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Flexibilities in Negotiations on Non-Agricultural Products*

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Abstract

The current negotiations on non-agricultural market access for developing countries involve ambitious tariff-cutting formulas combined with exceptions or "flexibilities" for some products. The resulting complexity makes it difficult to be sure what the effects of "modalities" would be. We develop a political-economy model to understand the support for the current tariff regime, and hence the political costs of alternative approaches to tariff cutting. We then use this model to assess countries' likely choices of flexibility options, and the implications for tariffs if the proposed modalities under recent discussion were implemented.

*The views expressed in this paper are those of the authors alone and not those of any institution with which they may be affiliated.

Flexibilities in Negotiations on Non-Agricultural Products

International negotiations on industrial products frequently involve the use of quite rigorous approaches to liberalization combined with provisions for more flexible treatment for particular products. This phenomenon has been particularly evident in the handling of non-agricultural market access (NAMA) for developing countries under the Doha Development Agenda, but is an important feature of other negotiations such as those for regional trade arrangements where "substantially all trade" must be included. A related issue arises in negotiations on the provision of duty-free, quota-free access to the least developed countries under the Doha Development Agenda.

The approach used for developing countries in the current WTO negotiations has similarities to that used for the then-industrial countries in the Kennedy Round and Tokyo Rounds of WTO negotiations in the 1960s and 1970s. However, it differs in some important respects. In the earlier negotiations, it appears that the objective was to include essentially all trade, and the exceptions emerged more or less as an afterthought, with no pre-negotiated approach to determining their extent. In recent negotiations — such as the Doha Agenda negotiations, and the negotiations between the European Union and developing countries on Economic Partnership Agreements (EPAs) — the formulas to be used for tariff cutting and the rules regarding flexibilities to deviate from these formulas are being negotiated simultaneously.

In many cases, the flexibility options involve formulas that cut tariffs quite aggressively unless the products are identified as exceptions. This tendency is particularly marked in negotiations on free trade areas, where WTO rules require that tariffs be eliminated on substantially all trade. It is also evident in the WTO negotiations on non-agricultural products, where the Swiss formulas under negotiation would require very large reductions in the highest tariffs. Another strong tendency is to allow the outcomes for the excepted products to deviate substantially from the formula outcomes. Sometimes, as in the WTO's NAMA negotiations, the flexibility options include quite complex menus of choices.

Another feature of recent negotiations is for flexibilities on non-agricultural products to be provided only for developing countries. In a WTO context, this may be because industrial products in industrial countries have already been subject to cuts and

binding through eight previous multilateral rounds of negotiations. In agriculture, where negotiated disciplines on tariffs were first introduced with the Uruguay Round agreement of 1994, there continues to be demand for flexibilities in both industrial and developing countries (Jean, Laborde and Martin 2008).

The use of a formula approach to negotiations has a key advantage over earlier approaches such as request-and-offer in that they potentially allow countries to make a holistic assessment of the "gain" side of the equation as well as the political "pain" of their own liberalization. Flexibilities of the type discussed in the WTO negotiations potentially prejudice this advantage by leaving participants unsure how their trading partners will use the flexibilities to reduce liberalization on the products of greatest interest to them. Once the gains become unclear, it is tempting for negotiators to focus on the political "pain" associated with own-liberalization, and to become defensive, rather than balanced, in their perspective on the negotiations.

Given the emerging approach to the handling of these issues, a number of important research challenges can be identified. A first is to predict the effects of proposed sets of exceptions on countries' choices of products to be chosen for flexible treatment, and hence on the implications of a potential agreement for efficiency and for market access. Another is to understand the underlying economic logic of the sharp difference between the formula and the treatment of those products chosen for flexibility—does it make sense to combine sharp tariff-cutting formulas with relatively liberal exceptions. A third challenge is to help design menus of potential flexibility options that better achieve the goals of the negotiations.

In earlier work (Laborde, Martin and van der Mensbrugghe 2008), we have attempted to assess the implications of the Modalities for overall market access. In this paper our focus is much more directly on the implications of the menu of flexibility options available to developing countries. To obtain insight into these implications, we restrict our examination to the relatively small set of countries covered by the "standard" developing country tariff regime. Many other developing countries are covered by different provisions, such as those for Small and Vulnerable Economies (SVEs); countries with low binding coverage (Paragraph 6 countries); or Recently-Acceded

Members (RAMS), and the effects of flexibilities may be quite different for these countries.

Our analysis of the likely outcome of these flexibilities rely on a political economy setting à la Grossman and Helpman (1994), whereby both welfare and vested group interest are taken into account in representing the motivation of trade policy. We use this framework to value the liberalization options from the policy maker's point of view. We can then assess the choices of policy makers when faced with constrained flexibilities. We do not believe that we can hope, with this type of analysis, to identify any benefits that might arise from use of import substituting policies for infant-industry purposes, as considered by Rodrik (2007). However, we hope that it has the potential to provide information on the deadweight costs of these flexibilities to the home economy and the costs in terms of market access losses to trading partners that is relevant irrespective of the reason that the flexibilities are sought.

In this paper, we begin with a brief review of some of the policy discussions on flexibilities, focusing primarily on the WTO negotiations on NAMA products. Then, we formulate an approach to assessing the products likely to be chosen for flexibilities. Finally, we examine the implications of including sensitive product treatment in the Modalities for the tariffs levied, and for economic welfare and market access.

