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**Evaluating existing policy flexibilities
in WTO agricultural negotiations: different criteria
for the selection of sensitive products**

Listorti G.¹, Kempen M.², Girardin J.¹ and Kränzlein T.¹

1 International Trade Policy Unit, Federal Office for Agriculture (FOAG), Bern, Switzerland

2 Institute for Food and Resource Economics, University of Bonn, Germany

giulia.listorti@blw.admin.ch

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Evaluating existing policy flexibilities in WTO agricultural negotiations: different criteria for the selection of sensitive products

Giulia Listorti, Markus Kempen, Jean Girardin and Tim Kränzlein

Abstract

Within WTO agricultural negotiations, this paper deals with alternative criteria for the selection of sensitive products. Existing methodologies mostly rely on the analysis of tariffs and trade flows. On the contrary, assessments of the economic impacts on specific groups of stakeholders, namely the domestic agricultural sector, are missing or conducted at a high level of product aggregation. We hence develop a methodology that considers the effects of the selection of sensitive products on domestic agricultural prices. Our model, TRIMAG (Tariff Reduction Impact Model for Agriculture), defined at the 8-digit level, optimizes the domestic agricultural value added subject to a maximum number of sensitive tariff lines. The existing methodologies are applied to the Swiss tariff schedule and results compared with those of TRIMAG. Findings confirm the importance of developing sound economic criteria for the ex-ante impact assessment of policy flexibilities. Furthermore, TRIMAG can be considered as a tariff aggregation tool that can be linked to agricultural simulation models that operate at a higher level of aggregation.

Keywords: WTO agricultural negotiations, market access, sensitive products

JEL classification: F13, Q17.

1. INTRODUCTION

In the WTO agricultural negotiations, the so called market-access pillar deals with the progressive decrease of border protection. In this respect, the Framework Agreement of July 2004 (WTO, 2004) proposes the use of a “tiered” formula, in which tariffs classified in higher “bands” are subject to proportionally higher cuts. Differently from the average-cut approach adopted in the Uruguay Round (UR) Agreement on Agriculture of 1994 (a straight proportional reduction, with a minimum cut for the single tariffs), a tiered formula ensures that higher tariffs are cut more than the lower ones (Jean et al., 2006). However, one of the key elements of the Framework Agreement is the possibility for WTO members to self-select a limited number of exceptions to the general tiered formula, or “sensitive products”¹. While in the UR the flexibilities were built in the formula itself, here a separate category of products is created (Sharma, 2006a). According to the last version of the draft modalities, dating December 2008 (WTO, 2008), developed WTO members are allowed to select up to 4% of their tariff lines as

¹ In the remainder of this text, the term “sensitive” always refers to the specific context of WTO negotiations. One might also refer to the general “sensitiveness” of a product to trade liberalization (see for example Gallezot, 2007).

sensitive². For these lines, the tariff cut shall be 2/3, 1/2 or 1/3 of the otherwise applicable tiered reduction formula. These gentler cuts must be compensated by the expansion of import tariff rate quotas (TRQs^{3,4}). According to the deviation chosen, the TRQ expansion shall be equal to 3%, 3.5% or 4%, respectively, of the quantity of domestic consumption of the products concerned. The choices of each member country will be made available only at the scheduling phase. The possibility of selecting sensitive products has drawn considerable attention; indeed, given the high variability of agricultural tariffs in developed countries' schedules, and the high concentration of world trade on a limited number of tariff lines⁵, agricultural exporters argue that the effects of even a limited number of exceptions to the general rule could be remarkable. On the contrary, for some developed countries, mostly net importers of agricultural products and with a highly protected agricultural sector, sensitive products are a key aspect of the negotiations. For all these reasons, the assessment of the impacts on global welfare and trade of the selection of sensitive products is crucial. This involves complex political considerations; at the same time, there is a strong need for scientific analysis. To derive and compare reliable criteria for the designation of sensitive products is an issue strongly intertwined with the evaluation of the impacts on domestic and global markets.

This paper deals with alternative criteria for the selection of sensitive products. So far, various methodologies have been proposed. They mostly rely on the analysis of tariffs and trade flows. However, in order to fully understand the implications of their choices, policy makers might need more precise information concerning their impact on specific groups of stakeholders – notably, the agricultural production sector. Such evaluations can be made within partial or general equilibrium models, but often at a relatively high level of aggregation. To fill this gap, we developed a methodology that considers the effects of the selection of sensitive products on domestic agricultural prices. The Tariff Reduction Impact Model for Agriculture (TRIMAG), defined at the 8-digit level (about 2300 tariff lines), optimizes the domestic agricultural value added subject to a maximum number of sensitive tariff lines. For all possible combinations of tariff reductions, the effects of the subsequent domestic price changes are estimated for about 90 commodities. Consequently, in a static context, the corresponding impact on the domestic added value of agricultural production is derived. The “optimal” selection of sensitive lines is the one minimizing this impact. Furthermore, TRIMAG can be considered as a tariff aggregation tool that provides input to simulation models that operate at a higher level of aggregation.

In this paper, some of the existing methodologies for the selection of sensitive products are applied to the Swiss tariff schedule, and the results are compared with those of TRIMAG.

² For the detailed provisions, see paragraphs 71 to 83 (WTO, 2008). Members having more than 30 per cent of their tariff lines in the top band can select as sensitive up to 6% of their tariff lines.

³ For an analysis of origin, operating and economic impact of TRQs see Skully (2001).

⁴ Although, in principle, products without TRQs cannot be selected as sensitive, it could however be possible for a very limited number of lines to create new TRQs (see paragraph 83 in WTO, 2008).

⁵ Globally, 5 per cent of tariff lines account for 63 per cent of agricultural trade (Vanzetti and Peters, 2008).

Following a review of the existing criteria (section 2), TRIMAG is described (section 3). The results of the empirical analysis are presented in section 4. Section 5 concludes.

2. EXISTING METHODOLOGIES FOR THE SELECTION OF SENSITIVE PRODUCTS

There is neither a single indicator that by its own discerns the sensitiveness of a product, nor a single indicator valid for all countries (Ibañez et al., 2008). Furthermore, all analyses will have to face some difficulties and key methodological challenges (see for example Jean et al. 2006): the difference between bound⁶ and applied tariffs (or “binding overhang”); the existence of various types of tariffs (specific, i.e., a fixed charge per unit of imports; ad valorem, i.e. expressed as a fraction of the value of the product; etc.), tariff preferences and TRQs. Inherently to the non-linear nature of the tiered formula for tariff cuts, analysis will have to be conducted at a disaggregated level (normally, 6-digit in the Harmonized System, HS⁷).

