive products to 2 percentage points when such flexibilities were included. A tariff cap of 200 percent helped reduce the losses resulting from inclusion of sensitive and special products, particularly by bringing about substantial reductions on cereals.

Examination of the impact of special and differential treatment shows that the developing countries can expand each other's market access opportunities substantially by participating fully in the negotiations. While developing countries' tariffs would fall by more in absolute terms than tariffs in developed countries, the proportional fall would still be smaller because of the bigger tariff binding overhang in developing countries. A factor not considered in this analysis is the potential further gains in market access if developing countries were able to trade fuller participation for deeper cuts in protection in developed countries or for reductions in the use of sensitive products of particular interest to developing countries.

ABSTRACT

This paper assesses the impacts of alternative approaches to liberalizing agricultural market access within the broad guidelines provided by July 2004 Framework Agreement for the Doha Development Agenda. Computations are carried out at the finest level available on an internationally comparable basis, and take into account non-ad valorem tariffs, tariff preferences and the gap between bound and applied duties. Examination of different tiered formulas shows that only formulas that bring about very deep cuts in bound rates will have a substantial impact on applied tariffs and hence on market access. Another key finding is the extraordinary sensitivity of the results to self-selected sensitive and special products.

Classification JEL: D58, F13, P17, Q17

Keywords: Doha Development Agenda, Flexibility, Sensitive Products, Bound Tariffs, Applied Tariffs, Political Economy.

**IMPLICATIONS DE DIFFÉRENTES FORMULES DE RÉDUCTION
DES DROITS DE DOUANES POUR L'ACCÈS AUX MARCHÉS AGRICOLES**

RÉSUMÉ

L'objectif de ce document de travail est d'estimer l'impact de différentes approches de libéralisation des marchés agricoles en suivant l'état d'esprit de l'accord-cadre de 2004 relatif au cycle de Doha. Nous examinons différentes formules progressives de réduction tarifaire : les droits de douanes les plus élevés doivent connaître les baisses les plus fortes, mais avec des intensités diverses. La protection des produits sensibles ou spéciaux ne sera réduite que dans des proportions plus faibles et nous évaluons les conséquences de critères de choix alternatifs pour les sélectionner.

L'analyse des modalités de gains d'accès au marché rencontre des difficultés méthodologiques d'importance. L'une d'elle est la nature non-linéaire des formules de réductions examinées, il est donc impératif de travailler au niveau désagrégé. Pour cette raison nous travaillons au niveau le plus fin possible de nomenclature internationale harmonisée : le système harmonisé à 6 positions. Un autre élément d'importance est la prise en compte des droits non ad-valorem. En effet, dans les pays développés les droits les plus restrictifs sont typiquement peu transparents, qu'ils soient spécifiques, composés ou mixtes.

Les conséquences des régimes préférentiels doivent aussi être prises en considération puisqu'une réduction du droit de la nation la plus favorisée (NPF) n'implique pas forcément un gain d'accès au marché pour un pays bénéficiant d'une préférence. Pour un pays confronté aux droits NPF, la réduction tarifaire implique généralement un meilleur accès au marché et accroît le prix reçu par ses exportateurs. A l'opposé, pour un pays bénéficiant initialement d'un accès préférentiel, la baisse du droit NPF entraîne une érosion de la marge préférentielle et une réduction du prix perçu pour ses exportateurs.

L'écart fréquent entre les droits appliqués et les droits consolidés est une source supplémentaire de complexification de l'évaluation des réformes tarifaires dans le domaine agricole. Cette marge de consolidation implique qu'une diminution des tarifs consolidés ne se traduira pas automatiquement par une réduction correspondante des taux appliqués et, *in fine*, d'une amélioration de l'accès au marché. La marge de consolidation peut changer radicalement le résultat de l'application d'une formule de coupe tarifaire. Comme l'écart entre droits NPF et droits consolidés n'est pas uniforme, spécialement dans les pays développés, il est très difficile d'avoir une idée a priori de son interférence avec l'application des formules.

Nos travaux s'appuient sur la base de données tarifaires la plus détaillée disponible actuellement, MAcMap-HS6, préparée par le CEPII en collaboration avec le CCI (Centre de Commerce International), combinée avec une base comparable sur les droits consolidés, suivant la même nomenclature et la même méthodologie que MAcMap (Bchir, Jean et Laborde, 2005). Ces données sont utilisées pour analyser les implications de différentes

options de libéralisation sur le niveau et la dispersion des droits de douanes, appliqués et consolidés. Nous examinons aussi les conséquences de ces formules sur les conditions d'accès au marché rencontrées par les pays et les groupes de pays.

Nous travaux soulignent un élément important de la conception des formules étagées : les discontinuités causées par une formule étagée simple, qui associe aux plages tarifaires initialement plus élevées des taux de réduction proportionnels plus importants. Une application directe de ce principe entraîne des discontinuités dans le profil tarifaire. Par exemple, un droit consolidé légèrement supérieur à 90% - valeur frontière entre deux bandes – se retrouvera après la libéralisation une dizaine de points en dessous de la nouvelle valeur d'un droit initialement égal à 90%. Nous examinons une solution possible à ce problème : la formule étagée est retranscrite en suivant la logique de l'imposition progressive sur le revenu avec des taux de réduction marginaux croissants avec les bandes tarifaires.

Plusieurs scénarios sont examinés : formule étagée, formule étagée avec exception pour les produits sensibles et spéciaux, coupe proportionnelle, et différentes modalités concernant le traitement spécial et différencié. Parmi les formules étagées, seules celles impliquant des coupes significatives des taux consolidés ont un impact substantiel sur la protection appliquée (c'est-à-dire sur l'accès effectif au marché), surtout si des taux de réduction plus faibles sont appliqués aux produits sensibles et spéciaux. Par exemple, des coupes de 45, 70 et 75 % sur les droits consolidés des pays développés réduiraient les droits moyens rencontrés par les pays en développement de 15 % à 10 %, un gain d'accès au marché réel mais correspondant au tiers seulement de l'impact d'une libéralisation totale. Des coupes importantes sont donc nécessaires pour obtenir un effet significatif sur l'accès au marché effective.

Un autre résultat important est la mise en évidence de la grande sensibilité des résultats à la flexibilité qu'auraient les pays pour désigner des produits sensibles et spéciaux. Nous faisons l'hypothèse que les pays choisiront des produits qui ont un volume de commerce significatif, des droits élevés et une marge de consolidation faible. Sous cette hypothèse, nous montrons que permettre à 2 % des produits des pays développés de bénéficier de ce traitement (et 4 % pour les pays en développement) réduirait dans des proportions drastiques la libéralisation commerciale. La réduction dans les barrières tarifaires rencontrées par les pays en développement passerait de 5 % en l'absence de produits sensibles à 2 % quand cette flexibilité est permise. La mise en place d'un plafond fixé à 200% sur les droits consolidés permet de réduire cet effet négatif, en particulier en entraînant des baisses significatives dans les céréales.

La prise en compte du traitement spécial et différencié fait apparaître que les pays en développement peuvent bénéficier de gains d'accès au marché réciproques s'ils participent pleinement aux négociations. Alors que les droits dans les pays en développement baisseraient plus en termes absolus que dans les pays développés, la réduction en termes proportionnels serait plus faible, en partie à cause de l'importante marge de consolidation présente dans ces pays. De plus, un facteur omis dans notre analyse est la possibilité qu'un engagement important des pays en développement peut leur permettre d'obtenir des

réductions plus importantes chez les pays développés et une utilisation réduite des produits sensibles pour les produits d'intérêts pour leurs exportateurs.

RÉSUMÉ COURT

Cet article examine les conséquences de différents scénarios de libéralisation sur l'accès au marché agricole, en se basant sur les indications de l'accord-cadre de juillet 2004 pour le cycle de Doha. Les calculs sont réalisés au niveau le plus fin de la nomenclature harmonisée internationale et prennent en compte les droits de douanes ad-valorem et spécifiques, les accords préférentiels et l'écart entre droits consolidés et droits appliqués. L'examen de différentes formules étagées montre que seules les formules impliquant une coupe très importante des droits consolidés se traduiront par un gain d'accès au marché significatif. Cette étude fait apparaître un élément crucial des négociations : la grande sensibilité des résultats à la possibilité de laisser aux pays l'opportunité de sélectionner des produits sensibles et spéciaux qui bénéficieraient de dérogations.

Classement JEL : D58, F13, P17, Q17

Mots Clés : Agenda de Doha pour le développement, produits sensibles, flexibilité, droits de douanes appliqués, droits de douanes consolidés, économie politique du protectionnisme.

**CONSEQUENCES OF ALTERNATIVE FORMULAS
FOR AGRICULTURAL TARIFF CUTS**

*Sébastien Jean, David Laborde, and Will Martin*¹

The Framework Agreement for the Doha Development Agenda (WTO 2004b) provides new and important guidelines for negotiations on agricultural market access. It adds some key objectives that were missing from the original Doha Declaration (WTO 2001). In particular, it includes an important goal that was absent from the agricultural section of the original Doha Declaration—progressivity in tariff reduction through larger cuts in higher tariffs.

The new framework for WTO agricultural negotiations is, at the same time, much less specific on market access than some of the preceding documents, particularly the Harbinson Draft (WTO 2003b). Where, for instance, the Harbinson formula proposed specific approaches for reductions in tariffs, and even offered tentative numbers, the framework speaks much more generally of a tiered formula. This alone would seem to rule out deceptive practices such as the average-cut approach, which gives members strong incentives to reduce higher tariffs by less than lower tariffs, thereby reducing gains in market access and increasing the variability of tariffs around their averages (World Bank 2003, 92; Martin 2004).

The greater generality of the framework allows for exploration of alternatives that might better achieve the objectives of countries participating in the Doha Round. The purpose of this chapter is to assess the impacts of alternative approaches to liberalizing market access within the broad guidelines provided by the framework. We consider several alternative formulas, all of which follow the framework goal of cutting higher tariffs by more than lower tariffs but do so to different degrees. We also consider the implications of different ways of designating products as sensitive or special; such products are subject to smaller reductions in protection.