The Proposed Tariff-Cutting Approach

The proposals for Modalities in the Doha Agenda reflect seven years of hard negotiations. While—as always in WTO rounds—nothing is agreed until everything is agreed, it appears that Ministers representing WTO members were close to reaching agreement on the Modalities for NAMA at their meeting in July 2008. Certainly, the issues remaining in contention at this meeting were the special safeguard and the treatment of cotton—both of which are issues in the agricultural negotiations.

The proposal which seemed to find support amongst WTO members involves the use of a Swiss formula for tariff cutting in both industrial and developing country members. For industrial country members, no flexibilities were to be allowed, while developing countries had a menu of alternative flexibilities (WTO 2008). The basic

approach to tariff cutting is the use of a Swiss formula, which leads to large cuts in high tariffs, and hence is strongly harmonizing. This is coupled with a menu of choices that allow countries to make substantial deviations from the formula on selected products. The range of products chosen for smaller cuts is constrained by restrictions on the number of products and the value of imports.

The Swiss formula is:

(1) $$t_1 = \frac{a_i . t_0}{a_i + t_0}$$

where t_1 is the tariff after application of the formula; t_0 is the tariff rate before application of the formula, and a_i is a coefficient for group i. The critical element of this formula is the coefficient, a_i which determines the extent of the reduction in each tariff, and the maximum potential tariff.

The Swiss formula is highly nonlinear, and involves much larger proportional cuts in the highest tariffs than in relatively low tariffs. The flexibilities have been defined as using cuts equal to one half of the formula, or equal to zero. Other alternatives, such as allowing products chosen for flexibilities to use a coefficient twice as high as the coefficient otherwise used, would likely have had a stronger harmonizing effect than an exception based on half the formula cut (Messerlin 2008).

The proposal which was under discussion at the July 2008 Ministerial in Geneva involved a coefficient of 8 percent for industrial countries and three different potential coefficients for developing countries based on a sliding-scale (Stephenson 2008). Since there appears to have been something close to consensus on these coefficients, it seems preferable to focus on them, rather than on the ranges in the draft Modalities prepared prior to the meeting (WTO 2008). Under the potential compromise proposal, a coefficient of 20 percent would have allowed countries to make half of the proportional cut implied by the formula on 14 percent of non-agricultural tariff lines, accounting for no more than 16 percent of non-agricultural imports; or to make no cuts on 6.5 percent of tariff lines accounting for 7.5 percent of imports. A coefficient of 22 percent would allow countries to use half the formula cut on 10 percent of tariff lines and 10 percent of imports. Finally, a coefficient of 24 percent would allow no flexibility to deviate from the formula.

The specific proposal under discussion (WTO 2008) also involves a number of detailed provisions to deal with the concerns of particular groups of countries[1]. UN-defined Least Developed Countries (LDCs) are exempt from formula cuts but are expected to substantially increase their level of binding coverage. Non-LDC countries with binding coverage below 35 percent[2] are required to bind [70-90] percent of lines if their binding coverage is currently below [12] percent; [75-90] percent if their binding coverage is between [12] and [25] percent; and [80-90] percent if their binding coverage is between [25] and 35 percent.

The provisions for LDCs, SVEs and Paragraph 6 countries are quite diverse. However, a common feature of these approaches is a great deal of flexibility in approach that make specific provisions for flexibility unnecessary. Recently Acceded Members (RAMs), in contrast, are to use the tariff cutting approach appropriate for their status, depending upon whether they qualify as SVEs or not, although they benefit from an extended implementation period. These country exceptions mean that the formula and its associated exceptions apply to a relatively small number of—generally relatively large—developing countries.

One contentious feature of the proposal is an anti-concentration clause that requires countries to not use flexibilities on all tariff lines within a Harmonized System Chapter. Under the final version of this clause under discussion at the Ministerial, at least 20 percent of tariff lines and 9 percent of imports within each chapter would be subject to the full tariff cuts (Stephenson 2008).

Selection of Products for Flexibility

[1] These groups are: LDCs identified in the UN list of Least Developed Countries. Economies treated as Small and Vulnerable (SVEs): Antigua & Barbuda, Barbados, Belize, Bolivia, Botswana, Brunei Darussalam, Cameroon, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Fiji, Gabon, Georgia, Ghana, Grenada, Guatemala, Guyana, Honduras, Jamaica, Jordan, Kenya, Macau, Mauritius, Mongolia, Namibia, Nicaragua, Panama, Papua New Guinea, Paraguay, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Sri Lanka, Trinidad and Tobago, Uruguay and Zimbabwe. Economies with less than 35% tariff binding coverage are identified as Cameroon; Congo, Cuba, Ghana, Kenya, Macau, China; Mauritius; Nigeria; Sri Lanka; Suriname; Zimbabwe. RAM treatment: China, Croatia, Ecuador, Georgia, Jordan, Mongolia, Oman, Panama, and Chinese Taipei. RAMs with no requirement to reduce tariffs: Albania, Armenia, Former Yugoslav Republic of Macedonia, Kyrgyz Republic, Moldova, Saudi Arabia, Tonga, Viet Nam and Ukraine.

[2] Frequently known as Paragraph 6 countries because of the relevant provision in the Hong Kong Ministerial declaration.