Already from early stages of the negotiations, various methodologies have been developed to identify the products that are most likely to be selected as sensitive. We follow Gohin (2008) and classify them as accounting criteria (section 2.1); mercantile criteria (section 2.2) and economic criteria (section 2.3). We add a “detective” methodology based on policy information communicated within WTO negotiations (section 2.4).

2.1. Accounting criteria

These methodologies are all intuitive and easily applicable, but lack a sound theoretical foundation (see Gohin, 2008; Jean et al., 2008). Sharma (2006b) proposes the use of high bound tariffs as an indicator to identify the sensitive products which will be chosen by each country. Indeed, many of the commodities with peak tariffs, especially in OECD countries, are considered to be “sensitive”. On the contrary, for developing countries, which tend to have uniform bound tariffs, it is the binding overhang that might convey useful information: the smaller the gap, the more sensitive is the product in the context of tariff reductions. However, the author notes that this is not a good basis because tariff overhangs are often very small for tariff lines with very low bound tariffs. Vanzetti and Peters (2008) rely instead on high applied tariffs. For developing countries they also refer to the binding overhang, assuming that they would make use of the existing flexibilities to make as little changes as possible in their applied rates. Jean et al. (2005; 2006) select sensitive products by the tariff revenue that would be forgone through the standard implementation of the tariff cut in respect to the sensitive cut, assuming imports remain unchanged. Products that are important in trade, subject to high tariffs, and with little binding overhang are more likely selected. However, trade is not independent from the level of tariff protection: sensitive products with prohibitive tariffs have low import

⁶ In WTO negotiations, commitments are made in terms of “bound” tariffs, i.e., the ceiling beyond which tariffs cannot be raised.

⁷ The Nomenclature of the Convention on the Harmonized Commodity Description and Coding System, or “HS Nomenclature”, elaborated under the auspices of the World Customs Organization, comprises about 5,000 commodity groups identified by a 6-digit code and arranged according to a legal and logical structure. The Swiss tariff schedule comprises additional 8-digit subdivisions.

levels and consequently low tariff revenue and are not selected (Vanzetti and Peters, 2008). Furthermore, high volumes of trade might not be the best indicator if domestic production of the concerned commodity is however low (Gohin, 2008). Finally, the *Institut de l'élevage* (op. cit. in Gohin, 2008) take the proximity of the import price after tariff reduction to the domestic price as an indicator of the sensitiveness of a product.

2.2. Mercantile criteria

These criteria refer to the expected increase in imports after the application of the standard tariff reduction formula (Gohin, 2008). In respect to the methodologies previously described, it is clear that such an impact cannot be directly observed. These works (Sharma, 2006a; European Commission, 2005; Cluff and Vanzetti, 2005) refer to a stage of the negotiations where the parameters for the TRQ expansion were not yet fixed. They mostly aim at exploring the question of the "equivalency" between a standard tariff cut and a sensitive cut plus TRQ expansion. Although most of these parameters are now agreed, a number of questions remains valid: namely, the difficulties in estimating the net import demand elasticities, and the simultaneity in the selection between the various countries.

2.3. Economic criteria

A third group of studies are those that consider the economic impact of the selection of sensitive products. Jean et al. (2008; 2010) provide a solid theoretical framework, starting from a political-economy welfare function. They assume that the demand for flexibilities results from governments seeking to maximize the political-economy functions that gave rise to their original tariffs, while being willing to undertake international trade negotiations because of the potential for greater gains. Their objective function takes into account the benefits from providing protection to particular sectors, while considering its costs to consumers and taxpayers of providing this protection⁸. Sensitive products are those whose tariffs and consequently domestic prices maximize this objective function. In this context, the political welfare change (ΔW_i) as a share of expenditure (e) following the selection of a sensitive product in respect to the application of the standard formula (subscripts s and f), is derived as

$$\frac{\Delta W_i}{e} \Big|_s - \frac{\Delta W_i}{e} \Big|_f \approx \frac{1}{2} \sigma s_i \left[\frac{f_i t_i}{1 + t_i} \right]^2 (1 - \epsilon_i^2) \quad (1)$$

Where σ is the elasticity of substitution, s_i is the import expenditure share at domestic prices of product $i = 1, \dots, N$, f_i is the proportional tariff cut implied by the formula, t_i is the initial applied ad valorem tariff and ϵ_i is the fraction of the standard formula cut required for

⁸ It is constituted by the sum of profits over all sectors, tariff revenues, consumer expenditures (with a negative sign), and a term defining the political weight of the agents of the economy (linear function of prices). The coefficients of the objective function are calibrated assuming that the policy situation before the liberalization is an optimum. For a critical review see Gohin (2008).

sensitive products⁹. This welfare change provides an indicator for the selection of sensitive products based on the value of imports at domestic prices, the squared proportional cut in the price of imports brought about by the formula, and the extent to which sensitive product status reduces the size of this price cut. Equation (1) includes the height of the applied tariff, τ_i , but 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. To conclude, this “political economy function” indicator has two main advantages: not only is it theoretically well founded, but can also be easily applied.

We also include in this section all those analyses in which partial or general equilibrium models are used to study the effects of the selection of sensitive products and TRQ expansion. A non exhaustive list includes Gohin (2008) that uses the GOAL Computable General Equilibrium Model; Grant et al. (2008) that develop a 6-digit source differentiated partial equilibrium model embedded in the GTAP framework; Binfield et al. (2009), using the EU-GOLD model; Piketty et al. (2009) making use of the CAPRI model; Pelikan et al. (2010) that use the GTAP model; Ramos et al. (2010) that develop a partial equilibrium model at the 8-digit level for EU beef. While a detailed description of these models is beyond the scope of this paper, some general considerations hold. Firstly, although their inherently complex use, they allow to assess the impact of the selection from a solid economic perspective. Secondly, they often work at a high level of product aggregation, although some recent developments have been made (see Grant et al., 2007, 2008; Ramos et al., 2010). Thirdly, to the Authors’ knowledge, the selection of sensitive products is never optimized. Alternative simulations are run by selecting different lists of products according to various criteria (i.e., high tariffs), and results compared ex post.

