FAO TRADE POLICY TECHNICAL NOTES
on issues related to the WTO negotiations on agriculture

No. 2. Tariff reduction formulae: Methodological issues in assessing their effects

CONTENTS

Introduction

The current round of WTO negotiations on agriculture initiated in Doha in 2001 produced a range of suggestions as to the appropriate approach for further cuts in, and disciplines on, the use of agricultural tariffs. Subsequent analyses have provided crucial information for negotiators and policy analysts on the relative implications of these approaches on the tariff profiles of their individual countries as well as on those of their main trading partners. However, it is essential that these analysts and negotiators are aware of a number of key methodological issues and assumptions which can fundamentally affect analytical results.

Section 1 of this technical note provides a brief overview of the evolution of negotiations related to tariff reduction. Section 2 explains the effectiveness of different approaches to tariff reduction in achieving the objectives of the WTO negotiations on market access. Section 3 discusses the construction and use of summary statistics for comparing tariff structures across countries. Section 4 argues that individual country tariff profiles imply different effects for a given tariff-cutting formula across countries and discusses how countries' tariff schedules can be characterized. Section 5 examines methodological issues that can affect the characterization of a tariff profile and, in turn, the estimated incidence of a given approach to tariff reduction on a given country.

1 Objectives of the tariff reduction formulae

The negotiations on agriculture have not yet found a consensus formula for reducing agricultural tariffs. At Doha, WTO members could only agree that the broad goal of comprehensive negotiations in agriculture should aim at "substantial improvements in market access";[1] that special and differential treatment for developing countries should be an integral part of all elements of the negotiations; and that non-trade concerns should be taken into account. Attempts to operationalize this mandate have generated widely divergent views and proposals.

On one side of the spectrum are those groups that want an ambitious outcome in terms of substantial tariff reductions, especially in tariff peaks, and improvement in market access. At the other end of the spectrum are those wanting the flexibility to reduce tariffs modestly on sensitive products, i.e. those products often protected by high tariffs. At the same time, a large number of developing countries want special products related to food security, livelihood and rural development concerns to be largely exempt from tariff reductions, while others would argue against

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[1] A distinction needs to be made between market access and market entry, the latter of which is dependent on a range of factors including SPS/labelling; market structure, the role of TNCs, and supply constraints in countries seeking access. This paper focuses on market access, but recognizes that having greater access to markets does not necessarily mean that countries will be able to export greater quantities of goods to those markets.

tariff reductions that would result in preference erosion.[2]

This divergence in views is illustrated with respect to one proposed reduction approach – the Uruguay Round (UR) formula. Initially in the UR, the United States and the Cairns Group felt that this formula was not ambitious enough, while others, notably the G10, found the formula was too ambitious. The counterproposal of the United States was to use the Swiss formula, with a coefficient of 25, to harmonize tariff levels across countries and bring all tariffs down to less than 25 percent. (Box 1 reviews the alternative approaches.)

Behind the divergence in views as to the extent of tariff reduction to be attained is a more fundamental difference of opinion as to what the development in the Doha Development Agenda implies. Some feel the negotiations should result in substantial improvement in access for every country to every market, some feel they should lead to greater access for developing countries in developed country markets only, and others think it should mean only limited change in the status quo.

In order to fulfil the work programme and timetable established for the negotiations, the task of the chairman of the agriculture negotiations (Harbinson) in the run-up to the Cancun Ministerial Conference was to develop "modalities" for the agriculture negotiations, including a formula for reducing agricultural tariffs[3]. He proposed a banded approach (see Box 1) which attempted to reconcile the positions of all groups. Tariffs in higher bands would be cut by a higher percentage than those in lower bands (this was to satisfy the United States and Cairns Group on ambition and harmonization of tariffs across countries). However, in each band, cuts would take place using a UR approach (an average cut by a negotiated percentage) that would allow flexibility to countries as to which tariff lines would be cut by the minimum for that band. Special and differential treatment (SDT) was to be provided through lower percentage cuts for developing countries in corresponding bands.

When the chairman presented his compromise formula in order to meet the modalities deadline of 31 March 2003, it was roundly rejected by all WTO members, some feeling it was too ambitious (EU, G10, most developing countries) and some feeling it was not ambitious enough (Cairns Group and United States). As a result, the 31 March 2003 modalities deadline was missed.

During the intervening period between March 2003 and the Cancun Ministerial in September 2003, the emphasis shifted from a chairman-driven to a member-driven process. In July 2003, the European Union (EU) and the United States proposed a blending of the UR and Swiss formulae, but SDT provisions were not spelled out, leaving the impression that developed and developing countries might be subject to more or less the same treatment. The G20 reacted with a proposal that the blended formula apply only to developed countries and that the UR formula be used for developing countries. The text, submitted to the Cancun Ministerial conference, retained the blended formula for the developed countries but also contained two options for developing countries: (1) application of a banded approach to developing countries only, or (2) application of the blended formula also to developing countries. The Derbez text resulting from the Cancun Ministerial basically retained the blended formula option for developing countries.

The August 2004 Framework Agreement proposed an approach similar to Harbinson's Banded approach but with no requirement to use the UR formula in each tier. The approach would be applied to all countries, but the formula would be constructed to take account of the differing tariff structures across countries.

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[2] See FAO Trade Policy Technical Notes on "Special and Differential Treatment" and on "Preferences".

[3] A fuller description of the process of negotiations during the Doha Round is provided in WTO (2004) WTO agriculture negotiation: the issues and where are we now (25 October 2004).

BOX 1 - Alternative approaches to reducing tariffs

Negotiations related to the reduction of agricultural tariffs have focused on five main formulae or approaches: the Uruguay Round formula, the Swiss formula, the Banded approach, the Blended approach and the Tiered approach. This box provides a brief overview of their main characteristics and differences.