We begin by specifying an objective function for policy makers that takes into account the benefits to politicians from providing protection to particular sectors, while at the same time considering the costs to consumers and taxpayers of providing this protection. Our political economy objective function is expressed in monetary terms as:

$$W(\mathbf{p},u,\mathbf{v}) = -e(\mathbf{p},u) + g(\mathbf{p},\mathbf{v}) + \mathbf{h}'\mathbf{p} + \mathbf{z}_\mathbf{p}'(\mathbf{p}-\mathbf{p^*}) \qquad (1)$$

where e is the consumer expenditure function, defined over a vector of domestic prices, $\mathbf{p}$, and the utility level of the representative household, u; $g(\mathbf{p},\mathbf{v})$ is a net revenue or GDP function defined over domestic prices and a vector of specific factors, $\mathbf{v}$; $\mathbf{p^*}$ is the vector of foreign market prices for traded goods, so that $(\mathbf{p}-\mathbf{p^*})$ is a vector of specific tariff rates; $\mathbf{e_p}$ and $\mathbf{g_p}$ are vectors of first derivatives and, by the envelope theorem, the demand and supply of each good; $z = e - g$ is the trade expenditure function; $\mathbf{z_p} = \mathbf{e_p} - \mathbf{g_p}$ is a vector of net imports; $\mathbf{z_p}'(\mathbf{p}-\mathbf{p^*})$ is tariff revenues, which are assumed to be redistributed to the household; and the elements of $\mathbf{h}$ are the differences between the unitary weights on benefits to consumers, producers and taxpayers used in the Balance of Trade function (see Anderson and Neary 1992), versus those that motivate political decisions.

We focus on the sub-problem in which individual economies[3] choose their own sensitive products, taking as given the policy choices of other countries and the vector of world prices, $\mathbf{p}^*$. Solving this problem—both for the country itself and for its trading partners—is an essential prerequisite to solving the broader problem of whether political welfare exchanges of market access concessions of the type considered by Grossman and Helpman (1995) will lead to welfare gains. Solving for the country itself provides an indication about how the political "pain" associated with own-reforms can be managed. Solving for other countries helps determine whether the market access benefits will be large enough to warrant the residual political "pain."

We take world prices as given, which seems consistent with the choices made by policy makers dealing with product-specific issues such as the "tariffication" of non-tariff barriers (Hathaway and Ingco 1996), and is the approach used in the seminal paper by

[3] Note that, even when countries negotiate as part of broader coalitions such as the G-20 or the Cairns Group, they can choose their sensitive products individually unless they are members of a Customs Union, which we would treat as a single economy.

Grossman and Helpman (1994, Proposition 2) and in all empirical implementations of this model of which we are aware.

The **h** weights reflect a number of political-economy features identified by authors such as Anderson and Hayami (1986), Lindert (1991) and Grossman and Helpman (1994) that influence whether a particular agricultural sector will receive tariff protection, including: (i) the ability to overcome the barriers to effective organization created by free-rider problems and to lobby effectively (typically, the interests of producers are more influential than those of consumers, as observed by Smith, 1776); (ii) the impact of own output prices on the returns to specific factors in a given sector; (iii) the adverse impacts on the costs to other politically-influential groups of protecting a particular sector; (iv) the ratio of imports to total domestic consumption, which determines the balance of benefits between tariff revenues and transfers to producers; and (v) whether the sector is declining, in which case the benefits of protection are less likely to be shared with new entrants (Hillman 1982). Lindert (1991) and Anderson (2008) show that these factors contribute to the observed patterns involving high levels of agricultural protection in high-income countries and the low levels seen in the poorest countries.

For most of the developing countries considered here, previous WTO commitments have resulted in little practical constraint as far as applied protection in industrial products is concerned, as illustrated by their often-large binding overhang.[4] We therefore assume that equation (1) is being maximized in the initial equilibrium, we can use the first order conditions for maximization of this function to solve for **h**:

$$\mathbf{h} = -(\mathbf{p}^0 - \mathbf{p}^*)'\mathbf{z}_{pp}^0 \qquad (2)$$

where $-(\mathbf{p}^0-\mathbf{p}^*)'\ \mathbf{z}_{pp}{}^0$ is the marginal welfare cost of tariff changes around $(\mathbf{p}-\mathbf{p}^*)$, and the superscript ^{0} refers to values at the initial equilibrium (since world prices are assumed to be constant, $\mathbf{p}^{*0} = \mathbf{p}^*$). Equation (2) has a simple, intuitive interpretation. The **h** values for particular prices are revealed by policy makers' willingness to pay the marginal social

[4] Recently acceded members are probably the countries for which this assumption is most disputable.