2.4. A detective methodology

Ibañez et al. (2008) build a “detective methodology” that makes use of a mix of indicators based on the information provided by member states during WTO negotiations. As “Uruguay Round” (UR) indicators they consider high bound tariffs, the right to apply the Agriculture Special Safeguard (SSG), the application of the SSG and the existence of TRQs. As “Doha Round” indicators (DR), they take into account the notification of consumption data in the Doha negotiations process, the identification as “core-products”, and a high level of “Common Consumption Allocation” (CCA) share in the “two-step” methodology^{10; 11}.

⁹ For example, $c_i = 1/3$ if the deviation from the standard tariff reduction is $2/3$.

¹⁰ See Annex A of the modalities (WTO, 2008).

¹¹ This share combines the share of the 6-digit lines in world trade of the product category, with the rule that at least 90% of the domestic consumption must be delivered into the “core” lines within a product category.

3. AN ADDITIONAL CRITERION : THE TRIMAG MODEL

An innovative criterion for the selection of sensitive products is here proposed. In the remainder of this section, the Tariff Reduction Impact Model on Agriculture (TRIMAG) will be briefly presented. Our model optimizes the domestic agricultural value added of production following the application of the tiered formula subject to a maximum number of sensitive tariff lines. Based on 8-digit data (section 3.1), the effect of the standard and of the sensitive tariff cut on prices are assessed (section 3.2). The price effects of various combinations of sensitive lines are then aggregated at the “commodity” level. The corresponding reduction of the added value of the domestic production is calculated (section 3.3). Finally, an optimization model is applied minimizing the loss of added value by selecting the best combination of tariff reductions subject to the maximum number of sensitive tariff lines (section 3.4).

3.1. The data used

The TRIMAG database consists of domestic (CH), EU and rest-of-the-world (RW) import prices (*cost, insurance and freight*) for the 2302 8-digit tariff lines of the Swiss tariff schedule (source: Swiss Federal Office for Agriculture). The Swiss schedule consists of specific tariffs, and TRQs¹². Applied duties might be below the bound duties. TRQ are administered in different manners (auctioning; first-come, first-served basis and others). Some TRQs are subdivided covering only specific products and all quota are de facto filled. There is no allocation of quota shares to specific trading partners. For every tariff line, the data on bound, applied and, where applicable, preferential tariffs are included in the database (source: Swiss Federal Customs Administration), as well as the corresponding ad valorem equivalents (AVE) agreed in Paris in 2005¹³. In addition, imports differentiated by origin (source: Swiss Federal Customs Administration), the quantities of domestic consumption as prescribed in Attachment A of the WTO modalities and the values of domestic agricultural production for about 90 commodities (source: Swiss Federal Statistical Office) are also included. In general, the average of the yearly values of the reference period 2004-2009 is used. However, since some autonomous tariff cuts have been undertaken in the past years, and to the extent that such changes are not related to the evolution of world prices, the use of the 2009 applied tariff rates has been preferred¹⁴.

3.2. The estimation of the domestic price drop

Estimating the domestic price drop, caused by the reduction of import tariffs at the 8-digit level, implies accounting for the substitutability between the domestic and the imported product, as well as between the various sources of imports. Relying on the price information available, a

¹² For TRQs, separate tariff lines exist for imports occurring in and out of quota; the first cannot be chosen as sensitive.

¹³ For specific bound duties, the corresponding ad valorem equivalents (i.e., shares of the value of the imported good), have been agreed with a political compromise in Paris in 2005 by calculating the reference world prices for each country (years 1999-2001).

¹⁴ Some applied tariffs might be adjusted more than once a year depending on world prices. For this reason, here we take the difference between the 2009 domestic reference price and the average world price over the reference period as applied tariff rate.

simple approach is taken. Firstly, the domestic price drop resulting from a given tariff drop is estimated separately for each of the importing regions (EU and RW) according to their specific import prices and to tariffs applied to their imports. Secondly, the resulting domestic price is derived as an import weighted average¹⁵. We assume that the applied tariff after reduction is equal to the minimum between the reduced bound rate and the currently applied rate, and that reductions of the bound tariffs will have an effect only when the binding overhang is completely eroded¹⁶. Furthermore, we take into account the “water” that might be contained in the applied tariff (the difference between the import price plus applied tariff and the domestic price). This means that the applied tariff is prohibitive and no imports occur at all. In case of TRQs, the presence of water in the out of quota applied tariff would imply that the import quota is binding¹⁷ and no out of quota imports occur. For those TRQs that are underfilled, the corresponding in quota tariff is taken as the relevant applied tariff. According to the Armington assumption (Armington, 1969) imported and domestic goods are imperfect substitutes in demand. Provided bilateral trade flows exist, we make the simplistic assumption that the ratio between the domestic price and import price plus applied tariff stays constant over time – but only once “water” has been eroded¹⁸. The effects on the domestic price of import tariff cuts are then derived separately for each of the importing regions (EU and RW), then aggregated by an import weighted average. For every tariff line, these calculations are repeated applying the general tiered formula with a capping at 100% (f) and the gentler tariff cuts granted by the sensitive product status, plus the exception from capping (s , applying the maximum possible deviation of 2/3)¹⁹. In quota tariff lines, “tropical products” (paragraph 148 of the modalities), tariff lines not included in the Attachment A and single tariffs with no TRQ assigned are not eligible as sensitive.

3.3. From the tariff line to the product level

The effect of tariff reduction at the 8-digit level is then derived at a more aggregated product level. We can calculate the price index of the aggregate product m (p_m) as a consumption ($CONS$) weighted average of the prices of the corresponding tariff lines i .

$$p_{m,t} = \frac{\sum_i [p_{s,t} I_{i,t} + p_{f,t} [(1 - I_{i,t})] CONS_i]}{\sum_i CONS_i}$$

(2)

¹⁵ Alternatively, one might think of deriving, according to a standard “Constant Elasticity of Substitution nested” approach, first a weighted import price, and then the domestic price of the product (see for example Grant et al., 2008; Hertel et al., 1997). This would imply a tremendous effort for the estimate of the substitution elasticities at the 8-digit level, and is not applied in our model.

¹⁶ This is a widely used assumption. However, the initial applied rate is not the only possible counterfactual, since applied tariffs could be raised up to the new bound rate (see for example Bchir et al., 2006; Jean et al., 2006).

¹⁷ A quota is binding when it is set below the free trade level of imports; the quota is filled and no out of quota imports occur.

¹⁸ The ratio between the domestic price and the import price plus applied tariff will be one when there is water in the applied tariff.