Analysis of approaches to market access expansion must confront some key methodological challenges. One of these is inherent in the nonlinear nature of a tiered formula. Analysis must be undertaken using information on tariffs at a disaggregated level. Applying a tiered formula to tariff averages will not yield correct results. For this reason, we have based our

¹ Sébastien Jean and David Laborde acknowledge financial support by the “Agricultural Trade Agreements (TRADEAG)” project, funded by the European Commission (Specific Targeted Research Project, Contract no. 513666). This work benefited from financial support from the World Bank, and is forthcoming as Chapter 4 in *Agricultural Trade Reform and the Doha Development Agenda*, edited by Kym Anderson and Will Martin. Washington, DC: World Bank. The authors are solely responsible for the contents of this paper. Correspondance: david.laborde @ cepii.fr.

analysis on applied and bound tariffs at the finest level available on an internationally comparable basis: the six-digit level of the Harmonized System.²

Another important condition for well-founded analysis is that it include the effects of tariffs that are not ad valorem. Conventional tariff data sets that include only ad valorem tariffs are quite inadequate for analysis of agricultural protection in the industrial countries (World Bank 2003). The most restrictive tariffs in developed countries are typically nontransparent specific, compound, or mixed tariffs. Tariff data sets based only on the conventional ad valorem elements of tariffs lead to misleading estimates, such as a weighted-average, most-favored-nation (MFN) tariff of 6.2 percent for Japanese agriculture reported in Francois and Martin (2003). We estimate that the average MFN tariff on agricultural imports to Japan was actually 51.3 percent in 2001, with the vast majority of this attributable to non-ad valorem tariffs.

Another key issue that needs to be addressed is the implications of tariff preferences. The effects of tariff cuts on market access may be quite different for countries receiving effective tariff preferences than for countries subject to most-favored-nation status. For a country receiving MFN status, tariff cuts generally increase market access and raise the prices its producers receive for their exports. For countries receiving preferential status, the result may be an erosion in preference margins and a reduction in prices received for exports.

Tariff rate quotas (TRQs) raise some similar issues. A substantial share of developed-country imports, and a much larger share of production, is subject to TRQs. Under these, imports up to a quota limit are permitted at an in-quota tariff, which is unbound and lower than the MFN (out-of-quota) rate. If imports are occurring at the in-quota rather than the out-of-quota rate, then reductions in bound, out-of-quota tariffs may not liberalize imports until the bound tariffs fall below the in-quota tariffs. Cuts in bound tariffs may thus be less effective in reducing applied rates than they would be in a situation where imports are restricted by MFN tariffs.

An important complication for the evaluation of agricultural tariff reform is the frequent, wide divergence between the bound tariff and the tariff rate actually applied. This binding overhang means that reductions in bound tariffs will not always bring about corresponding reductions in applied rates and hence increases in market access. The phenomenon of binding overhang is widely associated with developing-country agricultural tariffs, but it is prevalent in developed countries as well (Martin and Wang 2004). The binding overhang can change radically the outcome of a given tariff-cutting formula. To the extent that the gap between MFN and bound tariffs is far from uniform across products (especially in developed countries), it is difficult to gauge a priori how much it would interfere with the application of a given formula.

² Martin and Wang (2004) experiment with using tariff-line level data instead of 6-digit data, but find that the broad results are not greatly affected.

Once these problems are overcome, however, quantitative analysis can play a much larger role than it has in previous negotiations. Traps and deceptions such as the use of the average-cut routine can be revealed at a much earlier stage than was the case in earlier rounds.³ In this situation, analysis provides a basis for allowing policy makers to size up the effects of proposed agreements, taking into account the direct effects not only on their own tariff schedules but also on their potential gains in market access. In previous negotiating rounds, including the Uruguay Round, most such evaluations were undertaken only after completion of the agreement (see, for example, Martin and Winters 1996).

This chapter draws on the most detailed available data on applied tariffs, the MAcMap data set, prepared by the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) and the International Trade Centre (ITC), combined with an equally detailed data set on bound duties, using a methodology consistent with MAcMap (Behr, Jean and Laborde, 2005). These data are used to examine the implications of various liberalization options for the level and dispersion of tariffs, both bound and applied. It also examines the consequences of these formulas for the market access facing countries and groups of countries. The resulting data are presented at a level of aggregation suitable both for making direct assessments of the impact of formulas on tariffs and for use as inputs into model-based analyses of the impacts of the negotiations on output, employment, trade, and welfare (as in Anderson, Martin, and van der Mensbrugghe 2005).

The first section of this chapter focuses on key design features of the proposal for market access expansion contained in the framework. Because the effects of any proposal for reform depend on the initial market access situation, the second section surveys the broad features of the initial tariff situation. Then we examine the consequences of applying particular tiered formulas to particular import markets, before examining the implications of these formulas for the market access opportunities facing countries and regions. The final section offers some conclusions.

1. FEATURES OF THE FRAMEWORK'S MARKET ACCESS PROPOSAL

The four key elements of the framework agreement on market access are the application of a tiered formula that will make deeper cuts in higher tariffs; self-selection of sensitive products for which "substantial improvements" are to be made in market access through combinations of tariff reductions and TRQ expansion; smaller tariff reduction commitments in developing countries; and self-designation of special products by developing countries. Consider the issues involved in each of these areas.

³ In the Uruguay Round, it was only after the negotiations were completed that the full extent of the slippage associated with the use of "dirty tariffication" and the average cut routine was revealed (see Hathaway and Ingco 1996).

1.1. The Tiered Formula

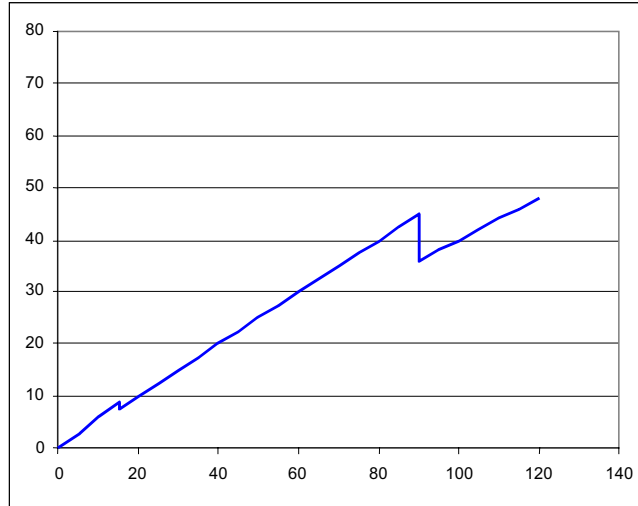
Economic theory supports the use of a formula like that proposed in the framework, in which higher tariff rates are cut more than lower tariff rates (Vousden 1990). Proportional tariff cuts potentially meet the framework requirement of “deeper cuts in higher tariffs” since higher tariffs are cut by larger absolute amounts, although the proportion cut in all tariffs is the same. A rather extreme top-down approach is the so-called Swiss formula, in which all tariffs are reduced below a coefficient that becomes the new maximum tariff, and the proportional cut in tariffs rises as the tariff rises. Francois and Martin (2003) show that the family of flexible Swiss formulas can provide a wide range of alternatives between the Swiss formula and a straight proportional reduction. The family of progressive “tiered” formulas, in which tariffs in higher bands are subject to higher proportional cuts, provides another family of formulas between the proportional cut and the Swiss formula.

The Harbinson proposal contains some elements of a tiered formula in that it involves higher cuts in higher tariffs. Unfortunately, this proposal involves the use of the average-cut routine within each group, encouraging countries to minimize disciplines by imposing larger percentage cuts on lower tariffs within each group (Martin 2004). The average-cut approach is clearly not consistent with the goal in the framework of making deeper cuts in higher tariffs nor with the ambitions of the Doha agenda to reduce tariff escalation. It is also likely inconsistent with the goal of achieving substantial gains in market access (Martin 2004).

For developed countries, the Harbinson proposal involves reductions of 40 percent in tariffs under 15 percent, 50 percent in tariffs between 15 and 90 percent, and 60 percent for tariffs above 90 percent (WTO 2003b). In developing countries, there are four tiers, with reductions of 25 percent for tariffs below 20 percent, 30 percent for tariffs between 20 and 60 percent, 35 percent for tariffs between 60 percent and 120 percent, and 40 percent in tariffs above 120 percent. Although this proposal was not adopted, its transition points clearly reflect a great deal of consultation and thought and may provide a useful indication of widely accepted transition points under a tiered-formula approach.

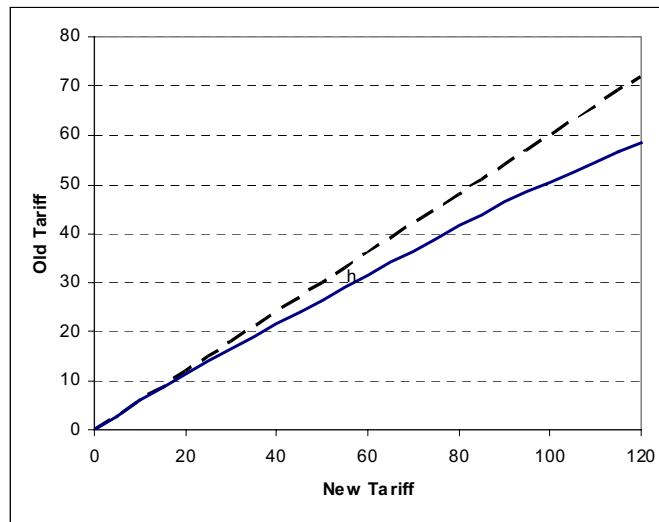
Attempts to convert these different rates of tariff reduction into a tiered formula confront a problem of discontinuities. This is evident in figure 1, which maps tariffs before application of the formula to postformula tariffs using the developed-country transition points of 15 and 90 percent. The discontinuity problem is most evident around the 90 percent transition point, where a tariff of 90 percent becomes a tariff of 45 percent, while a tariff just over 90 percent becomes a tariff of 36 percent. This discontinuity would not only result in a change in the ordering of tariffs but could potentially raise the costly variability of tariffs. Most important from a political-economy perspective, such discontinuities would likely create major political resistance from firms just above each of the transition points.

Figure 1 - Converting the Harbinson Formula into a Tiered Formula, Percent



Source: Authors' calculations.

Figure 2 - A Tiered Tariff-Cutting Formula without Discontinuities, %



Source: Authors' calculations.

Note: Upper line shows the 40 percent reduction. Lower line shows the 40:50:60 percent progressive tiered formula.

This problem of discontinuities and nonmonotonicity is inherent in any formula that attempts to apply different proportional cuts in different tariff bands. One way to deal with it is to follow the approach of the progressive income tax, where the higher proportional rate is applied to the part of the tariff that lies above the limit of the lower band. This approach has the disadvantage of cutting high tariffs by less in absolute terms than a proportional cut (because the lower portion of the tariff is cut at a lower rate), but it does impose the higher cut on higher tariffs required by the framework. Further, it provides a continuous mapping from the old tariffs to the new, as depicted in figure 2.

1.2. Sensitive and Special Products

Two other key issues in assessing the implications of the framework agreement are those products to be designated as sensitive by developed countries and those products to be designated as special by developing countries. The designation of exceptions such as these is typically a key element of any formula-based negotiation (Baldwin 1986). While some such exceptions are likely to be necessary for political reasons, excessive use of exceptions can easily undermine the fundamental goal of expanding market access, contradicting the requirement in the framework that sensitive products should be allowed “without undermining the overall objective of the tiered approach” (WTO 2004b, para 31).