Uruguay Round formula

The Uruguay Round formula requires the negotiation of an average percentage reduction in tariffs over a number of years with the flexibility of a smaller minimum reduction for individual tariff lines.

The formula applied is $Z = C.X$ where X is the initial tariff rate, C is a constant proportion of the original rate to which the tariff is reduced and Z is the resulting lower tariff rate (end of period). The average reduction is obtained by averaging the Z's applied to each tariff line and not by a reduction in the average X.

The combination of average and minimum reduction figures allows countries the flexibility to vary their actual tariff reductions on individual products.

In the following example, to achieve a 36 percent average cut over six years, a cut of 6 percent per year is applied.

Where tariffs are initially high, the final rates will also be relatively high. For example, a 36 percent reduction of all tariff lines implies that in a tariff line that has an initial tariff of 150 percent the final rate will be 96 percent in year six. If tariffs in other tariff lines start at 10 percent and 25 percent, the rates in year six are 6.4 percent and 16 percent. The range of final tariffs, from 6.4 percent to 96 percent, therefore remains wide.

Figure 1 – Application of the Uruguay Round Formula to different initial tariffs (36 percent over 6 years)
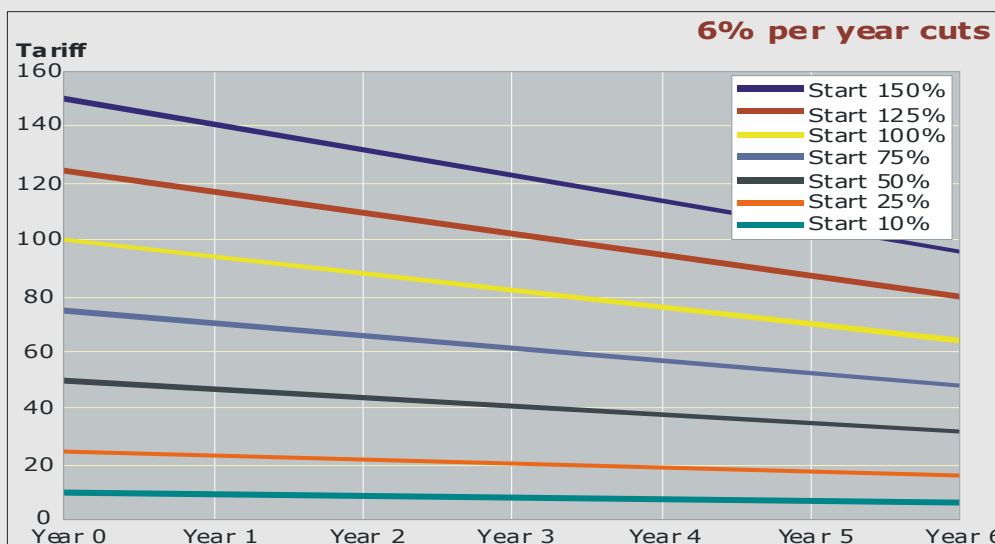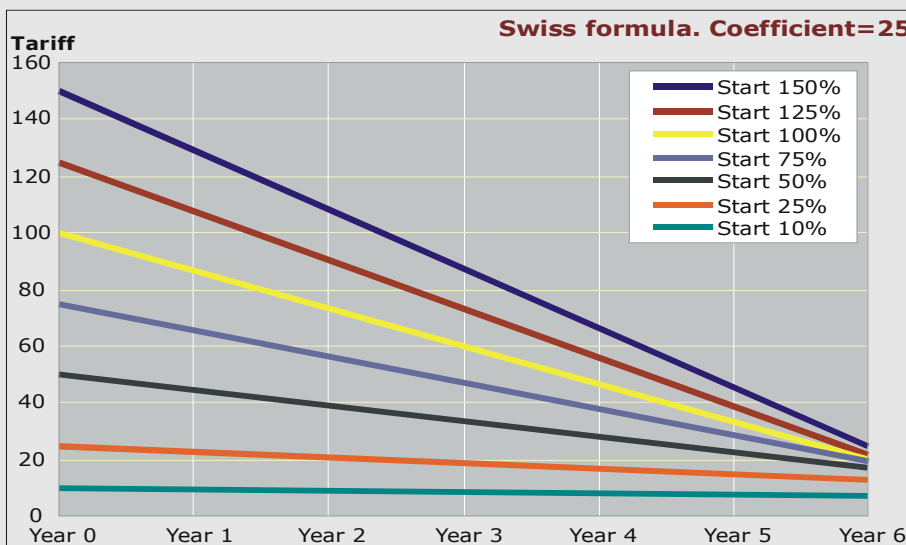

Source: WTO (2004)

Swiss formula

The Swiss formula is a harmonizing formula where a much narrower gap between high and low tariffs is achieved with a built-in maximum tariff. It uses a single mathematical formula to produce a narrow range of final tariff rates from a wide set of initial tariffs and a maximum final rate, no matter how high the original tariff. A key feature is a coefficient. This coefficient determines the maximum final tariff rate below which all tariff rates will to be reduced.

$Z = AX/(A+X)$ where X is the initial tariff rate, A is a coefficient and maximum final tariff rate and Z is the resulting lower tariff rate.

The following chart demonstrates how the same sets of tariff lines depicted above are brought much closer together, harmonized, under the Swiss formula.

Figure 2 – Application of the Swiss Formula to different initial tariffs (Coefficient = 25)

Source: WTO (2004)

In the current Doha round of negotiations, three approaches, utilizing the formulae explained above, have been considered.

Banded approach

The Banded approach, proposed in the Harbinson draft modalities in March 2003, categorizes tariffs into a number of bands on the basis of their initial values. In each band, the UR formula would be applied using different average and minimum cuts in each band. These bands differed for developing and developed countries as shown in Table 1.