¹⁹ In general, no AVE > 100% will be allowed at the end of the implementation period (they are then “capped” at 100%), although some exceptions are possible both for standard tariff lines, and for sensitive lines (see paragraph 76 of the modalities, and attached working paper W5). In this work, we ignore the possibility of selecting exceptions to capping besides the tariff lines which will be selected as sensitive, that are on the contrary assumed to be all exempted from capping.

Where ps_i is the expected price if the i product is selected as sensitive, and pf_i if the standard tariff cut is applied. I is an index function, equal to 1 if the i tariff line is selected as sensitive, and 0 otherwise. For each of the m products, there are then $\alpha = i^2$ combinations of tariff cuts at the 8-digit level. Each of them requires a specific number of sensitive tariff lines and will yield a certain m price. Heterogeneous changes in prices lead to changes in the consumption pattern due to substitution effects. All tariff lines have then been classified in $m = 1 \dots 145$ product groups according to their degree of substitutability in consumption. Following Britz and Witzke (2008) the total utility of consumption within each product group is given by the Constant Elasticity of Substitution (CES) framework described in equation (3) and (4)

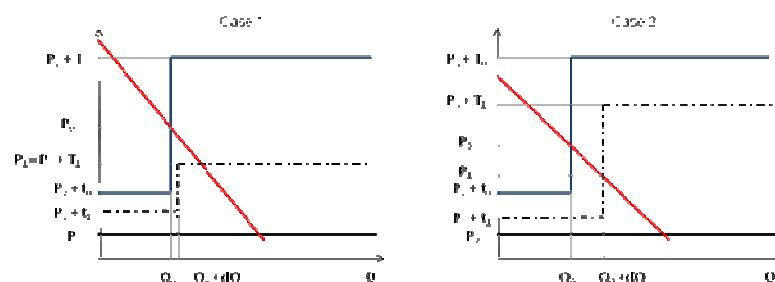
$$U_m = \left[\sum_{i=1}^n \delta_i \cdot (CONS_i)^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}} \quad (3)$$

$$CONS_i = CONS_{NUM} \left[\frac{\delta_i \cdot ps_{NUM} I_{NUM} + pf_{NUM} \mathbb{I}(1 - I_{NUM})}{\delta_{NUM} \cdot ps_i I_i + pf_i \mathbb{I}(1 - I_i)} \right]^{\sigma} \quad (4)$$

Where U_m is the utility associated to the consumption of product m , $i=1 \dots n$ indicates the tariff lines classified in product m , $CONS_i$ is the consumption and $\sigma > 0$ is the elasticity of substitution. The parameter δ_i , often called share parameter, is used to calibrate the equations to the observed initial situation. The tariff line with highest consumption is selected as the numeraire (NUM). Equations (3) and (4) yield a square system, that allows deriving the consumption pattern for all possible combinations of prices. Consequently, the aggregate price effects of tariff reductions can be calculated.

Additional complexity arises from the WTO modalities. Whenever a tariff line is selected as sensitive, a certain expansion of its TRQ must be granted. Intuitively, for a given product, the more tariffs are selected as sensitive, the higher the aggregate price resulting from the out of quota tariff cut, but the higher the risk for the TRQ expansion to have an effect. In particular, if TRQs are binding, and if they remain binding also after their expansion, the price drop caused by the negative slope of the net import demand curve could offset the higher protection granted by a lower out of quota tariff cut (up to ending in a non-filled quota regime). In Figure 1, assuming that Switzerland is a price taker, and considering that all quota are filled, in Case 1, the lowering of the out of quota tariff from T_0 to T_1 causes out of quota imports to occur, and the domestic price, P_0 , to be reduced to $P_1 = P_w + T_1$. The TRQ expansion from Q_0 to $Q_0 + dQ$ has no effect on the equilibrium price. Case 2 shows that, if the TRQ expansion is "high", we might end up in a situation where although the out of quota tariff is still relatively high, the domestic price decreases due to the market access expansion, i.e. $P_1 < P_w + T_1$ (for a diagrammatic supply and demand model on TRQs, see Skully, 2001; de Gorter and Kliaga, 2006).

Figure 1. Application of the standard tiered formula vs. sensitive reduction: an example



Source: own elaboration

The price drop consequent to the enlargement of the TRQ is estimated at the aggregate product level. It is derived according to product specific net import demand elasticities²⁰ and the increase in imports, the latter simply assumed to be equal to the TRQ expansion²¹, which in turn is, according to the modalities, equal to a certain percentage of domestic consumption of the tariff lines concerned. The possible existence of out of quota imports (see Binfield et al., 2009) as well as of autonomous TRQ extensions is also considered. At this point, we correct the aggregated prices derived from the CES framework for these effects, by taking the minimum price resulting from the increased market access and the out of quota tariff reduction for further analysis.

It is now possible to select those combinations of sensitive lines yielding the highest aggregate price $p_{m,\alpha}$. For each of the m products, this reduces the complexity of $\alpha = i^2$ potential combinations of sensitive lines to $\alpha = i$ favorable combinations.

3.4. Minimizing the impact on the added value of domestic agricultural production

All base agricultural products (90 commodities) are assigned the corresponding value of domestic agricultural production, whereas processed products (the remaining 55 products) are assigned the value corresponding to their market share of the base product. In this simplified context, we only aim at ensuring that an appropriate weight is given to each product in the optimization procedure. The interaction between the various products is very limited²². Finally, the best possible combination of tariff cuts is selected at the 8-digit level, by maximizing the sum over the m products of the added value of agricultural production²³ subject to a maximum number of sensitive lines (equation 5).

²⁰ Derived from Ferjani (2008). In addition, sensitivity tests have been repeated using values calculated using the demand and supply elasticities of Ferjani (2008) and import penetration ratios (see Sharma, 2006a). The values of the net import demand elasticities were bounded between -0.1 and -10.

²¹ Since import quotas for Switzerland are normally binding.

²² In addition, we assume that, should the price of the processed product fall less than the price of the basic agricultural product, the increase in the margin is fully captured at the higher stages of the production chain.