costs of the tariffs on these commodities.[5] We can simplify (2) by noting that, in the neighborhood of any optimum, $\mathbf{z_{pp}\,p} = 0$ by the nature of the optimization process and net expenditure at domestic prices cannot be reduced further by changes in quantities at the optimum. In this situation, (2) may be rewritten:

$$\mathbf{h} = \mathbf{p^{*\prime} z_{pp}^{0}} \tag{2′}$$

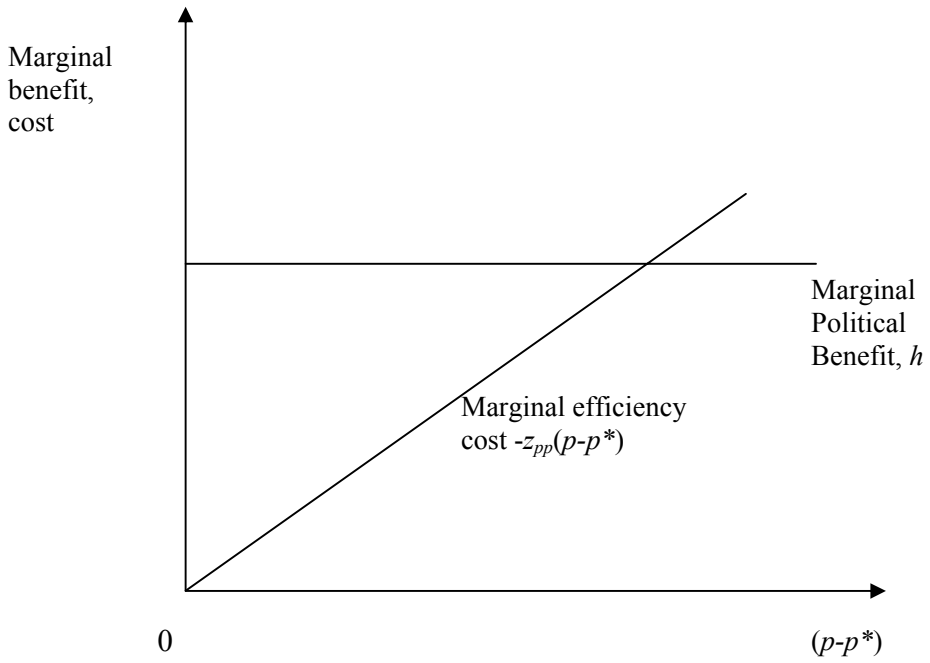
This allows us to rewrite (1) in potentially observable variables and parameters, permitting inferences about the effects of changes in tariffs using:

$$\mathbf{W} = -z\mathbf{(p, v,}u\mathbf{)} + \mathbf{p^{*\prime} z_{pp}^{0} p} + \mathbf{z_{p}\,(p - p^{*})} \tag{1′}$$

An appealing graphical interpretation of equation (2) can be obtained by examining the changes in the marginal cost of protection for an economy with a single distortion. In this case, the relationship between (**p-p***) and the marginal welfare benefits and marginal efficiency costs of changes in **p** can be depicted graphically, as shown in Figure 1.

[5] Notice that the values of **h**, which are defined as differences from unitary weights, are not positive for all goods. In particular, from (2) it follows that the value of **h** is negative for the numeraire good unless it is a complement with the taxed good.

Figure 1. Political-economy marginal benefits and costs of protection



In the diagram, we assume that the marginal political benefit of protection to a particular commodity is a constant. In contrast, the marginal efficiency cost of protection is an increasing function of the level of protection. Under these circumstances, the level of protection observed allows us to infer the value of **h**. The greater is the slope of the import demand function, $\mathbf{z_{pp}}$, and the higher the initial level of protection considered, the greater the marginal cost of raising protection, and hence the lower the protection rate chosen for any given value of **h**. This result is consistent with that used in empirical tests of the Grossman-Helpman model (for example, see Mitra, Thomakos, and Ulubaşoğlu 2002, p. 499).

A second-order Taylor-Series expansion of equation (1) around the initial distorted equilibrium provides valuable insights into the qualitative nature of the solution. We begin by taking the first and second derivatives of (1′) with respect to prices:

$$\frac{\partial W}{\partial \mathbf{p}} = \mathbf{p}^{*\prime}\mathbf{z}_{\mathbf{pp}}^{\mathbf{0}} + (\mathbf{p}-\mathbf{p}^{*})^{\prime}\mathbf{z}_{\mathbf{pp}} \text{ and } \frac{\partial^2 W}{\partial \mathbf{p}^2} = \mathbf{z}_{\mathbf{pp}} + \mathbf{z}_{\mathbf{ppp}}(\mathbf{p}-\mathbf{p}^{*}) \qquad (3)$$

Assuming that the third derivative of z is small relative to the second:

$$\frac{\partial^2 W}{\partial \mathbf{p}^2} \approx \mathbf{z_{pp}}$$

As we observed above, the first derivatives of the political-welfare function are zero in the neighborhood of the welfare-maximizing solution. However, we are interested in discrete (and sometimes large) reductions in tariffs associated with tariff-reduction formulas. A second-order estimate of the welfare losses from cutting tariffs relative to their initial equilibrium values is provided by the Taylor-Series expansion:

$$\Delta W = \frac{\partial W}{\partial \mathbf{p}}\Delta \mathbf{p} + \frac{1}{2}\Delta \mathbf{p}' \frac{\partial^2 W}{\partial \mathbf{p}^2}\Delta \mathbf{p} = \frac{1}{2}\Delta \mathbf{p}' \mathbf{z_{pp}} \Delta \mathbf{p} \tag{4}$$

Equation (4) can be generalized to compare two different tariff cuts. We can, for instance, compare the formula tariff cut, $\mathbf{\Delta p_f}$, with a sensitive-product cut, $\mathbf{\Delta p_s}$, using:

$$\Delta W_{fs} = \frac{1}{2}(\Delta \mathbf{p_f} - \Delta \mathbf{p_s})' \mathbf{z_{pp}} (\Delta \mathbf{p_f} - \Delta \mathbf{p_s}) \tag{4'}$$