Since the framework allows countries to choose the products they will designate as sensitive, there is considerable uncertainty about which products will be designated and what the effects of this designation will be. In the framework, the number of tariff lines to be allowed as sensitive products is explicitly to be negotiated.⁴ WTO members can readily see the politically beneficial (but economically damaging) impacts of allowing particular numbers of tariff lines on reducing the disciplines they must impose on their own politically sensitive commodities. But it is more difficult for them to assess the adverse impacts of other countries’ sensitive and special products on their market access opportunities. A key goal of this chapter is to provide some of the information relevant to decisions about this tradeoff.

The approach to dealing with this problem adopted by Martin and Wang (2004) is to assume that the products treated as sensitive are those with the highest tariffs. If the number of tariff lines that can be treated as sensitive is constrained, however, it is unlikely that countries would choose to use their limited number of sensitive tariff lines on products that have high tariffs but play only a small role in trade and production. Accordingly, in this analysis, the tariff lines to be treated as sensitive were selected by ranking products by the tariff revenue that would be forgone through implementation of the formula.⁵ This approach takes into account the importance of the commodity, the height of the existing applied

⁴ This was an important advance from the preceding draft text (WTO 2004a), which would have treated all TRQ commodities, roughly 20 percent of high-income country agricultural tariff lines and a staggering 52 percent of high-income economy agricultural production as “sensitive” (de Gorter and Kliuga 2005).

⁵ Note that for the sake of simplicity, the corresponding calculation is carried out assuming the value of imports (net of taxes) to be unchanged.

tariff, and the gap between the tariff binding and the applied rate. The broad results of this analysis appear to be supported by an analysis in which the selection of products is based on a Grossman-Helpman political support function (Jean, Laborde and Martin, 2005).

The framework indicates that special products in developing countries are to be distinct from sensitive products available to both developed and developing countries. It nonetheless seems likely that policy makers would use similar criteria in deciding which products to designate as special. The stated criteria in the framework, such as food security, provide little guidance. In fact, tariffs are more likely to reduce than to improve food security. As Sen (1981) demonstrated, food security is not an issue of national self-sufficiency but rather one of ensuring that individuals - particularly the poor - have access to food. Raising national food self-sufficiency by raising agricultural prices through protection may well reduce the access of poor people to food. Given the lack of a convincing rationale in the framework for special products, the analysis here effectively treats this group as an increase in the number of tariff lines allowed “flexibility” of the type permitted by the sensitive products category.

We assume that tariff lines in the sensitive or special product categories would experience liberalization equivalent to a 15 percent reduction from their initial tariff levels. The framework provides for expansion of MFN tariff rate quotas, possibly together with tariff reductions, to bring about substantial improvements in market access for these products. Unless the rules for this improvement in market access for these products are extremely demanding, it seems difficult to be optimistic about the possibility of substantial market access expansion through TRQ expansion. As de Gorter and Kliuga (2005) point out, the in-quota tariffs are not bound, and TRQs are frequently not filled because of administrative devices, sometimes even when there are substantial out-of-quota imports. Quotas are frequently allocated on the basis of licenses on demand, which is not an efficient or equitable method of allocating scarce and valuable quotas. In this respect, agriculture’s TRQ regime seems an even less promising vehicle for liberalization than was the labyrinthine system of textile quotas erected under the textile industry’s Multifibre Arrangement. Clearly, a great deal needs to be done if any faith is to be placed in TRQ expansion as a means of improving market access.

2. MARKET ACCESS GEOGRAPHY

This analysis uses the latest version of the MAcMap database, which covers tariffs for 2001 and takes into account ad valorem tariffs, specific tariffs, and tariff preferences (Bouët and others 2004). This data set underlies the Global Trade Analysis Project (GTAP) database used in global economic models for analyzing trade policy reform. CEPII has developed software allowing easy aggregation up to the GTAP level for analysis with computable general equilibrium models. Some changes in the data were required for the analysis at hand, including corrections to problems resulting from tariff rate quotas, corrections to protection estimates distorted by idiosyncrasies of the TRQ system; modification of China’s tariffs to take account of WTO accession commitments; the phase-in of remaining commitments from the Uruguay Round; and changes caused by the accession in April 2004 of 10 new members to the European Union.

The tariffs applied on TRQ commodities in the MAcMap database depend on whether the quota is filled. If the quota is less than 90 percent filled, the in-quota tariff is assumed to apply to these commodities. If the quota is between 90 and 99 percent filled, the effective tariff is assumed to be the average of the in- and out-of-quota tariff. If the quota is more than 99 percent filled, then the out-of-quota tariff is applied.

Several key features of global agricultural tariffs are shown in table 1. The global average tariff of 17 percent includes 11 percent from ad valorem tariffs and 6 percent from the ad valorem equivalents of non-ad valorem measures. There are extraordinary variations between countries and country groups around these levels. In developed countries as a group, the average tariff is 14 percent, only 4 percentage points of which are contributed by ad valorem tariffs; the remaining 10 percent comes from the ad valorem equivalents of specific, mixed, or compound duties. These latter duties are a particular concern to developing countries, since specific tariffs tend to impose greater burdens on developing-country exports (these exports frequently have lower per unit prices, making the tariff a higher percentage of the export value for developing countries). Within the developed-country group, average tariffs vary considerably, with Japan having an average agricultural tariff of 36 percent, mostly derived from non-ad valorem tariffs, and the European Free Trade Area (EFTA) having a tariff of 29 percent. The average agricultural tariff in the EU is considerably lower, at 12 percent, and those in the United States and Australia, lower still, at 3 percent.

Developing countries have higher average tariffs, at 20 percent, than developed countries, but only 2 percentage points of this protection is provided by specific tariffs. Average tariffs are extremely high in the Republic of Korea, at 94 percent, and also high in China, India, Pakistan, and Sub-Saharan Africa.⁶ The net agricultural exporting Mercosur region of South America has quite low tariffs, at an average of 5 percent. Interestingly, least developed countries (LDCs) as a group, and the LDCs of Sub-Saharan Africa have quite low tariffs; that is consistent with the tendency noted in the political economy literature for poor countries to have low agricultural protection (see, for example, Anderson, Hayami, and George 1986).

Another feature of agricultural protection evident in table 1 is the height of the barriers on the TRQ commodities. The analysis by de Gorter and Kliauga (2005) indicates that these products cover 20 percent of agricultural tariff lines, and 52 percent of the value of production, in the countries using TRQs.⁷ The fact that average applied tariffs on these commodities are so high, even though some imports are permitted at lower in-quota tariffs, is striking testimony to the importance of protection on these commodities both in developed countries and in those developing countries using these measures. Had all TRQ goods been automatically treated as sensitive products, as was proposed in WTO (2004a), a

⁶ Korea is a self-declared developing country in the WTO but a high-income country by World Bank standards and a member of the OECD.

⁷ This percentage corresponds to products that are at least partly protected by a TRQ (see de Gorter and Kliauga 2005 for details). It should therefore be considered as an upper bound.

very large share of total agricultural protection would have been shielded from liberalization.

Table 1 - Key Features of Applied Agricultural Tariffs, by Selected Countries and Regions, 2001 - percent, trade weighted average

<i>Country/region</i>	<i>Overall average</i>	<i>Ad valorem tariffs</i>	<i>Specific tariffs</i>	<i>Tariff for TRQs</i>	<i>TRQ Share</i>
Australia	3.0	2.1	0.9	1.0	5.6
Bangladesh	14.4	14.4	0.0	0.0	0.0
Canada	9.7	8.3	1.3	30.7	21.0
China	38.9	38.9	0.0	5.7	22.0
Japan	35.5	9.9	25.6	103.4	8.8
Korea, Rep. Of	93.9	93.9	0.0	226.3	38.5
Mexico	10.7	10.6	0.1	33.8	23.6
Pakistan	30.4	9.7	20.7	0.0	0.0
India	55.1	54.3	0.9	0.0	0.0
Turkey	14.0	13.9	0.1	0.0	0.0
United States	2.7	0.9	1.7	11.2	17.1
Mercosur	12.9	12.9	0.0	6.9	3.3
European Free Trade Area (EFTA)	28.6	2.0	26.6	58.2	33.6
ASEAN	11.2	7.5	3.7	32.0	8.4
Sub-Saharan LDCs	13.1	13.1	0.0	0.0	0.0
Other Sub-Saharan Africa (SSA)	25.6	25.5	0.0	0.0	0.0
Maghreb	17.6	16.2	1.5	39.4	14.3
South African Customs Union	13.0	4.4	8.6	16.3	55.9
EU	11.8	3.1	8.8	35.5	21.5
Developed	14.3	4.3	10.0	36.9	17.3
Developing	20.9	18.5	2.4	63.7	11.6
LDCs	13.4	13.0	0.3	0.0	0.0
World	17.2	10.8	6.4	46.5	14.4

Source: MacMap-HS6 Database, Centre d'Etudes Prospectives et d'Information Internationales (CEPII), Paris (see Bouét and others 2004).

Note: The Maghreb region consists of Algeria, Libya, Mauritania, Morocco, and Tunisia.

Another key element of the geography of market access is the relationship between applied and bound tariffs. The higher bindings are relative to applied rates, the larger the reductions in bound rates that must be made before applied rates must change and market access improvements are realized. The gap between applied and bound duties has two origins: the binding overhang, that is, the gap between bound and MFN tariffs; and preferential arrangements, which create a gap between the MFN and applied rates.⁸

⁸ Note however that given the methodology used here, TRQs are also a source of difference between MFN and applied rates, since the MFN duty is always assumed to be equal to the out-of-quota tariff rate, while that is not the case for the applied duty as soon as the quota is not filled by more than 99 percent.

There was substantial binding overhang in many developing countries after the Uruguay Round. Developing countries had the right to set their tariff bindings without reference to previous levels of protection, under the so-called ceiling binding option. Many developing countries used this right to set their bindings at high, and frequently uniform, levels such as 150 or 250 percent. The effects are illustrated in table 2, which shows that the bound tariff in developing countries is 2.4 times the average applied rate.