²³ For each product m , production costs are assumed to be a fixed proportion of the value of domestic agricultural production, so that its percentage variations correspond to a percentage variation of the added value.

$$\max \sum_m V_{m,\alpha} = \max \sum_m V_{m,t0} * \left(1 + \frac{p_{m,\alpha} - p_{m,t0}}{p_{m,t0}} \right) \quad (5)$$

$$s.t. \sum_{i=1}^N I_i \leq x N$$

where $V_{m,t0}$ is the domestic added value of agricultural production of product m at time $t0$. $p_{m,t0}$ and $p_{m,\alpha}$ are the prices of the m product before and after a certain combination of tariff cuts has been applied. The overall number of tariff lines subject to the sensitive cut cannot be above a certain share (x) of the overall number of tariff lines, N . In other words, the variations on the added value of the domestic agricultural production constitute an indicator to evaluate an “optimal” selection of sensitive products. In general, two elements contribute to the selection of a certain i tariff line as sensitive: the price drop for the product m consequent to its selection; the size of V_m . To our knowledge, TRIMAG is the only existing model which focuses on the impacts on the domestic agricultural sector while optimizing the selection of sensitive products.

4. EMPIRICAL ANALYSIS

In this section, some of the various methodologies described in section 2 have been applied to the Swiss tariff schedule at the 8-digit level: high bound tariffs (Sharma, 2006b), high applied tariffs (Vanzetti and Peters, 2008), high tariff revenues (Jean et al., 2005), the political economy function indicator (Jean et al., 2008, 2010) and the factual indicator (Ibañez et al., 2008). Results have been compared with those of TRIMAG.

4.1. Trade indicators

For specific bound duties (Sb), the AVEs agreed in Paris in 2005 are a binding parameter of the current Doha negotiations. They determine the tier in which tariffs are classified, and the corresponding tariff cut. In addition, according to “tariff simplification” provisions²⁴, at the end of the implementation period, specific duties might have to be converted into ad valorem. The AVEs agreed within WTO negotiations (WTO) therefore provide an indication of the level of border protection after the implementation of the Doha Round. To account for possible future alternative price scenarios, we also calculate “current” (cur) AVEs, by dividing the bound tariffs for the Swiss yearly average unit import value over the years 2006 to 2009, and “TRIMAG” AVEs, by using the import prices of TRIMAG ($TRIMAG$), validated by the commodity experts of the FOAG²⁵. In general, the AVE of a bound tariff is then $Tb_{i,j,k}$, where $i = 1....2302$ is the 8-digit tariff line, j refers to the use of a different import price for the conversion (WTO , cur , $TRIMAG$) and k indicates the formula cut applied ($t0$ = no cut, f = standard cut, s = sensitive cut). $Tb_{i,j,k} = (1 - F_k) Tb_{i,j,t0}$, where F_k is the cut on the bound rate according to the modalities (F_{t0}

²⁴ See paragraphs 103 -108 of the modalities (WTO, 2008).

²⁵ For a review of the issues concerning the computation of AVEs, see Bouët et al. (2004; 2008).

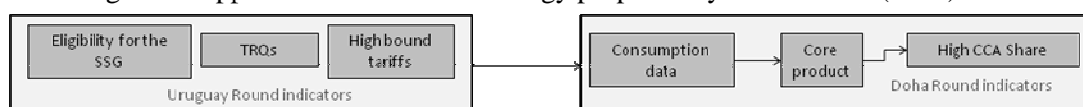
= 0). Analogously, also 2009 specific applied tariffs²⁶ (Sa) have been converted, obtaining $Ta_{i,j,k} = (Sa / Sb) * Tb_{i,j,k}$. In order to calculate the tariff revenues that would be foregone implementing the standard formula in respect to the sensitive cut, the average value of imports over the years 2006 to 2009 (i_i) has been multiplied by the difference between the applied tariff rate after implementation of the WTO formula and of the sensitive cut, so $R_{i,j} = i_i * (Ta_{i,j,f} - Ta_{i,j,s})$, where these rates are assumed to be, respectively, equal to the minimum between the 2009 applied AVE and the bound 2005 WTO AVE after implementation of the standard or sensitive cut ($Ta_{i,j,k} = \min(Ta_{i,j,10}, Tb_{i,WTO,k})$)²⁷. The “political function” indicator (Jean et al., 2008; 2010) is described in equation (6), where s_i is the import expenditure share at domestic prices (average 2006-2009) of tariff line i .

$$PE_{i,j} = s_i \left\{ \left[\frac{Ta_{i,j,f} - Ta_{i,j,t0}}{(1 + Ta_{i,j,t0})} \right]^2 - \left[\frac{Ta_{i,j,s} - Ta_{i,j,t0}}{(1 + Ta_{i,j,t0})} \right]^2 \right\} \quad (6)$$

4.2. Factual indicators

The UR and DR indicators have been combined to obtain a “factual indicator” (Ibañez et al., 2008; Figure 2). First of all, the products that fulfill the highest number of UR indicators (existence of TRQs²⁸; eligibility for the SSG; highest bound tariffs, up to 6% of the total number of tariff lines) have been selected. For Switzerland, the application of the SSG turns out not to be interesting, since a once-only application can be observed for only 7 lines and one product (pork meat). Ibañez et al. (2008) suggest that the indicators based on the Doha Round are to be used as an additional filter. Firstly, we have then checked whether Switzerland had presented consumption data for that specific tariff line, and whether the product in question was a “core” product. However, these criteria were still not enough to restrict the selection. For this reason, only those tariff lines with the highest level of CCA share within a certain Product Category have been selected.

Figure 2. Application of the methodology proposed by Ibañez et al. (2008)



Source: own elaboration

²⁶ Although preferential or reduced tariffs for specific uses might exist, we only consider Most Favoured Nation applied duties.

²⁷ The tariff lines of tariff heading 0406 (cheese), whose in 2007 trade has been completely liberalized with the EU, by far its biggest trade partner, have been excluded from the analysis. Due to the existence of preferential and reduced duties for specific uses, the real values of revenues and of revenue variations could differ from those calculated here.

²⁸ Note that, differently from TRIMAG, this criteria is here not binding.