To obtain insights into the effects of particular tariff changes, it is useful to rearrange (4) into proportional change form, and to express welfare changes as a share of initial expenditure:

$$\frac{\Delta W}{e} = \frac{1}{2}\begin{bmatrix} \frac{\Delta p_1}{p_1} & \frac{\Delta p_2}{p_2} & \dots & 0 \end{bmatrix} \begin{bmatrix} s_1\eta_{11} & s_1\eta_{12} & \dots & s_1\eta_{1n} \\ s_2\eta_{21} & s_2\eta_{22} & & \\ \dots & & & \end{bmatrix} \begin{bmatrix} \frac{\Delta p_1}{p_1} \\ \frac{\Delta p_2}{p_2} \\ \dots \end{bmatrix} \tag{4''}$$

where e is initial expenditure on <u>all</u> goods and services, including the non-distorted numeraire, n; s_i is the share of expenditure on good i; η_{ij} is the elasticity of demand for good i relative to the price of good j; and $\frac{\Delta p}{p}$ may refer to the price changes associated with applying the formula, as in equation (4), or deviations from that formula, as in (4'). The change in the price of the numeraire good is, of course, zero.

If we focus on the impact of sensitive product treatment for an individual good, *i*, where all other non-agricultural tariffs are being cut by a pre-determined formula, equation (4") yields equation (5), where the proportional deviation of p_i from the formula cut is represented by $\tilde{p}_i$ and the formula cuts for p_j are represented by $\hat{p}_j$:[6]

$$\frac{\Delta W_i}{e} = \frac{1}{2} s_i \tilde{p}_i [\eta_{ii} \tilde{p}_i + 2 \sum_j \eta_{ij} \hat{p}_j] \tag{5}$$

The factor 2 in front of the cross-product terms in equation (5) reflects the presence of the two cross-product terms in the matrix of elasticities and shares. Equation (5) suggests that the products likely to be chosen as sensitive are likely to be those: (i) with large expenditure shares at domestic prices, s_i; (ii) for which sensitive product treatment allows relatively large reductions in the required change in prices, $\hat{p}_i$; and (iii) for which the elasticity of import demand is large relative to the cross-price elasticities. However, equation (5) provides relatively little guidance on which specific products will be selected due to uncertainty about the relative magnitudes of the own and cross-price elasticities.

Equation (5) can also be formulated using expressions more familiar to trade negotiators, with the formula cuts given by $\frac{\Delta p_i}{p_i} = \hat{p}_i = \frac{f_i t_i}{(1+t_i)}$ where $\hat{p}_i \leq 0$ is the cut in the price of the imported good; t_i is the initial *ad valorem* tariff, and f_i is the proportional cut in the applied resulting from application of the formula.[7] The cuts with flexibility are given by $\frac{\Delta p_i}{p_i} = (\hat{p}_i + \tilde{p}_i) = \frac{c_i f_i t_i}{(1+t_i)}$, where $\tilde{p}_i \geq 0$ is the increase in the price from the post-formula level allowed for sensitive products and c_i is the fraction of the standard formula cut required for sensitive products.

[6] The price change for a sensitive product, *i*, is thus $\hat{p}_i + \tilde{p}_i$ for a small change, and $\hat{p}_i + \tilde{p}_i + \hat{p}_i \tilde{p}_i$ for a large change. To keep our exposition simple, we present only the small change case.

[7] Note that, in the WTO case, this will depend both on the proportional reduction in the bound tariff, and the extent of any binding overhang.

If we make the assumption of Constant Elasticity of Substitution (CES) preferences[8] for tractability and consistency with Anderson and Neary (2007), the elasticity terms simplify, with the own-price elasticity given by -(*1*- s_i).σ, where σ is the elasticity of substitution, and the cross-price elasticities, η_{ij}, are given by σ.s_j . Equations (4") and (5) can then be rewritten as:

$$\frac{\Delta W}{e} = \frac{1}{2}\sigma \sum_j s_j \frac{\Delta p_j}{p_j}\left(\sum_i \frac{\Delta p_i}{p_i} s_i - \frac{\Delta p_j}{p_j}\right) = -\frac{1}{2}\sigma VAR(\hat{p}) \qquad (4''')$$

with $VAR(\hat{p})$ the weighted (s_i) variance of price changes ($\frac{\Delta p_i}{p_i}$); and

$$\frac{\Delta \mathrm{W_i}}{e} = \frac{1}{2} s_i \sigma \tilde{p}_i[-(1-s_i)\tilde{p}_i + 2\sum_j s_j \hat{p}_j] \qquad (5')$$

Equation (4''') shows that, in general, the welfare cost of liberalization to policy makers increases with the distortion of the initial price and tariff distribution. Although the magnitude of the welfare cost is dependent on the value of σ, in this CES framework the choice of sensitive products to minimize $VAR(\hat{p})$, will be independent of the elasticity of substitution. Equation (5') provides additional insight into the likely choices of sensitive products. With this specification, the change in the price of good *i* can be compared with the weighted average of the changes of all other prices, including the numeraire. Cross-price effects are substantially diminished by the inclusion of the term $s_n.\ \hat{p}_n$, because of the zero change in the numeraire commodity, which has a large share of expenditure in most economies. With over 5,000 potentially tariff lines being considered the (*1*-s_i) term is likely to be approximately one for virtually all traded goods.