Table 2 - Bound and Applied Agricultural Tariff Rates, by Country and Region, 2001 - percent, trade weighted average

<i>Country/ region</i>	<i>Bound tariff</i>	<i>MFN tariff</i>	<i>Applied tariff</i>	<i>CV bound</i>	<i>CV MFN applied</i>
Australia	5.9	3.6	3.0	1.9	1.6
Bangladesh	156.7	14.4	14.4	8.8	3.4
Canada	19.6	19.3	9.7	23.6	23.7
China ^a	16.2	51.3	38.9	11.0	18.7
Japan	62.1	52.1	34.6	81.1	90.1
Korea, Rep. of	103.5	119.8	93.9	43.3	57.5
Mexico	49.4	31.9	10.7	17.7	25.0
Pakistan	107.7	30.0	30.4	3.3	5.2
India	153.4	55.4	55.1	23.3	12.9
Turkey	50.1	16.1	14.0	12.5	7.1
United States	6.2	6.0	2.7	14.0	14.0
Mercosur	34.0	12.9	12.9	1.8	1.2
EFTA	70.8	48.2	28.6	21.7	23.6
ASEAN	59.7	12.1	11.2	25.2	10.1
Sub-Saharan LDCs	62.8	14.8	13.1	1.8	1.3
Other SSA	104.4	26.5	25.6	1.0	6.7
Maghreb	38.0	18.9	17.6	10.9	5.2
SACU	51.5	13.8	13.0	11.7	4.7
EU	20.5	17.2	11.8	40.6	36.4
Developed	27.0	22.1	14.2	37.3	37.7
Developing	48.1	26.7	20.6	13.9	15.1
LDCs	77.6	14.3	13.4	3.7	1.8
World	37.4	24.0	17.0	26.2	26.9

Source: MacMap-HS6 Database, CEPII, Paris (see Bouet and others 2004).

Note: CV is the weighted coefficient of variation for the power of this tariff.

a. The bound average duty reported for China takes into account commitments not in effect in 2001, hence its lower level in comparison with the MFN rate.

Although developed countries did not have the right to use ceiling bindings, negotiators used a highly protected base period (1986–88) - and many members used so-called dirty tariffication - to set tariff rates for industrial countries well above the previously prevailing average applied tariffs (Hathaway and Ingo 1996). Table 2 indicates that binding overhang is substantial in developing countries and smaller, but by no means nonexistent, in

developed countries.⁹ These results are broadly consistent with the findings of Martin and Wang (2004), which were based on an entirely different data set.

For developed countries, the average bound rate was almost twice as high as the applied rate. This difference mainly comes from the large gap between MFN and applied rates, reflecting the importance of preferential agreements and tariff rate quotas in reducing average applied rates below their MFN levels. The difference is large in relative terms for all developed countries, highlighting the issue of preference erosion analyzed by Bouët, Fontagné, and Jean (2005). A key feature of table 2 is the sharp difference among countries. Low-income countries tend to have a large binding overhang, with bindings for the LDC group six times their applied rates. For Bangladesh, the average difference between bound and applied rates is more than 150 percentage points. In the European Union, Japan, the United States, average bound rates are more than 50 percent above the applied rates, suggesting that relatively large cuts in bound rates would be needed to bring about sizeable reductions in applied rates.

3. SIMULATION EXPERIMENTS

For this analysis, we assume that a reduction in a tariff binding causes a reduction in applied tariffs whenever the new binding is below the initial applied rate. This assumption is widely used, but the initial applied rate is by no means the only possible counterfactual. If, in the absence of a WTO agreement, tariffs would have increased, the effect of the WTO commitment might be greater than is implied under our assumption. If applied rates would otherwise have declined, the gain from the agreement might be less than we estimate. Even in the random-walk case, when the initial tariff rate is the best indicator of future tariff rates, our assumption that a unit reduction in the binding below the applied rate will cause a one-for-one reduction in expected applied rates is not necessarily true given the stochastic nature of unbound tariffs (Francois and Martin 2004). However, our simplified approach provides a useful, and widely adopted, rule of thumb.

Results are presented for 14 simulations designed to evaluate the consequences of different approaches to liberalization, particularly different degrees of top-down progressivity in the tariff cuts and different degrees of special and differential treatment (STD) for developing and least developed countries. As specified in the framework, all of these cuts are made in tariff bindings, and we examine the consequences for applied rates.

The analysis begins with the 2001 tariffs that are the basis for the GTAP-6 database. Before we performed the main simulations, however we undertook an experiment to introduce a number of developments that occurred before any tariff reductions arising from the Doha

⁹ Computing perfectly comparable information on MFN and bound ad valorem equivalent tariffs is a complex task. Because treating the information concerning MFN tariffs sometimes involves specific difficulties, such as incomplete raw information, we suspect that the extent of the binding overhang found here for developed countries, although already small, is still overstated (because the level of MFN duties might have been slightly understated in some cases). This is likely to be the case in particular for the EU and for Japan.

Agenda. These included the expansion of the EU to 25 members, the phase-in of remaining commitments by developing countries under the URAA, and the tariff reforms agreed by WTO accession countries, China in particular.¹⁰

Table 3 - Summary Description of the Agricultural Reform Scenarios

<i>Base</i>	<i>2001 applied protection</i>
Agric 0	Pre-experiment (EU enlargement + WTO commitments)
Agric 1	Tiered formula for agriculture, 45, 70, and 75% cuts
Agric 2	Tiered formula + sensitive products (2% of the number of HS6 products)
Agric 3	Tiered formula + sensitive products (5% of the number of HS6 products)
Agric 4	Proportional cut
Agric 5	Proportional cut + sensitive products (2% of the number of HS6 products)
Agric 6	Tiered formula + sensitive products (2% of the number of HS6 products) + 200%tariff cap
Agric 7	“Light” tiered formula, 35, 50, and 65% cuts
Agric 8	Tiered formula with developed-country coefficients in both developed and developing countries, no reduction for LDCs
Agric 9	Tiered formula with developing countries and LDCs treated as developed countries
Agric 10	Swiss formula
Agric 11	Swiss formula + sensitive products (2% of tariff lines)
Agric 12	Tiered formula with sensitive products not exceeding 2% of import value
Agric 13	Tiered formula with sensitive products not exceeding 5% of import value
Agric 14	Tiered formula with 2% of tariff lines sensitive products (excluding alcohol and tobacco products)

Source: Authors.

Note: In developing countries, the percentage of products subject to sensitive product treatment was doubled to allow for “special” products.

The simulations, descriptions of which are summarized in table 3, begin with a tiered formula consistent with the framework (scenario 1). The effects of adding different levels of sensitive and special products were then considered. Any top-down formula is likely to involve intense negotiating difficulties, since the extent to which higher tariffs are to be cut by more must be negotiated, and non-ad valorem tariffs must be converted to ad valorem form.¹¹ We therefore thought it worthwhile to compare the results of the tiered formula with those from a much simpler, proportional cut approach. Next, we examine the consequences of fuller participation by developing countries. Then, we consider the strongly top-down Swiss formula. Finally, we examine two important issues involving

¹⁰ Developing countries had 10 years from 1994 to implement their Uruguay Round commitments.

¹¹ Very extensive negotiations in the first part of 2005 were required to reach agreement on the technical issue of converting non-ad valorem tariffs into ad valorem equivalents, and the chairman’s summary of June 2005 (WTO 2005) makes clear the difficulties remaining ahead.

sensitive products: whether the choice of trade value, rather than number of tariff lines, greatly affects the impact of including sensitive products; and whether the impact of sensitive products is greatly influenced by the inclusion of alcohol and tobacco products.

As an initial attempt to capture the key elements of likely liberalization proposals, we first examine, in scenario 1, a tiered formula with transition points at 15 and 90 percent and marginal tariff cuts of 45, 70, and 75 percent.¹² The transition points for developing countries were placed at 20, 60, and 120 percent, and the marginal cuts at 35, 40, 50, and 60 percent. Consistent with the framework, least developed countries were not required to undertake any reduction commitments.

Scenarios 2 and 3 examine the consequences of including sensitive and special products. We assume that WTO members would take into account the importance of the commodity, the height of the existing tariff, and the gap between the tariff binding and the applied rate in deciding which products to designate as special or sensitive. We consider situations in which developed countries are allowed to treat 2 percent (scenario 2) and 5 percent (scenario 3) of tariff lines as sensitive. Developing countries are allowed, in addition, to classify the same number of tariff lines as special products.

Scenario 4 considers the impact of a proportional cut formula that brings about the same reduction in average bound tariffs in developed countries as a group, and developing countries as a group, as the tiered formulas used in scenario 1. Scenario 5 uses the same proportional cut formula and allows 2 percent of tariff lines to be treated as sensitive products; developing countries are also allowed to treat an additional 2 percent of tariff lines as special products. Scenario 6 considers the effects of adding a tariff cap of 200 percent, consistent with the suggestion in the framework that the role of a tariff cap be explored. Scenario 7 considers the “light” tiered formula proposed in the Harbinson draft, with tariffs cut by 10 percentage points less than in scenario 1. Scenarios 8 and 9 examine two aspects of special and differential treatment. Scenario 8 treats developing countries the same as developed countries but continues to exclude least developed countries from liberalization. Scenario 9 uses the tiered formula of scenario 1 but treats LDCs the same as other developing countries.

Scenario 10 examines the implications of moving to a Swiss formula approach to tariff reduction. For this scenario, the Swiss formula parameter is calibrated to bring about the same reduction in average tariffs as would have occurred using the tiered formula in scenario 1. While the reduction in the average tariff is the same, the more sharply concave nature of the Swiss formula means that higher tariffs are reduced more, and lower tariffs correspondingly less, than under the tiered or proportional cut formulas. Under scenario 11, we consider the impact of allowing developed countries to designate 2 percent of tariff lines

¹² An initial simulation was undertaken with cuts of 35, 60, and 65 percent and is reported in scenario 7. It was not chosen as the base for further simulations because it created insufficient liberalization to allow evaluation of the effects of liberalization erosion through the addition of sensitive and special products.

as sensitive and developing countries to classify 2 percent as sensitive and another 2 percent as special products while using the Swiss formula approach to liberalization.

In Scenarios 12 and 13, we return to the tiered formula used in scenarios 2 and 3, with exceptions for sensitive and special products. In scenarios 12 and 13, however, we specify the proportion of sensitive products to be allowed using the value of trade in those products, rather than the number of tariff lines. Finally, in scenario 14, we examine the sensitivity of our results to the exclusion of alcohol and tobacco products from the list of products that can be treated as sensitive. While the production of alcohol and tobacco is clearly protected in some cases, in other cases tariffs on these products may be intended either to raise revenue or discourage their consumption for social purposes. In these cases, governments might choose not to designate them as sensitive products, using their limited number of sensitive products for goods where the motivation for tariffs is purely protection.