Table 1 - Banded formula reductions

Initial tariff level	Average cut (%)	Minimum cut (%)
Developed countries		
Greater than 90%	60	45
15-90%	50	35
0-15%	40	25
Developing countries		
Greater than 120%	40	30
60-120%	35	25
20-60%	30	20
0-20%	25	15
Special products	10	5

Blended approach

The Blended approach, as proposed in the Cancun draft framework, separates products into three groups with tariffs for each of the groups subject to a different type of cut, namely: (1) a Uruguay Round approach with the average and minimum cuts to be negotiated and tariff quotas to provide market access if tariffs remain high; (2) a Swiss formula application; and (3) products falling into the third group being bound at a zero rate, in other words, duty-free. Countries would choose which tariffs were allocated to which group.

Tiered approach

The Tiered approach proposed in the August 2004 framework agreement reverts, in part, to the strategy of the Banded approach by characterizing products according to the height of their initial tariff. However, the Tiered approach leaves the option open for the application of any formula approach in any of the tiers. Although both the tiers (number and width) and the formulae (type and coefficients) remain to be negotiated, it was agreed that higher tiers would face steeper cuts.

Adapted from WTO (2003) and WTO (2004)

2 Issues raised in relation to the reduction formulae

- *What are the objectives?*

From a review of the proposals to date, the differing positions of WTO members can be summarized in terms of four objectives:[4]

(a) ambition – substantial reductions in average tariff levels;

(b) harmonization – post-reduction tariffs should be similar across countries (this can also result in reduced tariff peaks and escalation);

(c) flexibility – accommodation of country-specific concerns relating to sensitive and special products; and

(d) proportionality – SDT for developing countries, implying less onerous commitments than those agreed for developed countries with a lower proportional cut for developing countries than developed countries.

Attempting to achieve a range of objectives within a single mathematical formulation is obviously difficult, if not impossible. A key difficulty lies in balancing ambition and flexibility. This task is made more difficult by the fact that each country has a distinct tariff profile. Differences in tariff profiles can have significant implications in terms of the relative incidence of different formulae and, therefore, a formula that attains an appropriate balance in one country will not necessarily do so for others.

Evaluating the incidence of different formulae against the objectives is further complicated by a number of methodological issues. These issues relate both to the structure of a country's existing agricultural tariffs and to the estimation of their incidence after the application of a given approach to tariff reduction.

- *To what extent do the alternative approaches meet these objectives?*

Table 2 provides a summary of the relative success of alternative formulae in meeting the objectives. There is some ambiguity as to which measure should be used to assess the objectives. For example, should ambition be defined as a cut in the average or an average cut (for reasons given below, the latter is used here). Harmonization is taken as meaning progressivity, i.e. that percentage cuts in high tariff rates are greater than those in low rates and may result in reductions of tariff peaks, escalation and dispersion. Flexibility implies the freedom to decide final rates at tariff line level, while proportionality is the extent to which developing countries' reduction commitments are less than developed countries' reduction commitments.

Table 2 - Comparing formulae against objectives

	UR	Swiss	Banded	Blended
Ambition	Yes	Yes	Yes	Not guaranteed
Harmonization	No	Yes	Not guaranteed	Not guaranteed
Flexibility	Yes	No	Limited	Yes
Proportionality	Yes	No	Yes	No

Source: Adapted from Konandreas (2004). The tiered approach is not included as the outcome would depend upon the permutation of tiers and formulae adopted which would, in turn, affect which objectives were met and which were not.

In terms of flexibility, the UR formula scores highest, followed by the blended, banded, and Swiss. In terms of harmonization, the Swiss ranks highest followed by the banded and blended.

Although it brings about an average cut in tariffs, the UR formula fails to achieve significant reductions in tariff peaks and it is often rejected because flexibility can be easily abused. However, in its defence, it has the advantage of being both linear and more transparent.

The Swiss formula achieves a cut, particularly in peaks, but this reduction can be highly uneven in terms of the degree to which different countries are required to reduce their tariffs. Given that developing countries tend to have higher average initial bound tariffs than developed countries with the current tariff profiles (as explained in the following section), using the Swiss formula rather than a banded formula would result in greater average cuts in developing countries than in developed countries. The Swiss formula therefore violates the objective of proportionality. Indeed, as Table 3 reflects, the United States would face the lowest average tariff reduction of all selected countries, reinforcing the point that a country's tariff profile matters.

The banded formula provides some middle ground between the UR and Swiss formulae in maintaining proportionality, and under some circumstances provides greater harmonization than the UR but less than the Swiss formula. However, while there is no built-in mechanism to allow flexibility in the treatment of special or sensitive products that would fall within the band subject to the highest level of reduction, the banded formula can effectively reduce peaks, albeit not to the extent of the Swiss formula. It offers, therefore, a better balance in achieving the objectives than either the UR or Swiss formulae used alone.

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[4] See, for example, Konandreas (2004).

Table 3 - Achieving proportionality: The Banded Approach vs the Swiss formula

WTO member	Average initial bound tariff (%)	Average tariff reduction using Swiss (%)	Average tariff reduction using Banded (%)
United States	6.4	17.8	41.3
EU	17.4	37.1	44.7
Japan	20.8	34.6	44.2
Brazil	35.5	40.5	29.6
Colombia	91.9	63.2	35.8
India	115.1	66.6	36.1
Kenya	100.0	66.7	35.0

Source: Adapted from Tables 3 and 4, Konandreas (2004). Note: in this example the Swiss formula uses a coefficient of 25 for developed and 50 for developing countries. The cuts within the Banded approach are as specified in Box 1.