Equation (5) provides a potentially very useful guide for identifying likely sensitive products. The products that are likely to be selected are those with large expenditure shares at domestic prices, s_i, and for which the reduction in the price change allowed for sensitive products is large both in absolute terms and relative to the price

[8] The CES provides important insights that are likely to be consistent with those from more flexible demand systems. The popular Constant Ratio of Elasticities of Substitution-Homothetic (CRESH) demand system (Hanoch 1971) would allow the single elasticity of substitution to be replaced by product-specific elasticities, σ_i, and the shares by s^*_i terms defined as $s_i^* = \frac{\sigma_i s_i}{\sum_j \sigma_j s_j}$. See Dixon et al. (1982, p86) for details.

Clearly, if the product-specific elasticities are similar to each other, this yields effectively the same formulation as equation (5′).

changes resulting from the formula on the composite of other traded goods and the numeraire.

Three features of Equation (5') allow us to simplify it to obtain a rule of thumb for selecting individual tariff lines: (i) since dutiable agricultural imports are a small share of total expenditure, it is likely that $\sum_j s_j \hat{p}_j \approx 0$; (ii) since sensitive products are likely to be associated with large tariff cuts, the price reduction resulting from the cut in a candidate for sensitive product treatment, $\hat{p}_i$, will likely be large compared to the average price change ($|\hat{p}_i| >> \sum_j s_j |\hat{p}_j|$); and (iii) with over 5,000 potentially traded goods plus the numeraire domestic good, which is typically a large percentage of consumption, the (1-s_i) term is also likely to be approximately one for virtually all traded goods. Accordingly, we can write a simplified expression for the political welfare cost of the tariff cut associated with the formula:

$$\frac{\Delta W_i}{e} \approx -\frac{1}{2} s_i \sigma \hat{p}_i^{\,2} = \frac{1}{2} s_i \sigma \left[\frac{f_i t_i}{(1+t_i)} \right]^2 \qquad (4'''')$$

Equation (4'''') provides some important intuitive insights into the products for which the greatest political "pain" is likely to be felt following a formula cut. These products are those having large expenditure shares, s_i, <u>at domestic prices</u>, and large reductions in domestic prices relative to the initial, distorted equilibrium. The second (square-bracketed) expression shows that the declines in prices are determined by the height of the initial tariff, t_i, and the depth of the formula cut, f_i. Equation (4'''') shows that the price change associated with any tariff change enters in squared form as $\hat{p}_i^{\,2}$.

Using this simplified welfare criterion, we obtain a simple measure of the welfare change resulting from applying reduced disciplines to a particular product. We do this by comparing the welfare impact using the formula, $\left.\frac{\Delta \mathrm{W}}{e}\right|_f$ with the welfare impact allowing sensitive-product treatment for the product, $\left.\frac{\Delta \mathrm{W}}{e}\right|_s$:

$$\left.\frac{\Delta \mathrm{W}}{e}\right|_s - \left.\frac{\Delta \mathrm{W}}{e}\right|_f \approx -\frac{1}{2}\sigma s_i((\hat{p}+\tilde{p})^2 - \hat{p}^2) = \frac{1}{2}\sigma s_i \left[\frac{f_i t_i}{(1+t_i)}\right]^2 \left(1 - c_i^{\,2}\right) \qquad (6)$$

Equation (6) provides a simple measure that can be used for selecting sensitive products. It takes into account the key elements identified in the theory: the importance of the product in trade; the size of the formula cut; and the extent to which sensitive product selection allows a smaller cut in the tariff. The second formulation in (6) also shows that the political benefit from flexibility on product *i* is increasing in its initial tariff, t_i; and in the formula cut, f_i; but decreasing in the fraction of the formula cut, c_i, required for sensitive products. If c_i is constant across products, then the ranking of products will depend only on the terms identified in equation (4''').

Equation (6) permits comparison with the criteria for selecting products used in previous studies. Note that equation (6) includes elements of two of the previously used criteria: the height of the applied tariff, t_i, and the tariff revenue implications of the cut. It does not directly include the bound tariff. In fact, it clearly shows that the incentive to classify a product as sensitive is reduced as the bound rate increases relative to the applied rate, because the gap between the bound and applied rates reduces the cut in the applied rate for any given cut in bound rates. Three key differences between this decision rule and the highest-applied-rate rule are: (i) the inclusion of the s_i term for the importance of imports of the good in domestic consumption; (ii) the fact our criterion takes into account not just the tariff rate, but the extent of the required cut in the rate; and (iii) the fact that we consider not just the cut in prices, but the square of the proportional reduction in prices $\left[\frac{f_i t_i}{(1+t_i)}\right]^2$. The relationship with the tariff-revenue-loss criterion of Jean, Laborde and Martin (2006) is very clear, with the tariff revenue loss for a given formula cut given by $s_i\left[\frac{f_i t_i}{(1+t_i)}\right]$, which differs from (6) in using a price change term rather than a price change squared term. Whether the differences obtained using the price reduction squared, rather than the tariff-revenue-loss approach, will lead to sharply different results depends upon the nature of the reform, and can only be determined empirically.