4. THE CONSEQUENCES OF TIERED FORMULAS

What happens to bound and applied rates under the scenarios outlined above? Under scenario 1, world average bound duties would fall by half, from the initial level of 37 percent down to 19 percent (table 4). Logically, given the special and differential treatment granted to developing countries, the reductions in average tariffs, as well as the harmonizing effects across countries, are stronger among developed countries: their average bound tariff is cut from 27 percent to 9.5 percent, with a final level lower than 10 percent for each country, except EFTA (23 percent) and Japan (20 percent). Given the progressive nature of the formula, however, the cut is also substantial for developing countries (except the least developed). The average bound tariff for developing countries is cut almost in half, from 48 percent down to 27 percent. The reductions are quite large in percentage points for India (76 points), Korea (54 points), Pakistan (47 points), and all Sub-Saharan Africa except for its LDCs (47 points).

As already emphasized, these cuts in bound duties lead to cuts in applied rates only when the new bound duty is lower than the initial applied duty. Accordingly, it is no surprise that the cuts in applied duties are not as great as the cuts in bound duties. But the extent to which the binding overhang dampens the impact on applied duties is surprisingly large: while bound duties are approximately cut in half worldwide, applied duties are cut only by one-third, that is, by 5.5 percentage points on average (table 5). This liberalization appears rather limited, even though the formula used is considerably more rigorous than that proposed in the Harbinson draft.

Table 4 - Base Level and Reductions in Average Bound Duties, by Agricultural Reform Scenario - percentage points

Country	Base (%)	Scenario													
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Australia	5.9	2.8	1.0	1.0	3.9	3.2	2.2	2.2	2.8	2.8	1.2	1.1	2.6	2.4	2.5
Bangladesh	156.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	78.2	0.0	0.0	0.0	0.0	0.0
Canada	19.6	12.4	3.0	3.0	12.8	7.1	6.7	10.5	12.4	12.4	11.6	5.5	9.7	7.4	6.4
China	16.2	4.1	1.6	1.6	4.8	3.5	3.0	3.0	6.1	4.1	2.2	2.0	3.5	3.0	3.0
Japan	62.1	42.4	9.8	9.6	40.0	20.2	28.9	36.1	42.4	42.4	46.7	21.7	34.3	28.0	20.9
Korea, Rep. of	103.5	53.7	16.4	16.2	45.9	21.5	52.6	43.3	72.7	53.7	66.6	20.1	46.0	38.5	21.7
Mexico	49.4	19.9	7.5	7.5	21.9	19.2	17.6	15.0	31.1	19.9	15.1	11.7	17.2	15.9	16.9
Pakistan	107.7	47.4	16.3	16.2	47.8	21.7	27.6	36.7	72.6	47.4	46.5	26.6	45.7	42.6	21.3
India	153.4	76.1	23.2	23.2	68.0	64.5	73.3	60.8	107.4	76.1	87.5	40.2	71.5	67.5	73.6
Turkey	50.1	21.6	11.3	11.3	22.2	20.6	20.1	16.6	32.4	21.6	18.9	17.7	19.1	15.8	20.1
United States	6.2	3.3	1.4	1.4	4.0	3.1	2.4	2.6	3.3	3.3	1.9	1.5	2.7	2.1	2.4
Mercosur	34.0	12.6	6.2	5.7	15.1	13.6	12.0	9.2	20.1	12.6	6.9	6.0	12.2	11.5	12.1
EFTA	70.8	48.2	11.0	10.9	46.0	35.4	40.1	41.1	48.2	48.2	51.5	39.2	41.8	36.4	37.6
ASEAN	59.7	26.4	11.5	11.4	24.2	16.5	25.3	20.6	37.5	27.5	30.1	10.0	20.2	16.6	23.0
Sub-Saharan LDCs	62.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.0	0.0	0.0	0.0	0.0	0.0
Other SSA	104.4	47.4	16.7	16.3	46.3	37.0	38.1	36.9	70.9	47.4	47.9	36.9	46.0	44.1	38.6
Maghreb	38.0	15.1	5.7	5.7	16.3	11.8	12.3	11.4	23.4	15.1	13.0	11.0	13.9	12.5	11.9
SACU	51.5	21.5	11.4	11.3	22.7	20.4	21.3	16.4	33.2	21.6	18.9	17.3	18.1	16.8	20.9
EU	20.5	12.7	3.4	3.2	13.3	8.9	8.1	10.7	12.7	12.7	11.1	6.7	10.6	8.5	8.1
Developed	27.0	17.6	4.5	4.3	17.5	10.5	12.0	14.9	17.6	17.6	17.6	9.6	14.5	11.9	10.5
Developing	48.1	21.3	8.1	8.0	20.9	15.2	18.8	16.6	31.1	21.3	21.3	11.5	18.9	17.1	16.7
LDCs	77.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.3	0.0	0.0	0.0	0.0	0.0
World	37.4	18.9	6.0	5.9	18.7	12.4	14.8	15.3	23.3	19.6	18.9	10.3	16.2	13.9	13.1

Source: Authors' calculations, based on the MacMap-HS6 database, CEPII, Paris.

Note: For descriptions of scenarios, see table 3.

Table 5 - Reductions in Base Tariffs for Average Applied Tariffs, by Agricultural Reform Scenario - percentage points

Country	Scenario														
	Base (%)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Australia	3.0	0.9	0.3	0.2	1.5	0.9	0.4	0.7	0.9	0.9	0.3	0.2	0.8	0.7	0.7
Bangladesh	14.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
Canada	9.7	4.4	0.1	0.1	4.1	1.1	1.0	3.0	4.4	4.4	4.7	1.1	3.3	1.7	0.9
China	10.0	2.3	0.9	0.9	2.7	1.4	1.3	1.7	3.2	2.3	1.0	0.8	1.8	1.7	1.3
Japan	34.5	16.6	2.1	2.0	15.0	5.1	8.5	11.8	16.6	16.6	20.4	5.1	13.1	10.6	4.6
Korea, Rep. of	90.1	44.5	12.2	12.2	36.8	13.4	43.0	36.0	60.5	44.5	58.0	12.6	39.2	32.0	13.4
Mexico	9.5	1.5	0.2	0.2	1.8	0.3	0.2	0.8	3.4	1.5	1.0	0.2	1.5	1.3	0.3
Pakistan	30.4	0.5	0.0	0.0	0.9	0.0	0.0	0.1	8.6	0.5	0.1	0.0	0.5	0.5	0.0
India	54.5	4.4	1.7	1.6	5.1	1.8	1.7	3.2	12.9	4.4	3.7	1.7	4.4	4.2	2.0
Turkey	13.9	1.5	0.2	0.2	1.6	0.5	0.4	0.9	3.9	1.5	1.1	0.2	1.3	0.7	0.4
United States	2.7	0.9	0.1	0.1	1.2	0.6	0.3	0.6	0.9	0.9	0.4	0.1	0.8	0.6	0.3
Mercosur	12.8	0.4	0.0	0.0	0.8	0.1	0.0	0.1	2.1	0.4	0.0	0.0	0.4	0.4	0.1
EFTA	28.6	11.5	0.8	0.7	10.1	6.0	7.1	7.3	11.5	11.5	14.0	7.6	9.4	7.8	6.1
ASEAN	10.9	0.9	0.3	0.3	1.0	0.4	1.2	0.6	2.1	0.9	1.9	0.3	0.7	0.7	0.7
Sub-Saharan LDCs	13.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Other SSA	25.4	2.8	0.6	0.6	2.7	0.8	0.8	1.7	7.6	2.8	2.8	0.8	2.7	2.7	1.8
Maghreb	16.9	2.6	0.8	0.8	2.9	1.0	1.0	1.8	4.6	2.6	2.0	0.8	2.1	1.9	1.4
SACU	12.6	0.7	0.2	0.2	1.0	0.2	0.2	0.5	3.3	0.7	0.5	0.2	0.7	0.4	0.3
EU	11.8	6.1	1.3	1.1	6.5	2.9	2.5	4.9	6.1	6.1	5.3	1.8	4.9	4.0	2.4
Developed	14.1	6.6	0.9	0.9	6.5	2.6	3.1	4.8	6.6	6.6	7.1	2.1	5.3	4.2	2.3
Developing	17.9	4.3	1.3	1.3	4.1	1.6	3.5	3.3	6.9	4.3	4.7	1.3	3.8	3.3	1.7
LDCs	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
World	15.8	5.5	1.1	1.0	5.3	2.1	3.2	4.1	6.6	5.5	5.9	1.7	4.5	3.7	2.0

Source: Authors' calculations, based on MacMap-HS6 database, CEPII, Paris.

Note: For descriptions of scenarios, see table 3.

Among the main countries listed in table 5, only, EFTA, the EU, Japan, and Korea show reductions in applied duties of more than 5 percentage points. Indeed, liberalization appears to be overwhelmingly concentrated in Japan and Korea. In many countries, applied duties hardly change—they drop less than 1 percentage point in 8 of the 19 countries and groups shown in the table. For Pakistan, for instance, the 47 percentage point cut in the average bound duty translates into a 0.5 point cut in the average applied duty. In sum, for developing countries the formula considered in scenario 1 narrows the binding overhang in many cases without substantially changing applied duties. For developed countries, the cuts in applied duties are less than on bound duties in absolute terms, but they are comparable in most cases, when expressed in relative terms.

The tiered formula does, however, have a significant harmonizing effect on applied rates across products, as illustrated by the reduction in the coefficient of variation of the power of the MFN tariff (table 6). On average the coefficient of variation decreases from 36 percent to 14 percent for developed countries and from 10 percent to 7 percent for developing countries. The world average coefficient of variation decreases from 31 percent to 14 percent. The decline is sharper for countries with very uneven initial bound duties, especially Japan, Korea, and to a lesser extent India, the ASEAN (Association of Southeast Asian Nations) countries, and Canada.

When 2 percent of sensitive products are exempted from the tiered formula and instead subjected only to a 15 percent cut in the bound rate (scenario 2), the cut in the average bound duty worldwide narrows from 19 to 6 percentage points. Excluding 2 percent of products is thus enough to reduce the extent of delivered liberalization of bound duties by more than two-thirds, and even more than this in countries such as Canada, Japan, and Korea. This outcome results from the strong unevenness of protection across products in most countries, with a few tariff peaks accounting for a substantial part of total average protection. But the consequences of excluding 2 percent of sensitive products are even more spectacular when it comes to applied duties. Under scenario 2 average applied duties worldwide fall in a mere 1.1 points - that is just one-fifth the size of the cut delivered under the tiered formula in scenario 1.

Allowing sensitive and special products to be subject to much less rigorous tariff-cutting treatment also strongly undercuts the reductions in peak tariffs and in the variability of applied duties. Instead of 14 percent under scenario 1, the world average of the cross-product coefficient of variation of MFN tariffs falls only 3 percentage points, to 21 percent, when countries are allowed to designate 2 percent of their tariff lines as sensitive products (see table 6). The harmonizing impact of the formula is clearly much reduced by allowing for exceptions.