The outcome of the application of a blended formula is more difficult to judge, given that the results are highly dependent upon the parameters used, both in defining the width of the tariff groups (i.e. those subject to different reduction formulae) and in the coefficients in the reduction formulae applied. As with the Swiss formula, cuts are achieved but, again, the objective of proportionality is likely to be violated since tariff peaks will only be cut if the UR band is very narrow. Conversely, flexibility will be ensured only if the UR band is wide enough. The uncertainty intrinsic in the formula has been a fundamental cause of the difficulty in reaching agreement for its adoption.

At issue in the application of the blended approach is the definition of the group of tariff lines to be bound at zero percent. Within the approach, tariff lines allocated to this group will not necessarily have to be reduced, as many developed countries already have a large proportion of tariffs (approximately one third) bound at zero percent. The total proportion of duty-free lines in agricultural schedules varies by country. In New Zealand, 46 percent of its 988 lines are duty free; in the United States, 22 percent of 1 772 lines; in Japan, 24 percent of 1 341; in South Africa, 23 percent of 760 lines; and in the EU, 19 percent of 2 200. By contrast, in most developing countries, few agricultural tariff lines are bound at zero percent, the implication being that the tariff lines allocated to be bound at zero will effectively need to be cut.

The main criticism of the blended formula is that because most developing countries have average agricultural tariffs higher than those of most developed countries, the Swiss element of the blend would require the developing countries to make greater cuts in their agricultural tariffs than the developed countries. Moreover, since only about 2 to 10 percent of developed countries' tariffs are peak tariffs, they would have the flexibility to allocate these into the UR part of the blend where only minimal cuts could be made to tariff peaks.

- *Is the target an average cut or a cut in the average tariff?*

It is useful to emphasize the distinction between an average cut in tariffs as opposed to a cut in the average tariff. In the UR, an average cut in tariffs is defined as an average of the percentage reductions across each tariff line and allows for a minimal reduction in tariffs, especially higher tariffs, while a cut in the average tariff imposes more discipline.

Take for example a country with two tariff lines. Tariff 1 is initially set at 1 percent and then cut to 0 percent for a cut of 100 percent. Tariff 2 is initially set at 1 400 percent and maintained at this level after the application of the formula, a cut of 0 percent. Across the two lines, the average cut is equal to (100 percent + 0 percent)/2 = 50 percent. A significant average cut is achieved, but there has been no effective reduction of the average tariff, which falls from 700.5 percent to 700 percent. A cut in the average therefore provides more flexibility in choosing not to cut a particular tariff line.

The implication is that in countries with skewed tariff profiles, lines with peak tariffs need not necessarily be cut, thus retaining much of the protective effect of the existing schedule. In addition, the variance of tariffs in the profile could be increased. The problem could be reduced somewhat by taking tariff lines currently set at zero out of the calculation of the average tariff cut. However, scope would still remain for reducing tariffs on sensitive products only by the minimum. In contrast, for countries with uniform bindings, the average cut *would* in effect deliver a cut in the average tariff.

3   Indications of summary statistics for comparing tariff structures

There is no simple way to compare individual countries' tariff schedules. One approach adopted by researchers has been to provide summary statistics on tariff averages. The application of formulae has often been considered against these averages.

Table 4 - Summary statistics of tariff structures – example 1

WTO member	Average initial bound tariff (%)	Coefficient of variation of bound tariffs (%)	Peak initial bound tariff (%)	Average initial applied tariff (%)	Coefficient of variation of applied tariffs (%)	Peak initial applied tariff (%)	Average bound over average applied tariffs (%)	Peak bound over average bound (%)
United States	6.4	257.8	182.7	6.4	254.7	182.7	100.0	2854.7
EU	17.4	170.1	456.9	17.4	170.1	456.9	100.0	2625.9
Japan	20.8	245.7	534.8	18.5	242.7	477.9	112.4	2571.2
Brazil	35.5	29.6	55.0	12.5	43.2	55.0	284.0	154.9
Colombia	91.9	37.4	227.0	14.8	35.1	20.0	620.9	247.0
India	115.1	45.9	300.0	42.6	63.1	210.0	270.2	260.6
Kenya	100.0	0.0	100.0	23.1	52.4	85.0	432.9	100.0

Source: Konandreas (2004) Compiled from data provided by UNCTAD, based on 6 digit HS tariff lines (620-670 tariff lines for each member).

Table 5 - Summary statistics of tariff structures – example 2

	Simple average		Weighted average		Binding overhang	CV	Bound at zero
	Applied %	Bound %	Applied %	Bound %	% of bound (weighed)	% (weighed)	%
Industrialized countries	24	48	14	25	43	246	29
EU	20	23	17	21	18	168	25
Japan	24	48	21	52	60	282	29
United States	5	6.1	5	7	24	203	28
Developing countries	16	62	24	60	59	137	1

Source: Martin and Zhi (2004). Values rounded. Binding overhang is defined as the percentage cut in the weighted average bound tariff required to reduce its level to that of the weighted average applied tariff.

Tables 4 and 5 provide two examples of attempts to summarize tariff structures across selected countries. Although there is some divergence in these quantitative estimates of tariffs, for reasons discussed in the succeeding sections, a number of observations can be made.

1. Average bound rates for developed countries tend to be less than those for developing countries, but the dispersion of tariffs is greater in developed than in developing countries for both bound and applied tariffs.

2. Tariff peaks are greater in developed than in developing countries for both bound and applied tariffs.
3. For developed countries, bound tariffs are *generally* closer, and in many cases identical, to applied tariffs.[5]
4. In developing countries, there is often a significant gap between bound and applied tariffs.

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[5] Note that in Konandreas (2004), bound and applied rates are almost equal, but in Martin and Zhi (2004), a binding overhang of 43 percent on weighted is calculated. The discrepancy requires clarification of the extent of binding overhang in developed countries.

5. Tariff profiles of developed countries tend to be highly skewed.

The following looks at a number of issues that require consideration in the determination of summary statistics.