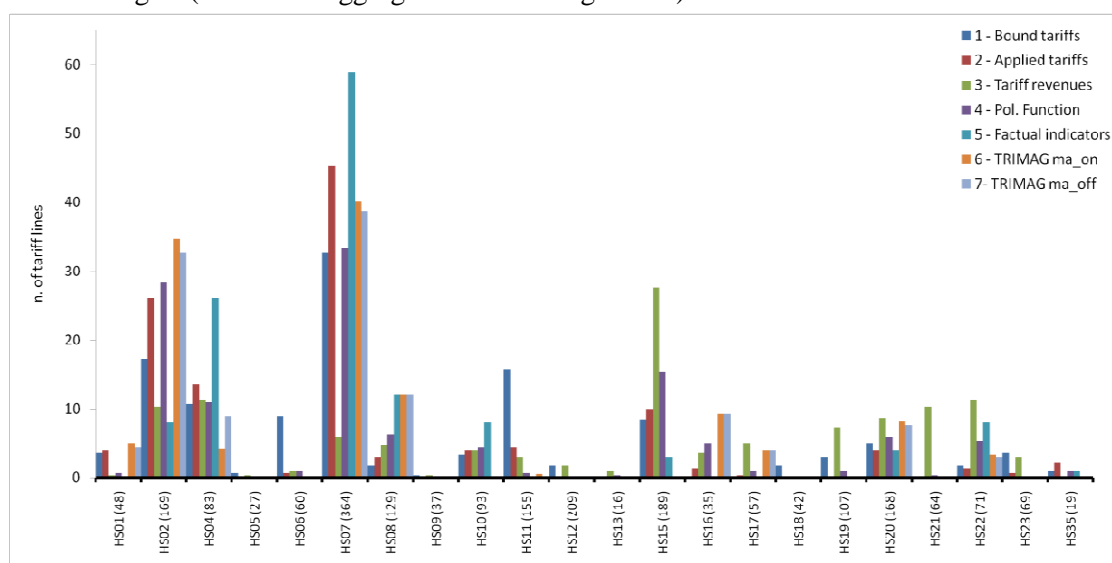
4.3. TRIMAG selection

The TRIMAG policy scenario consists of a detailed application at the 8-digit level of the December 2008 draft version of the modalities (WTO, 2008). Domestic and world prices are assumed to remain constant in time. The simulations have been repeated with and without considering the TRQ expansion (*ma_on* and *ma_off*); although only the *ma_on* option is to be retained as valid, this comparison allows to investigate how accounting for increased market access alters the selection of sensitive products. Various values of the substitution elasticities have been tested across all products (with $0.1 < \sigma < 10$).

4.4. Main findings

The distribution of sensitive tariff lines (up to 6% of the total number of lines) at the 2-digit level selected by the various methodologies is shown in Figure 3 (for a complete list of the 2-digit level chapters, see Annex 1)²⁹. Findings using the *j* prices did not significantly differ³⁰.

Figure 3. Distribution of 6% of sensitive tariff lines by applying the various methodologies (results are aggregated at the 2-digit level)



Source: own elaboration

According to the high bound tariff criterion, the highest number of sensitive products are found in chapter 07 (fruits), followed by 02 (meat), 11 (products of the milling industry), 04 (dairy products) and 06 (plants and trees). The high applied tariffs select a high number of tariff

²⁹ The 2, 4 and 6-digit groups of the HS are not composed by the same number of tariff lines (in all figures, these numbers are reported in parenthesis). However, since the overall commitment for the selection of sensitive products is defined in terms of a number of tariff lines, and we aim at comparing the results of the various methodologies, a comparison between the numbers of the lines selected in the various groups can be attempted.

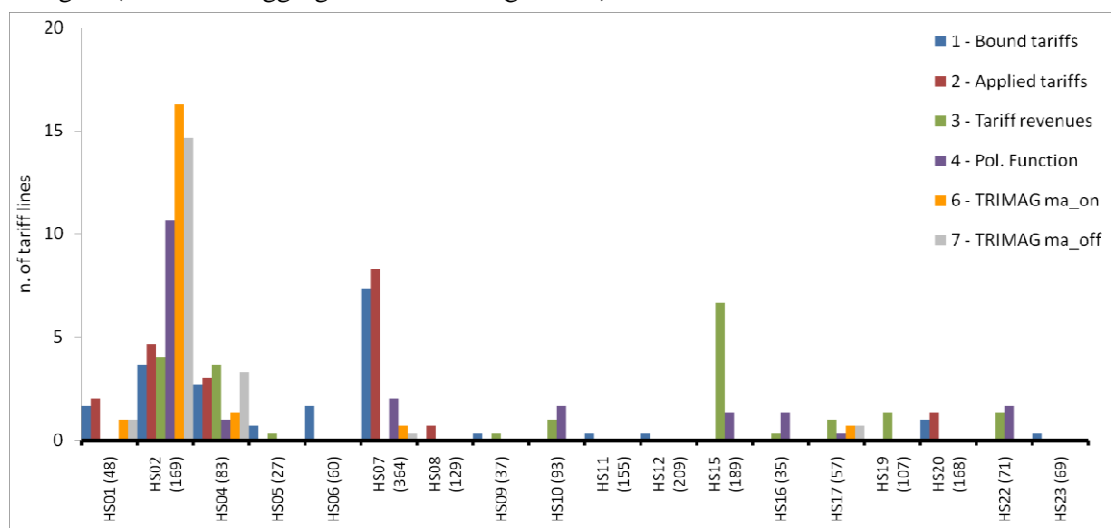
³⁰ A simple average of the results was taken at the 6-digit level. They have then been aggregated at the 2-digit level.