Raising the share of sensitive products to 5 percent (scenario 3) does not change the broad picture a great deal. The extent of delivered liberalization is somewhat lower, but the qualitative assessment and the general conclusion do not change: the pass-through from liberalization of bound duties to liberalization of applied duties is weak under a tiered formula such as the one studied here. Moreover, the little action that takes place is

concentrated on a very small number of products, so that excluding 2 percent of tariff lines as sensitive products is enough to empty the agreement of any substantive liberalization.

4.1. Tiered Formula Versus a Proportional Cut

Scenario 4 presents results for a proportional cut delivering the same cut in average tariffs - for industrial countries and for developing countries - as the tiered formula. On an economy-by-economy basis, the cut in tariffs is not substantially different from the tiered formula, with the exception of Korea, where the cut in applied duties is significantly lower (37 points, compared with 45 points). Even in terms of cross-product variability of MFN duties, the difference is not generally large, although the decline is less pronounced for developed countries. Nor is there much change when 2 percent of sensitive product tariff lines are excluded (scenario 5) either in the country-by-country average tariffs or in the coefficient of variation of tariffs. This result raises questions about the importance of a tiered formula relative to a proportional cut. While a tiered formula is generally more ambitious in reducing peak tariffs, it is likely to present more difficulties in achieving a consensus. If the differences between tiered formulas and proportional cuts are as small as our simulations indicate - even given the aggressive nature of our tiered formula - then the loss from moving to a proportional approach may not be large.

Another topic these scenarios aim to address is the potential importance of setting a cap for bound duties. Scenario 6 introduces such a cap (at a level of 200 percent), in addition to the application of the tiered formula with 2 percent of sensitive product lines excluded (scenario 2). Although excluded from the full application of the formula, sensitive products are subject to the cap in this scenario. The results show that setting such a cap can matter a great deal: the cut in the worldwide average of applied duties is three times as large in scenario 6 as in scenario 2. Setting a cap thus appears to be a potential way to limit the loss of market access opportunities that results from excluding sensitive products from tariff reductions. For most countries and regions, the cap has a relatively small impact on the resulting tariff cut. But for EFTA, the EU, Japan, and Korea, the cap increased the cut in average applied rates considerably.

Scenario 8 illustrates the implications of special and differential treatment for tariffs. In this scenario developing countries other than LDCs are subjected to the same formula as developed countries. Under this scenario, the absolute cut in developing countries' applied tariffs rises to 6.9 percentage points, from 4.3 percentage points registered in scenario 1. This reduction is larger in absolute value than the 6.6 percentage points in developed countries, but it is smaller proportionately (a 38 percent reduction, compared with 47 percent in developed countries). The smaller percentage cut results from the higher binding overhang in developing countries. There are, of course, considerable differences among developing countries in the extent to which the assumption of full disciplines would require larger tariff cuts. For many, such as Mexico and Turkey, the resulting tariff cuts would be proportionally larger but would remain small in absolute terms. For a few, such as India and Korea, eliminating special and differential treatment would require cuts that are larger both in absolute and proportional terms.

Table 6 - Cross-Product Coefficient of Variation of the Power of MFN Tariffs: Base and Reduction by Agricultural Reform Scenario - percentage points

Country	Scenario														
	Base (%)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Australia	1.6	0.7	0.2	0.2	0.9	0.4	0.4	0.5	0.7	0.7	0.4	0.2	0.4	0.3	0.6
Bangladesh	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Canada	23.7	15.9	3.1	3.1	14.5	3.7	5.5	13.4	15.9	15.9	17.5	5.9	6.1	3.6	4.7
China	11.0	2.7	1.0	1.0	2.9	1.9	1.8	2.0	4.5	2.7	2.3	1.4	1.5	1.0	1.8
Japan	83.2	51.8	7.9	8.0	42.4	11.6	45.2	42.1	51.8	51.8	70.6	16.8	10.6	5.0	15.4
Korea, Rep. of	45.7	19.5	4.1	4.1	13.9	4.2	21.1	15.4	27.8	19.5	30.8	4.5	10.8	7.5	4.3
Mexico	22.8	10.7	3.2	3.2	9.7	7.4	8.2	8.4	15.7	10.7	11.7	5.0	4.2	4.0	6.1
Pakistan	5.2	0.1	0.0	0.0	0.2	0.0	0.0	0.0	2.3	0.1	0.0	0.0	0.1	0.1	0.0
India	12.3	-0.6	-0.1	-0.1	-0.8	-0.1	-0.1	-0.3	0.8	-0.6	0.1	-0.1	-0.6	-0.7	0.0
Turkey	7.1	1.2	0.1	0.1	1.1	0.2	0.2	0.8	2.4	1.2	1.3	0.1	1.0	0.2	0.2
United States	14.0	8.5	4.0	3.8	8.9	4.8	4.8	7.1	8.5	8.5	7.0	4.9	4.3	2.4	4.8
Mercosur	1.2	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.4	0.1	0.0	0.0	0.1	0.1	0.0
EFTA	22.1	13.9	2.2	2.2	11.8	2.2	10.8	11.5	13.9	13.9	17.8	6.5	3.1	1.3	3.7
ASEAN	9.6	0.8	0.2	0.2	0.7	0.3	2.1	0.5	2.3	0.8	3.9	0.2	0.5	0.5	0.6
Sub-Saharan LDCs	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other SSA	6.7	1.5	0.4	0.4	1.4	0.4	0.4	1.0	3.4	1.5	1.6	0.4	1.5	1.4	1.0
Maghreb	4.9	1.4	0.4	0.4	1.4	0.5	0.6	1.0	2.5	1.4	1.4	0.4	0.6	0.5	1.0
SACU	4.4	0.4	0.1	0.1	0.4	0.1	0.1	0.3	1.2	0.4	0.4	0.1	0.3	0.1	0.1
EU	36.4	23.2	4.6	4.7	22.0	5.4	5.9	19.5	23.2	23.2	23.4	6.4	11.2	6.5	5.8
Developed	36.2	22.7	4.7	4.7	20.3	5.9	13.4	18.7	22.7	22.7	26.4	7.7	7.9	4.3	7.1
Developing	10.3	3.0	0.8	0.8	2.5	1.2	2.7	2.2	5.1	3.0	4.5	1.1	1.6	1.3	1.4
LDCs	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
World	24.0	13.5	2.9	2.8	12.0	3.7	8.4	11.0	14.4	13.5	16.2	4.6	4.9	2.9	4.4

Source: Authors' calculations, based on MacMap-HS6 database, CEPII, Paris.

Note: For descriptions of scenarios, see table 3. Figures for regions are computed as the simple average across countries.

For developing countries, these results suggest that, because of their binding overhang, the mercantilist “cost” of full participation in the Doha Round might be considerably lower than it would at first appear. That raises an important question for developing countries: what additional gains could they obtain by offering fuller participation? This question arises even more strongly in scenario 9, which shows the effect of a potential agreement for LDCs to participate in line with other developing countries. The results show that the effect on their cuts to applied rates would be extremely modest. The average applied agricultural tariff in LDCs would decline by only 0.2 percent, because the large binding overhang in LDCs reduces the requirement to reduce tariffs to an extremely low level.

Scenarios 10 and 11 examine the effect of the Swiss formula calibrated to produce the same reductions in average bound rates for developed and developing countries as the tiered formula applied in scenarios 1, 2, and 3. A key effect of this formula is to reduce applied protection in higher-tariff economies such as EFTA, Japan, and Korea by more than they are reduced in lower-protection countries. Another key effect is to bring about a larger reduction in the coefficient of variation of tariffs than either the tiered formula or proportional cuts. The reduction in applied tariffs is larger for both developed and developing countries, however, reflecting a tendency for the Swiss formula to be more effective in reducing binding overhang. However, there are important differences in the impact of the formula between countries. In countries and groups with relatively modest agricultural protection, such as Australia, China, Mercosur, SACU, and the United States, where both the mean and the coefficient of variation are low, the strongly top-down Swiss formula would require smaller tariff reductions in applied rates than the tiered formula. By contrast, in countries with high or variable tariffs such as Japan, Korea, and EFTA, the Swiss formula would require significantly larger reductions in average applied tariffs.

Scenarios 12 and 13 shed light on the importance of the way in which the share of products to be accorded sensitive product treatment is specified. Under scenarios 2 and 3, special products could be designated for a maximum of 2 percent and 5 percent of tariff lines, respectively. Under scenarios 12 and 13, the criterion is shifted to 2 percent and 5 percent of imports, rather than tariff lines. Under scenario 12, the global reduction in average applied tariffs is 4.5 percent, compared with 1.1 percent under scenario 2. The size of the resulting cut in tariffs is reduced by 10–20 percent in most cases, in contrast with the dramatic and unpredictable reductions in disciplines associated with basing sensitive products on tariff lines. Scenario 13 shows that expanding the volume of sensitive products to 5 percent diminishes the resulting disciplines on market access: the world average agricultural tariff falls by 3.7 percent, rather than 5.5 percent, as in Scenario 1. However, even when sensitive products are allowed to make up 5 percent of imports, the negative effect on tariff reductions is nowhere near what is when just 2 percent of tariff lines can be designated as sensitive products.

Although trade volume is also an imperfect criterion (because highly restricted products are likely to have small imports), its deficiencies as a basis for allowing sensitive products clearly appear to be less serious than those associated with using a percentage of tariff lines as a criterion. When tariff lines are used, a large and variable amount of trade can be sheltered from disciplines. Given the results in scenario 2, it seems doubtful whether a pure

tariff-line criterion for allowing sensitive products could be compatible with the expansion of market access required in both the initial Doha Agenda (WTO 2001) or the framework agreement (WTO 2004b). Use of a fraction of trade volume could potentially be made consistent with the focus on number of tariff lines in the framework agreement. It would simply require defining the number of tariff lines to be permitted sensitive treatment as the number accounting for a specified volume of trade.

Scenario 14 examines the implications of excluding “sin” commodities such as alcohol and tobacco from the sensitive product category. These goods are frequently high-volume trade products, and there is some doubt about whether countries would use their scarce sensitive products allocation to shelter them. A key question is whether the dramatic reduction in the market access gains observed in scenario 2 is robust if these high-tariff goods are excluded. The results of scenario 14 should be compared with those for scenario 2, since both involve allowing 2 percent of tariff lines to be treated as sensitive. The comparison, shown in table 4.5, finds that excluding these commodities from the sensitive product category does increase the size of the cut in applied tariffs. Even with this adjustment, however, the resulting reductions in tariffs are still extremely small (2 percent, rather than 1 percent), so the exclusion still does not create the “substantial increases in market access” required in the Doha Agenda.