- *The calculation of weighted averages vs. simple averages*

There is some debate over the use of weighted averages as opposed to simple averages. The straight forward approach takes a simple average of tariffs on all tariff lines.[6] However, some analysts prefer to use a weighted average because simple averages that take an average of the tariff values across all tariffs have been criticized for treating all tariff lines as equally important.

The alternative weighted averages also can be problematic in not fully reflecting the incidence of prohibitive tariffs. For example, where high or prohibitive tariffs exist, bilateral trade may not take place or may be extremely limited. As a result, a low weight for that tariff line in the calculation masks its relevance. In these cases, the internal value of the tariff could be used as a proxy. As a rule of thumb, simple average tariffs are often taken as equalling two times the value of weighted tariffs, but there are significant exceptions both in sectors, e.g. oilseed, and in many developing countries. Where trade is minimal due to the restrictive tariff levels, one alternative approach weights tariffs by production or consumption volume rather than by trade volume.

- *Specific as well as ad valorem tariffs are used*

Not all tariffs are specified on a simple ad valorem basis. Specific tariffs are criticized both for lack of transparency and for providing increased protection when prices fall. These types of tariffs tend to be used with the highest frequency for products with high levels of support in domestic markets, namely meat, dairy, sugar and cereals (Shirotiri, 2004).

Non-ad valorem tariffs should be converted to ad valorem equivalents (AVEs) in order to allow for profiles to be constructed, for aggregation across lines in the calculation of averages, and so non-ad valorem tariffs can be disciplined in practice. The methodologies for calculating AVEs for specific tariffs are discussed in Section 5.

- *Quantification of tariff lines when tariff-rate quotas (TRQs) are present*

The issue of how TRQs are defined and treated in the calculation of tariff equivalents is problematic.

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[6] These can be calculated at the tariff line, 8-digit or 6-digit level.

Of the EU's agricultural tariff lines, 12.3 percent are subject to TRQs. In the United States, 398 tariff lines are subject to TRQs, although only 196 of these are over quota tariff lines, equating to 10.8 percent of the United States' total agricultural tariff lines (Nassar, 2004).

Equivalent tariffs may differ depending on whether the import quota is filled. This influences the calculation of the applied tariff rates. UNCTAD calculates the applied tariff by averaging at the tariff line level. For example, if the in-quota tariff is 0 percent and the out-of-quota tariff is 100 percent, the applied tariff is calculated as 50 percent. However, the UNCTAD calculations include in-quota rates for Canada, the United States and Japan, but not for the EU. Additionally, the data are not available for China.

It would also be useful to investigate the impact on prices according to whether the status quo is the in-quota or the out-of-quota rate. This would depend upon whether or not the quota is filled, since the domestic price depends upon the fill rate. However, as a rule of thumb, the use of the out-of-quota price is considered to be best practice.

4   Implications of tariff profiles

While summary statistics have some value in illustrating the status quo, in practice the formulae will be applied at the tariff-line level. Analysts will need to investigate how individual tariff values, not the averages, are affected.

The previous sections demonstrate the importance of the tariff profile of an individual country in determining the incidence of a particular approach to tariff reduction. The key question facing analysts is how to characterize tariff profiles so that the implications of a particular approach can be determined.

Tariff structures can be illustrated pictorially, through use of a histogram, but analysts still need to run any proposed formula through the tariff schedules of all significant trading partners, each of which may have quite different profiles. Given the large number of possible trading partners, it may be necessary to analyze only those tariff lines that are most relevant to a given country.