lines in chapters 07 (fruits), 02 (meat), 04 (dairy), 15 (fats and oils). The same chapters, although in a slightly different order, are selected by the political economy indicator (07, 02, 15, 04). The high tariff revenue criterion selects tariff lines mainly in chapters 15 (fats and oils), 22 (beverages, spirits and vinegar), 04 (dairy), 02 (meat) and 21 (miscellaneous edible preparation). According to the factual indicator, sensitive products are mostly selected in chapters 07 (vegetables), 04 (dairy products), 08 (fruits), 02 (meat), 10 (cereals) and 22 (beverages, spirits and vinegar). TRIMAG selects sensitive products mainly in chapters 07 (vegetables), 02 (meat), 08 (fruits), 16 (preparations of meat) and 20 (preparation of vegetables and fruits). For some products (dairies, 04) accounting for TRQ expansion might alter the results. In some cases, the various criteria disagree. For example, chapters 06 (plants and trees) and 11 (products of the milling industry) are selected mainly by the high bound tariffs indicator. This is due to various factors: for chapter 06, a clear autonomous liberalization strategy has been undertaken by the Swiss government in the past years, resulting in low applied tariffs and relatively lower domestic prices. For chapter 11, although bound tariffs are relatively high (since they take into account the level of transformation of the product), applied tariffs have also been autonomously reduced, albeit to a smaller extent. It is well known that looking only at high bound tariffs might in some cases lead to the inclusion of minor products (Jean et al., 2010). Chapter 16 (meat preparations) is selected mostly by TRIMAG, indicating that the impact of the selection of these processed products on the price of the corresponding basic product might be high. Chapters 19 (preparations of cereals, flour, starch or milk) and 21 (miscellaneous edible preparation) are instead selected mostly by the tariff revenue criterion. This might also be the case since some of these products are used as input in the food industry, with high volumes of imports. The factual indicator is the only criterion that explicitly conveys policy information. However, on the one side, sometimes a very broad product coverage has been ensured by policymakers, in order to keep more possibilities open for the selection. On the other side, results might be strongly influenced by some “mechanical” facts, such as the size in terms of tariff lines of product categories (the smaller the categories, the higher the probability for a product to be “core”, and for the CCA share to be high, like in chapter 10, cereals). In addition, when the same product is classified in more than one category (which is the case for “basket”³¹ lines of chapter 22), its probability to be selected increases (while the contrary happens in chapter 02). In this respect, for example, the tariff lines of chapter 15 tend not to be selected since, although quite systematically eligible for the SSG and usually classified as “core” lines (in turn, because of small product categories), the CCA share is usually relatively small and they are not linked to a TRQ. As far as the relation between the various indicators is concerned, some considerations can be made. Firstly, it is interesting to note that in the chapters which generally attract the highest number of sensitive lines (02, meat; 04, dairy products; 07, vegetables; 15, fats and oils) the applied tariff criterion normally finds more tariff lines than the bound tariff

³¹ In the WTO jargon, a “basket” line is a tariff line which covers processed goods composed of several base agricultural products (e.g., ice cream).

one. Indeed, differently from the high bound tariff criterion, the applied tariff criterion reflects the current situation of protection, without being “diverted” by past information (as it happens for chapter 06, plants). Secondly, despite some similarities in the calculations, results of the tariff revenue criterion are only partially coincident with those of the political economy function (see also Jean et al. 2008). Thirdly, although the mix of factual indicators takes into account the presence of high bound tariffs, still the two criteria do not produce the same results. Indeed, many of the tariff lines with high bound tariffs tend to be eliminated when the Doha Round filters are used. This indicator is much more correlated with TRQ lines for which consumption data is provided and which are amongst those with the highest CCA share. Almost by their nature, those lines are core lines. In general, results of TRIMAG are in accordance with the other criteria, and in particular with the political economy function indicator, the only “economic” criterion used. In addition, they indicate processed products (chapters > 15) whose price changes might potentially have a relevant impact on the domestic added value of agricultural production. Analogously, no sensitive lines are selected in chapters which are either not relevant or where a declaration as sensitive would be infeasible (e.g. when no tariff quota exists, such as for chapter 15). Finally, only the tariff revenue criterion and TRIMAG find some sugar lines (chapter 17), showing that, despite not selected when looking only at tariffs, this product is important. The analysis of the selection allowing for only 1% of sensitive products brings some additional considerations (Figure 4; note that the factual indicator is not reported since limiting to 1% the number of high bound tariffs had almost no effect on its functioning). The importance of chapters 02 (meat), 04 (dairy products), 07 (vegetables) and 15 (fats and oils) is confirmed; however, a relatively smaller number of tariff lines is selected for chapter 07 (and none with the high tariff revenues criterion), indicating that, probably due the relatively low economic value, the respective tariff lines tend to be selected only when the overall number of sensitive lines is higher, and chapter 15 is selected only by the political function and the high tariff revenues criteria. Furthermore, a strong preference of the political economy function for chapter 02 emerges. The TRIMAG choice is mostly concentrated in chapters 02 and 04, indicating the preferences for products with an important added value.

Figure 4. Distribution of 1% of sensitive tariff lines by applying the various methodologies (results are aggregated at the 2-digit level)



Source: own elaboration

5. CONCLUDING REMARKS

The objective of this paper is to compare various methodologies that can be used for the selection of sensitive products in the current Doha Round of the WTO. We developed a model, TRIMAG, that minimizes the loss of the Swiss agricultural added value after implementation of the tariff reduction formulas, subject to the constraint of a maximum number of sensitive tariff lines. Results have been compared with those obtained by applying to the Swiss tariff schedule other alternative methodologies (high bound tariffs, high applied tariffs, tariff revenue indicator, political economy function, factual indicator).

Some major considerations emerge. Firstly, all methodologies tend to converge on the selection of tariff lines in chapters 02 (meat), 04 (dairy), 07 (vegetables), 08 (fruits) and 15 (fats and oils). Interestingly, TRIMAG also signals some processed agricultural products whose price variations are likely to have a big impact on the domestic added value of agricultural production, such as chapters 16 (preparations of meat), and 20 (preparations of fruit). Also the high tariff revenues criterion selects chapters of transformed agricultural products. However, in this case this might just be due to high volumes of trade. Secondly, each methodology has its strengths and weaknesses. For example, high bound tariffs might identify products for which liberalization strategies have already been undertaken. High tariff revenues tend to identify products for which high volumes of trade exist, while products with a relatively higher level of protection might be under represented. Indicators relying on policy information might also convey useful information, although the influence of some “mechanical” parameters need to be adequately assessed. The need for supplementary economic information is clear. In this regard, analysis with TRIMAG show that for some products the TRQ expansion following the selection of sensitive products might indeed be a crucial aspect. Thirdly, models as TRIMAG might

represent a first attempt of optimizing the selection of sensitive products on the basis of the economic impacts on specific groups of stakeholders; in our case, the domestic agricultural production sector. These results might be usefully compared with those using other economic criteria, such as the political economy indicator. They might be used to correctly predict the impact on global welfare and trade, and help policy makers confronted with the selection.

However, some aspects of TRIMAG need to be further explored. Assumptions on consumer's behavior (substitution effects, differentiation by origin) as well as on price transmission between the various commodities and along the food chain are crucial. The net import demand elasticities need to be carefully validated. In addition, for those countries whose agricultural tariff schedule is mainly composed by specific tariffs, the effects of tariff simplification deserve further attention. All these methodological developments could not only contribute to a better understanding of the impact of trade policy flexibilities on the domestic agricultural sector, but also to the development of a tariff aggregation tool that could provide inputs for agricultural simulation models that operate at a higher level of aggregation.