Product Selection and Tariff Cutting

While WTO negotiations are based on bound tariff rates, their implications for market access and for economic welfare depend largely on their implications for applied rates. To provide a preliminary assessment of the implications of the modalities for the applied protection, we begin with the MAcMapHS6 database for 2004 together with a set of bound tariff rates for which *ad valorem* equivalents have been calculated on the same basis. Where they exist, these bound tariffs become the base rate from which cutting is undertaken. For unbound tariffs, we generate the base rate used for cutting by adding 30 percentage points to the applied tariff if it is below half the Swiss formula coefficient and 20 percentage points if it is above half. Next, we cut the base tariff using each of the potential approaches set out in Table 1. Then, we use the conventional assumption that applied rates are not reduced unless the new bound rate falls below the initial applied rate[9] (assumed to be the applied rate in the MAcMapHS6 dataset, which is for 2004). Given the results from these analyses, we are in a position to assess which of these approaches minimizes the political-economy costs of tariff cutting to policy makers.

The tariff reduction formulas and the flexibilities are intertwined in that countries are frequently willing to consider more ambitious formulas when they have the flexibility to make smaller cuts for some products (see Jean, Laborde and Martin 2008). A major problem for negotiators in this situation is that the "price" paid for the flexibilities—in terms of efficiency and market access—is difficult to evaluate. In our analysis, we make a distinction between the cuts without flexibility and those resulting from the formula with flexibility. This decomposition is useful in allowing some estimate to be made of the implications of the flexibilities, as long as it is recognized that agreement on the particular formulas was almost certainly contingent on the presence of flexibilities. The assumptions used to assess the implications of the Modalities for NAMA are set out in Table 1.

[9] This assumption neglects the important value that can arise from bindings above current applied rates, by ruling out incidents of higher tariffs in the future (Francois and Martin 2004).

Table 1. Scenarios used in examining the NAMA flexibilities

Scenario	*Swiss formula*	*Flexibilities*		
		% trade	*% line*	*Cut*
A_0	20	-	-	-
A_1	20	16	14	half
A_2	20	7.5	6.5	none
B_0	22	-	-	-
B_1	22	10	10	half
B_2	22	5	5	none
C	25	-	-	-

As noted by Messerlin (2008), the simple mechanics of the Swiss formula suggest that the difference in outcome between the full Swiss formula and half of the formula cut might have a sizeable effect on the outcome by allowing much higher final tariffs. In the current situation, this impact could be heightened by substantial differences in the extent and nature of binding overhang between WTO members. Moving from the formula cut to half of the formula cut may, for instance, have a very large impact on whether applied tariffs are actually reduced. To gain some insight into the extent which different formula cuts actually cut applied rates, we compare the number of tariff lines for which the full formula and half of the formula cut bring about cuts in applied rates. The results of this analysis are presented in Table 2.

Table 2. Comparing the share of tariff lines where MFN applied rates are reduced.

	A_0 %	A* %	B_0 %	B* %	C %
Argentina	60.0	5.0	55.3	5.0	52.7
Brazil	69.6	6.1	66.2	6.0	55.5
Chile	0.0	0.0	0.0	0.0	0.0
China	92.3	91.8	92.3	91.8	92.3
Colombia	48.0	0.3	47.8	0.3	47.3
Costa Rica	17.3	0.0	17.3	0.0	0.5
Egypt	38.3	26.4	38.3	26.4	38.1
India	95.2	1.7	95.2	1.7	27.0
Indonesia	15.7	0.4	15.1	0.4	9.2
Malaysia	40.5	32.2	40.3	32.1	39.6
Morocco	63.9	48.6	63.6	48.4	63.2
Peru	14.6	0	14.5	0	14.5
Philippines	13.9	0.2	12.7	0.2	7.8
Thailand	48.1	28.7	48.0	28.4	47.1
Tunisia	78.7	46.8	78.4	44.7	77.4
Venezuela	49.9	0.7	49.7	0.7	47.9
Simple Average	49.7	20.6	49.0	20.4	41.3

Note: Formulas A* and B* use half the cut in bound rates of A_0 and B_0.

Table 2 shows that the move from full formula cuts to half of the formula cuts sharply reduces the number of tariff lines subject to cutting in most cases other than China. With the full formula and a coefficient of 20 percent (scenario A_0), 49.7 percent of tariff lines would be cut. With half of the formula cut, only 20.6 percent of applied rates would be reduced. In some individual countries, the reductions would be sharp. In India, the fraction of tariffs cut would fall from 95.2 percent to 1.7 percent, while in Brazil the reduction would be from 69.6 to 6.1 percent. By contrast, in China, the absence of binding overhang means that virtually all tariffs are cut under either assumption. In countries like Tunisia, the difference would also be relatively muted, with the number of applied rates cut falling from 78.7 to 46.8 percent when moving from formula A_0 to A*. A similar pattern emerges under Scenario B, with a Swiss formula coefficient of 22 percent.

To make any progress in understanding the implications of the formulas with flexibilities, we need to identify which of the options from the menu countries are likely to choose. To do this, we assess the political welfare costs associated with each of the scenarios in Table 1 using equation (4′′′) and a search algorithm subject to the integer constraints outlined in Table 1. Scenarios A_0 and B_0 were included for reference only, and were not expected to be chosen by any country. Based on these results, each of the 16 countries considered was mapped to the regime that minimized the political "pain" of tariff changes.

Table 3. Choosing from the menu of flexibilities.