For example, Figures 3, 4 and 5 provide depictions of the tariff profiles of the EU, Brazil and Cameroon. The profile of the EU shows a widely varying set of tariffs with significant peaks but with no gap between applied and bound tariff rates. In the case of Brazil, there is a variable, but relatively narrow, range of tariffs with bound rates generally, but not exclusively, above applied rates. For Cameroon, all tariffs are bound at 80 percent with all applied tariffs significantly lower at between 5 and 30 percent.
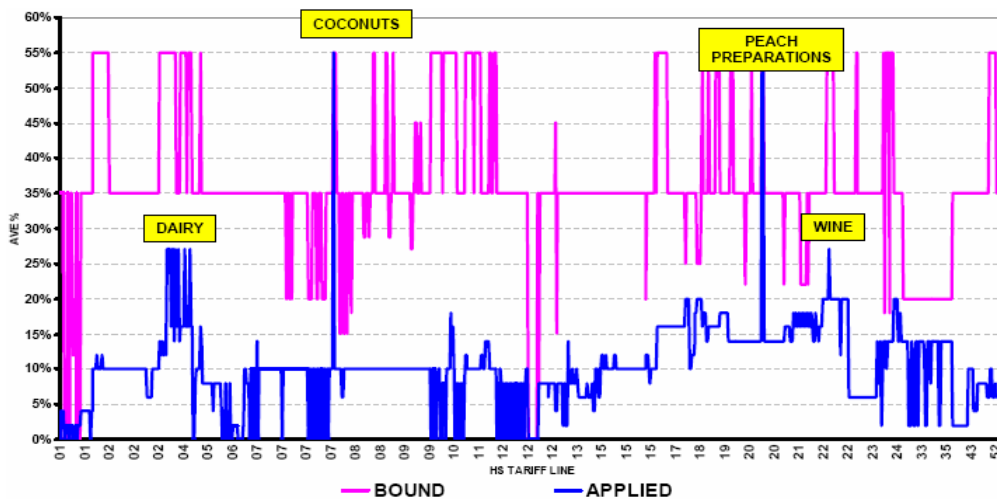
Figure 3 - EU tariff structure distribution according to HS Chapters
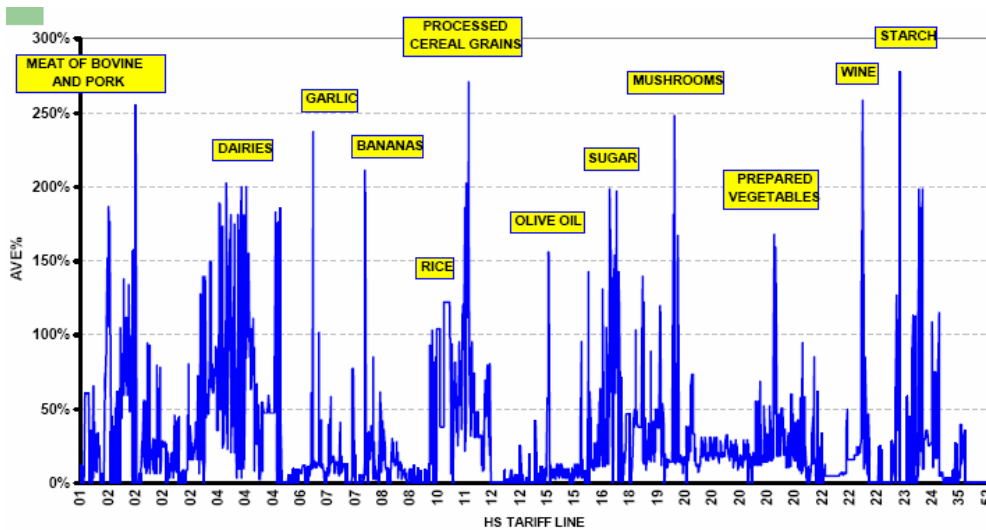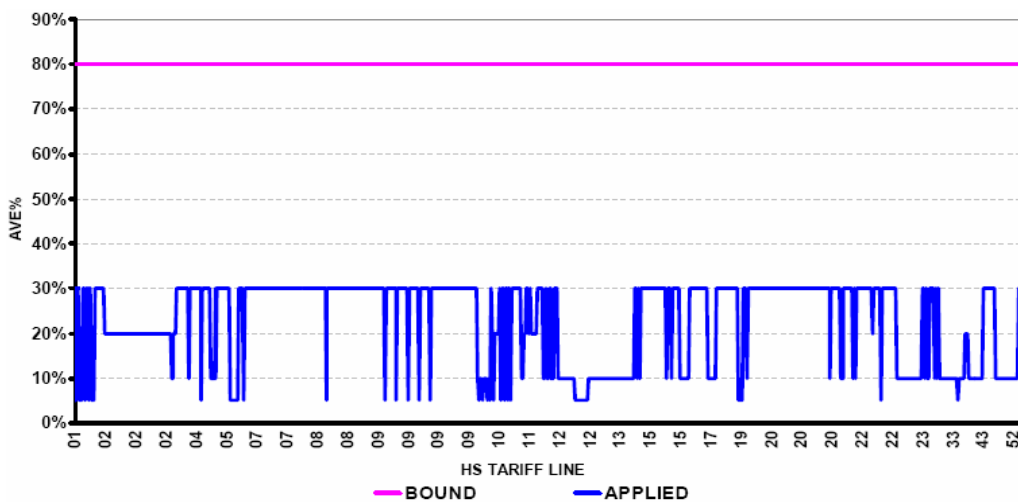

Source: Nassar (2004)

Figure 4 - Brazilian tariff structure distribution according to HS Chapters

Source: Nassar (2004)

Figure 5 - Cameroon's tariff structure distribution according to HS Chapters

Source: Nassar (2004)

Two key observations can be made with respect to the different structures: (1) profiles are not generally uniform, and (2) the bound tariff levels can differ significantly from applied tariff rates.

- *Uniform vs. non-uniform tariff structures*

The relative skewing or uniformity of the profile at the country level is not captured by use of the mean and CV in the summary statistics. However, this characteristic is fundamental in determining the incidence of alternative formulae. A skewed profile gives greater opportunity for the protection of tariff peaks because they can be set against the majority of low tariff lines in applying a reduction formula. By contrast, a more uniform profile, as characteristic of many developing countries, would result in a greater reduction of the average tariff.

The Blended formula is a case in point. If countries were allowed to allocate 10 percent of their tariff lines to a group on which the UR formula were to be applied, the result would be lower reductions for a country with a skewed distribution (the country would select its peak tariffs for the less stringent formula) than for the country with a uniform structure where all tariffs are at the same level (tariffs at this level would not be protected from the Swiss formula reduction).

The schedules of the EU and Cameroon are illustrative. In the EU, the vast majority of tariff lines are bound at less than 40 percent, but a significant number are subject to very high tariffs. By contrast, in Cameroon, all tariffs are bound at 80 percent.

- *Bound vs. applied tariffs*

With the exception of the United States, which proposed that further disciplines on tariffs be negotiated on the basis of applied tariff values, most countries requested a focus on reducing bound tariff levels. This has been agreed as the adopted approach.

While many developed countries have applied tariffs equal to their bound levels (as shown for the EU), there is often a significant gap between applied and bound tariffs in developing countries. This has led some to suggest that even though tariff formulae may require developing countries to cut their bound rates further than developed countries on average, this would not, in fact, be problematic, given that at currently applied levels, the tariffs used by these countries would be unaffected.

While this may be true for all product lines in some countries (for example Cameroon) it would not hold true for product lines in other countries (for example peach preparations in Brazil). Additionally, some developing countries have argued that the gap between the applied and bound tariffs allows them to raise applied tariffs

within the bindings, as a safeguard measure.[7] This has been stressed as being important for countries not having recourse to the SSG. However, the proposal to create a Special Safeguard Mechanism (SSM) available to all developing countries may obviate the need for this flexibility.