4.2. Implications for Market Access

What are the implications of these different tariff-cutting formulas for the market access opportunities of particular countries and regions? First, we consider the implications of different tariff-cutting formulas for the average tariffs applied on countries’ agricultural exports. Table 7 shows that developing-country exporters of agricultural products faced an average tariff of 16 percent in 2001, a rate that is expected to fall to 15 percent once current commitments, particularly by China and other developing countries, are phased in. The average tariff facing agricultural exports from developed countries was 17 percent in 2001 and will fall to 16 percent with full implementation of current commitments. The LDCs as a group face lower but still significant barriers, with an average tariff of 12 percent even after preferences are taken into account.

The tariffs faced by different countries will differ substantially in the absence of a substantial Doha outcome. China will face the highest tariff barriers, at an average of 32 percent. Australia, the United States, and the ASEAN group will also face very high average tariffs, of 18–20 percent. Korea will face an average tariff of 17 percent, while Europe will face an average tariff of 16 percent, essentially the world average. Mercosur will face average agricultural tariffs of 15 percent (down from 18 percent in 2001, prior to new WTO accessions).

Table 7 - Implications of Alternative Formulas for Market Access, Base Tariffs, and Reductions by Agricultural Reform Scenario
- percentage points

Country	Base (%)	Scenario													
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Australia	18.3	8.2	1.6	1.6	7.8	2.6	4.0	6.3	9.0	8.2	9.2	2.4	6.5	5.3	2.3
Bangladesh	5.7	0.2	0.0	0.0	0.2	0.1	0.1	0.1	1.2	0.2	0.1	0.1	0.2	0.1	0.1
Canada	9.3	3.3	0.3	0.3	2.9	0.9	0.8	2.0	3.6	3.3	4.2	1.0	3.1	1.9	0.7
China	31.6	14.8	3.4	3.4	12.8	5.5	14.5	11.7	18.8	14.8	19.3	4.6	11.2	10.9	5.1
Japan	10.4	2.7	1.0	0.9	3.4	1.9	1.6	1.9	4.2	2.7	1.4	0.9	2.5	2.3	2.0
Korea, Rep. of	17.0	5.0	1.6	1.2	5.7	4.1	3.4	3.4	5.8	5.0	4.5	2.6	4.6	4.6	4.2
Mexico	4.3	1.2	0.3	0.2	1.2	0.5	0.5	0.8	1.3	1.2	1.2	0.3	1.0	1.0	0.5
Pakistan	12.6	4.1	1.1	0.9	4.0	1.7	2.7	3.3	4.9	4.1	4.3	1.4	3.3	2.8	1.6
India	10.0	2.6	0.6	0.6	2.6	1.1	1.3	2.0	3.3	2.6	2.6	0.7	2.0	1.4	1.1
Turkey	10.2	2.3	0.5	0.4	2.5	1.3	1.6	1.6	3.0	2.3	2.3	0.9	2.2	2.1	1.6
United States	19.8	7.9	1.5	1.4	7.4	2.5	4.9	5.9	9.3	7.9	9.0	2.2	6.8	4.9	2.4
Mercosur	14.6	5.3	1.3	1.2	5.3	2.2	3.0	4.1	6.4	5.3	5.1	1.7	4.9	3.6	2.0
EFTA	13.8	5.1	1.1	1.0	5.8	3.4	2.5	3.8	6.1	5.1	3.9	2.1	4.3	4.0	3.5
ASEAN	19.3	3.9	0.7	0.7	4.0	1.9	2.9	2.9	5.7	3.9	4.3	1.3	3.0	2.7	1.7
Sub-Saharan LDCs	9.5	1.3	0.3	0.3	1.3	0.3	0.4	1.0	1.7	1.3	1.4	0.3	0.5	0.5	0.4
Other SSA	10.3	4.5	0.8	0.8	4.2	0.9	0.9	3.5	4.8	4.5	4.8	0.8	1.7	1.3	1.2
Maghreb	12.9	4.2	0.8	0.8	4.6	1.9	3.4	3.2	4.5	4.2	3.4	2.6	3.9	3.7	1.5
SACU	17.4	5.6	0.9	0.8	5.8	2.6	2.5	4.1	6.4	5.6	5.6	1.9	5.1	3.4	2.4
EU	15.8	4.2	0.8	0.8	4.3	2.2	2.0	2.8	5.3	4.2	4.0	1.8	3.7	3.3	2.3
Developed	16.4	5.8	1.1	1.0	5.6	2.2	3.1	4.2	6.9	5.8	6.3	1.9	5.0	3.9	2.1
Developing	15.3	5.2	1.1	1.1	5.1	2.0	3.3	4.0	6.4	5.2	5.6	1.5	4.1	3.6	1.9
LDCs	11.8	1.5	0.3	0.3	1.4	0.4	0.5	1.1	2.0	1.5	1.6	0.5	0.7	0.6	0.5
World	15.8	5.5	1.1	1.0	5.3	2.1	3.2	4.1	6.6	5.5	5.9	1.7	4.5	3.7	2.0

Source: Authors' calculations, based on MacMap-HS6 database, CEPII, Paris.

Note: For descriptions of scenarios, see table 3.

The tiered formula used in scenario 1 results in a substantial reduction in the tariffs facing most countries. The worldwide average tariff falls from 16 percent in the baseline to just over 10 percent. The average tariff facing developed countries falls by almost 6 percentage points to 10.6 percent; that facing the developing countries falls from 15 to 10 percent; and that facing the LDCs from 12 to 10 percent. The fall in barriers facing developing countries and the LDCs occurs despite a lack of reduction in tariffs on exports to those countries granting full preferences; the decline reflects reductions in tariffs in those countries not giving preferences or reductions in bindings that require liberalization below initial preferential rates.

Market access gains are much lower when the tiered formula is combined with flexibility on sensitive and special products (Scenario 2). With 2 percent of tariff lines subject to flexibility in developed countries, and 4 percent in developing countries (to allow for special products), the average agricultural tariffs facing developing countries falls by 1 percentage point, instead of 5 points in the absence of “flexibility.” For developed countries, gains in market access are reduced even more: instead of dropping 6 percentage points, tariffs drop only 1 point. For some individual countries, the loss is even greater. For China the cut in market access barriers is only 3 percentage points instead of the 15 point decline expected when the tiered formula is used; the tariffs facing Australia drop by 2 percentage points rather than 8 points. LDCs also suffer a loss in market access opportunities; tariffs drop only one-third of a point instead of 1.5 points.

Allowing sensitive product flexibility for 5 percent of tariff lines causes a further deterioration in market access, although this is barely visible in the rounded tariff numbers presented in table 7. The additional loss from increasing the share of tariff lines treated as sensitive is much smaller than reported by Martin and Wang (2004), however. That is because, in this analysis, we have taken into account the importance of binding overhang, as well as the value of the import tariffs, when identifying sensitive products. It seems likely that policy makers would base their designation of sensitive products in part on the degree of binding overhang. Even the approach used here, however, may not fully capture the adverse impacts for market access of allowing a small number of sensitive products. Many of the products identified as sensitive in our analysis were items such as tobacco products, for which tariffs are frequently used in conjunction with domestic taxes of the same magnitude to raise revenues. If this is the case, and the tariffs are replaced by pure domestic taxes, or both the tariff and the domestic tax are lowered together, there may be less trade creation than the tariff analysis would suggest.

The proportional cut experiment in scenario 4 yields, by design, the same average cut in tariffs at the global level. However, the distribution varies somewhat from country to country. China, in particular, receives less of a boost to market access, because it faces very high rates of protection in some key markets and so does not benefit to the same extent from reductions in peak tariffs. Interestingly, the Mercosur region benefits more from the proportional cuts than from the tiered formula, because it exports relatively more products that face moderate or low tariffs. Scenario 5 shows that a proportional cut approach is just as vulnerable to erosion from sensitive products as the tiered formula. Average tariffs facing both developed and developing countries are 3 percent higher when sensitive

products are allowed as when a “clean” proportional cut is applied. A key question for negotiators is whether the chances of a “clean” tariff cut would be higher with a proportional cut than with a more progressive tiered formula.

Comparison of scenario 2 with scenario 6 shows the potentially important role of a tariff cap in reducing barriers to market access. A tariff cap is particularly important to countries supplying highly protected East Asian markets, and it reduces the overall average tariff facing developing countries by 2 more percentage points.

Scenario 7, the original, weaker liberalization tiered formula, reduces market access barriers by noticeably less than scenario 1. As previously noted, this formula resulted in no reduction in applied tariffs in a number of regions.

Comparison of scenarios 1 and 8 shows the implications when developing and developed countries participate under the same rules. The average tariff facing both sets of countries falls by an additional percentage point as a consequence. As previously noted, the proportional cut in applied tariffs for developing countries remains lower than for developed countries, but both developed and developing countries gain considerably more market access.

Scenario 9 is to be compared with scenario 1. Under scenario 9, the LDCs participate on the same basis as developing countries. Not surprisingly, given the small trade and economic weight of the least developed countries, the implications for market access are too small to register on the scale used in this table. For LDCs, the case for fuller participation hinges on issues such as whether economic gains from their own liberalization are sufficiently large, whether MFN liberalization is a better option or a precursor to preferential liberalization, and whether they could negotiate some additional benefits from fuller participation.

Scenario 10 shows that the sharply top-down Swiss formula would bring about larger cuts in market access barriers than the tiered formula. The average tariff facing agricultural exporters worldwide would fall by 5.9 percentage points, compared with 5.5 points under the tiered formula in scenario 1. The gains would be particularly large for China, which would experience a 19 percentage point reduction in the average tariff against its exports. Australia and the United States would also benefit substantially. Scenario 11 shows that the Swiss formula also would be vulnerable to allowances for sensitive and special products. If countries could designate just 2 percent of their tariff lines as sensitive, the average reduction in global tariffs would be 1.7 percentage points, rather than 5.9 points when no product flexibility is allowed.

Scenarios 12 and 13 show that basing the exceptions for sensitive and special products on the value of imports, rather than on the number of tariff lines, greatly reduces the damage of this flexibility to market access opportunities. Under scenario 12, with 2 percent of trade allowed sensitive product treatment, the cut in average tariffs worldwide is 4.5 points - that is more than four times larger than the cut in scenario 2, where sensitive products were limited to 2 percent of based on tariff lines. The impact on the tariffs facing some countries is particularly marked. For China, for instance, the cut in tariff is only 3 points under

scenario 2 but 11 points under scenario 12. For SACU, the tariff cut goes from 1 percentage point to 5 points. Increasing the share of imports allowed sensitive treatment to 5 percent (scenario 13) erodes the gains, with the global average tariff cut falling from 4.5 to 3.7 points. However, allowing sensitive product treatment on 5 percent of import value does not completely remove all discipline in the way that 2 percent of tariff lines does under scenario 2.