	A_1	A_2	B_1	B_2	C
Argentina		Y			
Brazil				Y	
Chile					Y
China				Y	
Colombia	Y				
Costa Rica			Y		
Egypt	Y				
India				Y	
Indonesia				Y	
Malaysia				Y	
Morocco			Y		
Peru	Y				
Philippines	Y				
Thailand	Y				
Tunisia			Y		
Venezuela	Y				

The results in Table 3 suggest that the menu options have been designed in a way that is consistent with the likely preferences and distributions of initial tariffs in different countries. We assume that Chile, with uniform applied tariffs, chooses the relatively high coefficient (25 percent) of scenario C with no exceptions, although in practice all three scenarios leave this country's applied duties unaffected. Seven countries are assigned to options A_1 or A_2, with a relatively low coefficient (20 percent) and more options for flexibility. Another eight countries are assigned to regimes B_1or B_2, with a slightly

higher coefficient (22 percent) and smaller numbers of products eligible for flexibilities. The weighted average NAMA tariffs for each country and each scenario are presented in Table 4, with the regime chosen by each country indicated by shading.

Table 4. Weighted average MFN applied tariffs under different scenarios.

	Base	A_0	A_1	A_2	B_0	B_1	B_2	C
	%	%	%	%	%	%	%	%
Argentina	11.5	8.3	9.6	9.7	8.6	9.6	9.6	9.0
Brazil	9.9	7.8	8.8	8.6	8.1	8.7	8.7	8.5
Chile	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
China	5.8	3.7	4.2	4.4	3.8	4.2	4.5	4.0
Colombia	10.8	8.5	9.9	9.7	8.8	9.8	9.7	9.2
Costa Rica	4.0	3.9	4.0	4.0	4.0	4.0	4.0	4.0
Egypt	8.7	6.4	8.1	7.6	6.5	7.8	7.5	6.7
India	13.3	10.7	11.8	11.8	11.3	12.0	12.3	11.9
Indonesia	4.9	4.1	4.8	4.8	4.2	4.8	4.8	4.3
Malaysia	5.9	2.9	4.5	4.7	3.0	4.2	4.8	3.2
Morocco	23.3	10.1	11.7	12.8	10.7	12.2	12.4	11.4
Peru	9.5	9.2	9.5	9.5	9.2	9.5	9.5	9.2
Philippines	3.0	2.8	3.0	3.0	2.8	3.0	3.0	2.9
Thailand	9.4	5.7	7.4	7.7	5.9	7.5	7.2	6.2
Tunisia	24.7	11.4	14.2	13.5	12.1	14.2	13.2	13.2
Venezuela	12.1	9.3	10.8	10.6	9.6	10.6	10.6	10.1
Simple Average	10.2	6.9	8.0	8.0	7.2	8.0	8.0	7.5

The results presented in Table 4 highlight the impact of the flexibilities for the post-cut average tariff. If formula A were applied without exceptions, the average tariff would decline from 10.2 to 6.9 percent. Higher coefficients of 22 percent and 25 percent would result in average tariffs of 7.4 and 7.7 percent. Permitting half-of-formula or full exceptions from the tariff formula with a coefficient of 20 (scenarios A_1 or A_2) result in higher average tariffs of 8 percent. The envisaged flexibilities relative to scenario B result in similar final tariffs (8 percent).

In most cases, our political-economy optimization process leads countries to choose a set of tariffs with the highest average tariff in their row. Three exceptions are Brazil, where A_1 would yield a higher average tariff; Morocco where B_2 would do so; and Thailand, where A_2 would do so. While the tariff-revenue-loss criterion of Jean, Laborde and Martin (2006) ensures that the highest weighted-average tariff will be picked, this is clearly not the case with our political-economy criterion. In most cases where the formula without exceptions would result in sizeable reductions in the average tariff, allowing for exceptions substantially reduces—but does not eliminate—the reduction in weighted-

average tariffs. In Argentina, for instance, application of the formula with a coefficient of 20 without exceptions (A_0) would cut the initial applied rate from 11.5 to 8.3 percent and introduction of the flexibilities leads to a rate of 9.7 percent.

Concluding Comments

Many recent negotiations on trade reform involve rigid tariff cutting formulas coupled with allowance for—and comprehensive negotiations on—exceptions to these rules. Many of these negotiations involve specifying particular limits on these exceptions, such as the depth of cut on these products, the number of tariff lines, and/or the share of trade covered. The modalities for some negotiations, such as the current WTO negotiations on Non-Agricultural Market Access, involve detailed menus of options varying simultaneously in several of these parameters. While this situation seems preferable to the one seen in earlier negotiations—where exceptions emerged as a process of "unwinding"—the resulting agreements lack the transparency that is a key raison d'être of a formula approach.

In this paper, we attempt to understand the phenomenon of complex negotiations over exceptions, and to provide a means for analyzing its impacts. To this end, we formulate a simple but flexible political-economy model of the underlying tariff structure. This model allows us to associate the support for tariff protection in particular areas with the cost of providing this protection, and hence to evaluate the underlying strength of support for protection in this sector. We then use this approach to evaluate the consequences of tariff-cutting formulas such as the Swiss formula widely used in WTO negotiations for political welfare.

We apply this model to the case of the WTO negotiations on Non-Agricultural Market access (NAMA) where the menu of choices under discussion is particularly complex. With this model, we are able to identify likely choices of flexibility regimes in particular countries, and hence provide greater transparency about the consequences of the proposed menu of formulas plus flexibility for the resulting protection regime.

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