As seen in the Brazilian case in Figure 4, applied tariffs are sometimes greater than bound tariffs. This occurs because applied tariffs are calculated using data from before the end of the UR implementation period whereas bound tariffs are calculated from data at the end of the UR implementation period. Therefore, sometimes the applied rate is still greater than the intended bound rate. This is particularly the case where a longer implementation period is in place for developing countries. A current WTO project linking applied and bound tariffs in the datasets should be operational in late 2004.

5   Technical issues relating to the application of tariff reduction formulae

Differences in the way a tariff profile is characterized by analysts can result in large divergences in estimations of effective market access resulting from a given reduction formula. Therefore, the complexity of tariff structures in many countries requires a number of data and technical issues to be addressed before an analysis of the incidence of alternative tariff reduction formulae can be undertaken adequately.

Differences in estimated tariff profiles result from a number of reasons including: (a) the degree of disaggregation of tariff lines, (b) the data set used and (c) the approach used to convert specific tariffs to ad valorem equivalents, particularly the price used and the base year selected.

- *Tariff line definitions*

Data availability often determines the way in which tariff structures are constructed for analyses. Whilst the WTO agreement will be implemented at the tariff line level, this level of detail often is not available to the analyst who will conduct analysis at a more aggregate (6-digit or 8-digit) level, depending on data availability. There are a number of gaps in the data sets and some significant divergence between sources.

The harmonized system (HS) level at which the formula is applied can affect the degree of reduction of tariff peaks. For example, the United States has seven over-quota tariffs bound at 350 percent. Applying a Swiss reduction formula with a coefficient of 25 at the tariff line level would

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[7] This strategy would be WTO compatible if the adjustments to tariffs were announced well in advance, but not, for example, if they were adjusted by shipment as, for example, in the case of a variable levy.

reduce these tariffs to 23 percent (a 90 percent cut). However, if the same formula is applied to the 6-digit-level averages in which the 350 percent tariff lines are found (these averages come out at between 36 and 92 percent), then applying the Swiss 25 reduction formula to these averages would yield cuts of between 60 and 80 percent, and new bound tariffs of between 75 and 143 percent. In other words, the peaks would be hidden in the analyses undertaken at the 6-digit level.

From an analytical viewpoint, this indicates that working at the 6-digit level is easier. It allows greater standardization across countries and could also be better for making commitments, since commitments made at the tariff-line level allow greater opportunity for splitting tariff lines when the intention is to allow flexibility to protect specific lines.

- *Datasets*

A number of databases are available for use by analysts. The principle databases are the following.[8]

- WTO Integrated Database – currently accessible to organizations such as FAO, OECD, CARICOM and the World Bank at the tariff-line level with progress in improving access to intergovernmental organizations. It has some detail on commitments as well as schedules. if.wto.org/WTO_resources/idb/intro_e.htm.

- UNCTAD and ITC – collected and collated applied tariff data at the tariff-line level from national customs schedules (UN TARMAC Database). www.intracen.org/mas/mac.htm

- The ERS/USDA database – covers 54 countries and is particularly strong on specific tariffs. www.fas.usda.gov/ustrade/

- COMTRADE database – contains UNCTAD trade flow data. unstats.un.org/unsd/comtrade/

- TRAINS database – contains UNCTAD data on bound and applied tariffs. r0.unctad.org/trains/.

It should be noted there are some disparities in numbers across the databases. For example, Australian sugar exports are generally found to be greater than all imports of sugar from Australia – with a 30 percent discrepancy in some trade flows. This may be due to the fact that sugar is sold "on the boat" and it is difficult for databases

to discriminate as to where it is exported from. The WTO secretariat is currently collaborating with UNCTAD to close the divergences.

In addition, two key gaps have been identified in the existing databases:

- no provision of AVEs,[9] making it difficult for analysts to describe current tariff profiles accurately and to determine the incidence of alternative reduction formulae;

- less than full coverage of preferences which, given the importance of establishing the impact of preference erosion in the current negotiations, represents a significant gap.

- *The conversion of specific tariffs to AVEs*

In the previous section, the need to convert tariffs specified on a per volume basis to an *ad valorem* basis was explained. However, this is not straightforward. Table 6 shows how a specific tariff of US$5/kg can have widely different AVE values depending upon the unit value in the country in question.

Essentially, tariff lines specified as specific are converted by dividing the specific tariff by the price of the good. However, the choice of this price can generate widely differing results. Commonly, import unit values are used, but different approaches are used by different institutions. For example, UNCTAD has employed two methods:

- UNCTAD Method 1 uses the unit values of own-country imports at the tariff-line level;

- UNCTAD Method 2 uses the unit values of OECD-wide imports at the HS 6-digit level.

UNCTAD has used Method 2 to estimate AVEs for the QUAD countries and for Norway and Switzerland. They generate simple averages from the tariff-line level to the HS 6-digit level for all trading partners and for all products, taking into account available applied preference rates. They then take weighted average bilateral imports across GTAP regions and product categories. Normally, Method 2 generates higher values, as depicted in Figure 6.

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[8] The World Bank have developed software (WITS) to access a number of these databases. Users are required to register: http://wits.worldbank.org/witsnet/StartUp/Wits_Information.aspx.

[9] Although both the EU and the United States provide their own estimates of these.