A comparison of scenarios 2 and 14 shows the extent to which the results in scenario 2 arise from allowing commodities such as alcohol and tobacco to be designated as sensitive products. As observed earlier, flexibility for these “sin” commodities is associated with reductions in the gains on market access. The cut in overall tariffs doubles from 1 to 2 percentage points when alcohol and tobacco products are excluded from the sensitive and special product lists and importers are therefore forced to select sensitive products that do less damage to market access opportunities. Nonetheless, the results of scenario 14 provide support for our original interpretation of scenario 2: allowing sensitive products based on even 2 percent of tariff lines would greatly diminish the discipline associated with the tiered formula.

4.3. Implications for Commodities

A key feature of agricultural protection is sharp differences in tariff rates between commodities. That difference has important implications for the effects of liberalization on different countries. Table 8 shows the base tariff rates for selected commodities at the worldwide average level, and the changes in rates under different agricultural scenarios. The highest base tariff rates are on cereals, sugar, tobacco, meat, and dairy products. Under the tiered formula (scenario 1), the largest cut in tariffs is on cereals, for which the worldwide average falls by more than 19 percentage points, or close to half its initial level. Sugar and meat also experience large reductions relative to their initial tariff levels. For dairy products, the cut is substantial, at 6 points, but that is less than one-third of the initial tariff rate. It appears that the tiered formula generates larger cuts on those commodities, such as cereals, where a large share of global protection is provided by very large tariffs in a few countries than on products, such as dairy, where tariffs are high (but not stratospheric) in many countries.

Allowing flexibility for sensitive products on 2 and 5 percent of tariff lines under scenarios 2 and 3 dramatically reduces the degree of liberalization for all of the high-protection commodities. The largest tariff reduction is for cereals - 3.3 percentage points instead of 19 points under scenario 1. Not only would an allowance for sensitive products cut the reduction in base tariffs and the expansion of market access, it also would sharply increase the variation across commodities around the mean.

Table 8 - Implications of Alternative Scenarios for Protection by Commodity: Reductions in Global Average Tariff - percentage points

Commodity	Scenario														
	Base (%)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Meat	26.1	11.4	1.7	1.7	10.7	3.1	3.4	8.0	12.1	11.4	11.9	3.3	10.6	8.5	3.0
Dairy products	20.3	6.4	0.9	0.9	6.4	3.0	3.3	4.4	7.4	6.4	6.4	4.1	5.0	4.3	2.9
Vegetables	11.2	3.4	0.6	0.6	3.5	2.1	2.3	2.4	4.1	3.4	3.8	2.2	2.3	2.0	1.9
Fruit and nuts	11.7	4.3	0.7	0.7	4.8	1.8	1.4	3.2	4.8	4.3	3.2	0.8	4.3	4.2	1.3
Coffee and tea	3.4	0.5	0.2	0.2	0.6	0.4	0.3	0.4	0.8	0.5	0.3	0.2	0.5	0.4	0.3
Cereals	41.2	19.2	3.3	3.3	16.0	3.6	13.9	14.7	23.2	19.2	25.3	3.7	14.6	11.2	3.6
Oil seeds	12.3	5.5	1.4	1.4	4.6	1.6	5.4	4.5	7.2	5.5	7.1	1.5	5.0	1.9	1.6
Animal or vegetable fats	17.9	2.0	0.6	0.6	2.4	1.3	1.4	1.4	4.5	2.0	1.3	1.1	1.9	1.9	1.1
Meat preparations	12.5	4.3	0.6	0.6	4.8	3.5	3.0	3.0	4.7	4.3	4.2	3.0	4.0	3.9	3.0
Sugars	29.5	13.7	3.0	3.0	13.3	3.7	4.8	11.2	15.0	13.7	14.1	3.5	8.4	7.6	3.6
Preparations of cereals	10.4	1.6	0.3	0.3	1.9	1.7	1.4	1.0	2.0	1.6	1.7	1.7	1.6	1.5	1.3
Processed vegetables	12.0	3.5	0.7	0.7	4.4	3.9	3.2	2.5	4.2	3.5	2.0	1.6	3.4	3.3	3.0
Beverages and spirits	9.4	2.4	1.1	0.8	2.9	2.1	1.1	1.7	3.2	2.4	1.5	0.8	2.3	2.1	2.2
Tobacco	26.3	4.1	1.7	1.2	4.6	2.7	2.9	2.9	6.4	4.1	5.3	1.4	3.7	3.4	4.1
Wool	1.7	0.2	0.0	0.0	0.3	0.1	0.1	0.1	0.5	0.2	0.1	0.0	0.2	0.2	0.1
Cotton	1.4	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.0

Source: Authors' calculations, based on MacMap-HS6 database, CEPII, Paris.

Note: For descriptions.

The proportional cut approach presented in scenario 4 would reduce the tariffs on all commodities. Although protection on high-tariff commodities such as cereals and meat would not decline as much as it would under the tiered formula, it would still decline quite sharply. The tariff on cereals, for example, would fall by 16 percentage points, as against 19 percentage points under the tiered formula. For meat, the difference is less than a full percentage point. Scenario 5 shows that the market access gains under a proportional cut rule would be just as vulnerable to diminution through allowing sensitive and special products based on 2 percent of tariff lines. The tariff reduction on cereals, for instance, falls from 16 to 4 percentage points.

Scenario 6 shows that the introduction of a tariff cap is important only for cereals. For these, it dramatically increases the size of the tariff cut, from 4 percentage points under scenario 5 to 14 percentage points. Scenario 7 shows that smaller cuts in tariff rates would considerably reduce the potential market access gains from liberalization, even before allowing for any sensitive and special products.

Scenario 8 shows that special and differential treatment substantially reduces the overall gains in market access obtainable from the negotiations for several commodities. For cereals this effect is relatively large. Special and differential treatment of the type we have analyzed reduces the fall in average tariffs from 32 to 19 percentage points.

Scenario 10 shows that the sharply top-down Swiss formula would result in substantially higher cuts in protection on the most highly protected commodities. The reduction in the tariff on cereals would be 25 percentage points, compared with 19 points under the tiered formula in scenario 1. This formula, however, would be just as subject to erosion by allowing sensitive and special products as the other formulas. Designating just 2 percent of tariff lines as sensitive and special products would cause this market access gain to collapse to less than 4 percentage points.

Scenarios 11 and 12 show that the diminution in market access gains on the highest-protected products can be reduced significantly by changing the basis on which sensitive products are allowed to a percentage of trade value, rather than a percentage of tariff lines. With these products restricted to 2 percent of imports, the reduction in tariffs on cereals would fall from 19 percentage points under scenario 1 to 15 points under scenario 11. The reduction in protection to meat would be much smaller, with a decline from 11.4 percentage points to 10.6 percentage points. These results reinforce the conclusion from evaluation of the average tariffs in the previous section. If sensitive and special products are to be introduced into the negotiations, considerable attention must be paid to the manner in which this is done lest all semblance of liberalization be lost.

5. CONCLUSIONS

The July Framework Agreement has advanced the state of the art in the agricultural market access negotiations in a number of respects. By moving from the flawed and fundamentally deceptive average cut methodology embedded in some earlier proposals, the framework provides scope for an agreement that would not only increase market access but also lower

the highest and most distorting tariffs. Further, it avoids the commitment to essentially unlimited flexibility inherent in the preceding proposal (WTO 2004a) for all of the tariff rate quota commodities, which constitute roughly 20 percent of high-income countries' agricultural tariffs and over 50 percent of their value of output on some measures. It specifies that tariffs are to be cut in an economically desirable top-down manner, with larger cuts in higher tariff rates, and it provides scope for negotiations on the extent to which flexibility will be included in the negotiations.

This chapter points to a critical design issue in the tiered formula, namely, the discontinuities involved in a simple tiered formula with higher rates for higher tariff reductions. The principle of higher cuts in higher tariffs has strong support in economics, in equity, and in the practice of multilateral negotiations. However, literal application of a formula with higher proportional cuts in higher tariffs would lead to discontinuities in the tariff schedule with, for instance, tariffs just over 90 percent ending up close to 10 percentage points below tariffs of 90 percent. One possible solution to this problem is examined: implementation of a tiered formula that works like a progressive income tax schedule, with higher marginal rates of reduction on tariffs in higher tariff bands.

Scenarios analyzed in the chapter include tiered formulas, a tiered formula with exceptions for sensitive and special products, a proportional cut approach, and varying extents of special and differential treatment. Examination of the tiered formulas shows that only formulas that bring about very deep cuts in bound rates will have a substantial impact on applied tariffs and hence on market access, particularly when allowance is made for slippage due to smaller cuts on sensitive and special products. A progressive tariff reduction formula with cuts of 45, 70, and 75 percent in bound tariffs in developed countries would, for instance, reduce the average tariffs facing developing countries from 15 percent to 10 percent—an important gain in market access, but only one-third of the way to complete liberalization. Large cuts such as this would be required for there to be a major impact on market access.

Another key finding from the scenarios is the extraordinary sensitivity of the results to self-selected sensitive and special products. We made the assumption that countries would put into these categories products that are important in trade, subject to high tariffs, and have relatively little binding overhang. Under this assumption, we found that even allowing 2 percent of products in developed countries to have this treatment (and 4 percent in developing countries) would dramatically reduce the effectiveness of tariff reductions as a means of increasing market access. The reduction in the tariff barriers facing developing countries fell from 5 percentage points without sensitive products to 2 percentage points when such flexibilities were included. A tariff cap of 200 percent helped reduce the losses resulting from inclusion of sensitive and special products, particularly by bringing about substantial reductions on cereals. Clearly, if the Doha Round is to be successful in increasing market access, these results suggest that great care will need to be taken to ensure that the share of products allowed special treatment is extremely limited, or that substantial reductions in protection occur even on these products, or that the number of products to be included is restricted in a more meaningful way than by the number of tariff lines.

Comparison of the tiered formula with a regime of proportional cuts confirmed that either approach could bring about a substantial increase in market access. A proportional cut regime reduces high tariffs by larger absolute numbers of percentage points, although not by a larger proportion, as under the tiered formula. The key difference with the proportional cut approach is that some of the countries with the highest tariffs are required to make smaller reductions. This, in turn, reduces the market access gains to countries such as China that face particularly high agricultural tariff barriers.

Examination of the impact of special and differential treatment shows that the developing countries can expand each other's market access opportunities substantially by participating fully in the negotiations. While developing countries' tariffs would fall by more in absolute terms than tariffs in developed countries, the proportional fall would still be smaller because of the bigger tariff binding overhang in developing countries. A factor not considered in this analysis is the potential further gains in market access if developing countries were able to trade fuller participation for deeper cuts in protection in developed countries or for reductions in the use of sensitive products of particular interest to developing countries.

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