Table 6 - A specific tariff can have different AVEs: example for a specific tariff of US$5/kg

Supplying country	Import value (US$)	Import volume (kg)	CIF Unit import value (US$/kg)	Total duty (US$)	AVE (%)
Country A	10 000	150	67	750	7.5
Country B	2 000	20	100	100	5.0
Country C	1 000	5	200	25	2.5
Country Z	50 000	300	167	1 500	3.0
Countries A, B, C & Z	63 000	475	133	2 375	3.8
World trade	200 000 000	2 000 000	100		5.0

Figure 6 - Conversion to AVE for the EU using UNCTAD Methods 1 and 2
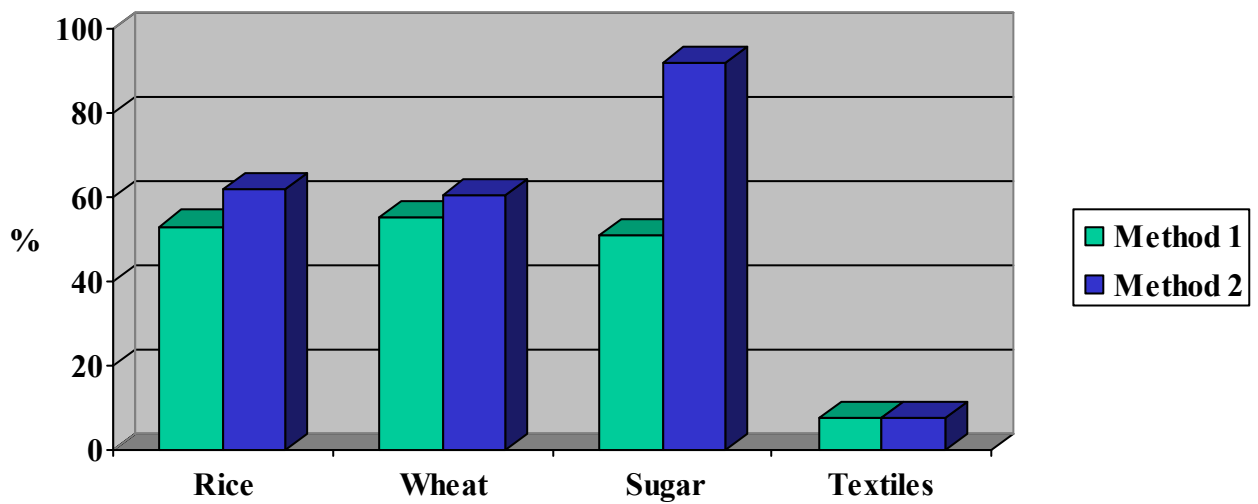
Source: Vanzetti (2004)

Table 7 - The implication of using CIF values instead of FOB values

Ad valorem rate

Valuation base	Import unit value ($/tonne)	Import quantity (tonnes)	Tariff	Duty paid ($)	Duty paid/FOB import value
FOB basis	100	1 000	50%	50 000	50%
CIF basis	120	1 000	50%	60 000	60%

Specific rate

Valuation base	Import unit value ($/tonne)	Import quantity (tonnes)	Tariff	Duty paid ($)	Ad valorem equivalent
FOB basis	100	1 000	50	50 000	50%
CIF basis	120	1 000	50	50 000	42%

Source: Wainio (2004)

An alternative set of approaches is specified in the WTO modalities document for NAMA[10] which applies the following rules:

- NAMA1 – if available, use the specific Member's import values and quantities to calculate the import unit value at the tariff-line level;

- NAMA2 – if unavailable at tariff-line level, use the Member's import values and quantities at the HS 6-digit level;

- NAMA3 – if neither is available, use the world unit values at HS 6-digit level;

- all tariffs for which an AVE cannot be calculated shall be assumed equal to the Member's tariff mean.

For NAMA 3, if there is no trade, then the world unit values are a good proxy. However, the application of the fourth rule is problematic given the significant number of tariff peaks that may be classified as not calculable and, thus, implicitly given the much lower value of the mean tariff.

The conversion to *ad valorem* values also will depend on the base year selected, the degree of disaggregation of tariffs and whether FOB or CIF values are used.

With respect to the base year, Nassar (2004) notes that the year in which imports are recorded is highly significant. For example, with a 2000/02 average, a relatively low world price is implied, resulting in a higher calculated tariff.

The use of CIF values can introduce a significant bias in the calculation of the AVE, as shown in the following example (Table 7) that demonstrates the implication of assessing tariffs on a CIF, as opposed to an FOB, basis.

The FOB price should be used in the calculation to ensure consistency across specific and ad valorem rates. However, in the NAMA annex for example, this is not required and countries are therefore likely to select the calculation which results in the minimum reduction.

Complicating the issue further, tariffs can be formulated in a number of ways:

- specific – $/unit, e.g. $1.80/m^3;

- compound – % of value plus $/unit, e.g. 1.4% + $0.57/kg;

- mixed – $/unit subject to a minimum value, e.g. 4.4c/kg but not less than 17.5%;

- technical – tariff on basis of type/quality, e.g. 3.66c/kg less 0.02c/kg for each degree under 100 degrees.

Additional complications arise with non-computable tariffs, e.g. those with unspecified variable tariffs, those such as agricultural components where the tariff element is applicable to input content, or those where there is a blank tariff line or an incomplete description.

6   Concluding remarks

A key difficulty in the negotiations on market access is that individual members have widely different objectives. This gives rise to many questions as to how to implement an agreement on market access that achieves the joint goals of flexibility, harmonization, ambition and proportionality. Achieving this with a single mathematical formula is likely to be very difficult. Analysts need to judge proposals in terms of how well they achieve objectives, looking at the implications of different formulae for countries with vastly different tariff profiles.

This note has reviewed the application of different approaches in terms of the main objectives, noting the various issues that can

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[10] Draft Elements for Modalities for Negotiations on Non-Agricultural Negotiations, WTO, TN/MA/W/35/Rev.1, 19 August 2003.

complicate this analysis. It has argued that summary statistics may reveal the status quo but are of limited value in determining the incidence of different tariff reduction approaches in practice. It also has explained an alternative method of characterizing tariff profiles and discussed the importance of the uniformity (or skew) of a profile and the gap between applied and bound tariffs.

Finally, it has explained how decisions on a number of technical issues can have significant consequences on the way in which tariff profiles are characterized and on the analysis of the incidence of alternative reduction approaches.

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