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REFERENCES

- Armington, P. (1969). A Theory of Demand for Products Distinguished by Place of Production. *International Monetary Fund Staff Papers* XVI: 159-78.
- Bchir, M., Jean, S. and Laborde, D. (2006). Binding overhang and tariff-cutting formulas. *Review of World Economics* 142: 207-232.
- Binfield, J.C.R., Donnellan, T., Hanrahan, K. and Westhoff, P. (2009). WTO Doha Round: Impact of an Agreement on Agriculture and the Importance of Sensitive Product Status. 83rd Annual Conference of the Agricultural Economics Society, Dublin, 30 March - 1 April 2009.
- Bouët, A., Decreux, Y., Fontagné, L., Jean, S., and Laborde, D. (2008). A consistent, ad-valorem equivalent measure of applied protection across the world: The MAcMap-HS6 database. *Review of International Economics* 16: 850-863.
- Bouët, A., Decreux, Y., Fontagné, L., Jean, S., and Laborde, D. (2004). A consistent, ad-valorem equivalent measure of applied protection across the world: The MAcMap-HS6 database. Centre d'Etudes Prospectives et d'Informations Internationales (CEPII); working paper 2004- 22. Paris : CEPII.
- Britz, W., and Witzke, H. P. (2008). CAPRI model documentation. Institute for Food and Resource Economics, University of Bonn. Available at http://www.capri-model.org/docs/capri_documentation.pdf.
- Cluff, M., and Vanzetti D. (2005). Sensitive and special products: The case of dairy products. FAO Commodity Market Review 2005-2006. Rome: FAO.
- de Gorter, H. and Kliauga, E. (2006). Reducing tariffs versus expanding tariff rate quotas. In Anderson, K. And Martin, W. (eds), *Agricultural Trade Reform and the Doha Development Agenda* Palgrave Macmillan/World Bank: 117–160.
- European Commission (2005). The derivation of the TRQ expansion formula. MAP Brief, April. Available at <http://ec.europa.eu/agriculture/publi/map/>.

Ancona - 122nd EAAE Seminar
"Evidence-Based Agricultural and Rural Policy Making"

- Ferjani, A. (2008). Agricultural policy (AP2011) Reform and the WTO: Potential Impacts on Swiss Agriculture. 107th EAAE Seminar, Modelling of Agricultural and Rural Development Policies, Sevilla, Spain, 29 January -1 February 2008.
- Gallezot J. (2007). Le choix régional des produits sensibles à l'APE soumis au jugement majoritaire des pays de l'Afrique de l'Ouest. Institut National de la Recherche Agronomique (INRA) and AgroParistech. Paris.
- Gohin, A. (2008). La sélection des produits agricoles sensibles : le cas européen. *Revue d'études en agriculture et environnement*, 87: 49-76.
- Grant, J.H., Hertel, T.W. and Rutherford, T. F. (2008). Dairy TRQ liberalization: contrasting bilateral and most favored nation reform options. Paper presented at the 11th Annual Conference on Global Economic Analysis, Helsinki, Finland, 12-14 June 2008.
- Grant, J.H., Hertel, T.W. and Rutherford, T. F. (2007). Extending general equilibrium to the tariff line: US dairy in the Doha Development Agenda. Paper presented at the 10th Annual Conference on Global Economic Analysis, West Lafayette, United States, 7-9 June 2007.
- Hertel, T.W., Ianchovichina, E. and McDonald, B. J. (1997). Multi-Region General Equilibrium Modeling. In Francois, J. and Reinert, K.A. (eds), *Applied methods for trade policy analysis. A handbook*. Cambridge University Press, 258:299.
- Jean, S., Laborde, D., and Martin, W. (2010). Formulas and Flexibility in Trade Negotiations. Sensitive Agricultural Products in the WTO's Doha Agenda. Policy Research Working Paper, 5200, The World Bank (WB) Development Research Group. Washington DC: WB.
- Jean, S., Laborde, D. and Martin, W. (2008). Choosing sensitive agricultural products in Trade Negotiations. Discussion paper 00788, International Food Policy Research Institute (IFPRI). Washington DC: IFPRI.
- Jean, S., Laborde, D. and Martin, W. (2006), Consequences of Alternative Formulas for Agricultural Tariff Cuts. In Anderson, K. and Martin, W. (eds), *Agricultural Trade Reform and the Doha Development Agenda* Palgrave Macmillan/World Bank, 81-116.
- Jean, S., Laborde, D. and Martin, W. (2005). Consequences for Alternative Formulas for Agricultural Tariff Cuts. Centre d'Etudes Prospectives et d'Informations Internationales (CEPII); working paper 2005-15. Paris : CEPII.
- Ibañez, A., Rebizo, M.M., and Tejeda, A. (2008). Implications of the July 2008 Draft Agricultural Modalities for Sensitive Products. International Center for Trade and Sustainable Development (ICTSD). Geneva: ICTSD.
- Pelikan, J., Isermeyer, F., Offermann, F., Sanders, J. and Zimmer Y. (2010). Auswirkungen einer Handelsliberalisierung auf die deutsche und europäische Landwirtschaft. Johann Heinrich von Thünen – Institut, Sonderheft 338. Braunschweig: VTI.
- Piketty, M.G., Weissleder, L., Meirelles De Souza Filho, H., Batalha, M.O., Adenauer, M. and Becker, A. (2009). Assessing agricultural trade policies options with the European Union: a Brazilian perspective. *Agricultural Economics*, 40: 447-457.
- Ramos, M. P., Bureau, J.C. and Salvatici, L. (2010). Trade composition effects of the EU tariff structure: beef imports from Mercosur. *European Review of Agricultural Economics* 37: 1-26.
- Sharma, R. (2006a). On the equivalence of tariffs and quotas for sensitive products in the WTO agricultural negotiations. Working paper, Commodities and Trade Division, Food and Agricultural Organization. Rome: FAO.
- Sharma, R. (2006b). Assessment of the Doha Round Agricultural Tariff Cutting Formula. Working paper, Commodities and Trade Division, Food and Agricultural Organization.
- Skully, D. (2001). The Economics of Tariff Rate Quota administration. Technical Bulletin, 1893. Economic Research service, US Department of Agriculture (USDA). Washington DC: USDA.
- Vanzetti, D. and Peters, R. (2008). Do sensitive products undermine ambition? Contributed paper at the 52nd annual conference of the Australian agricultural and resource economics society, Canberra, Australia, 5-8 February 2008.
- WTO (2008). Revised draft modalities for agriculture, Committee on Agriculture, Special Session. TN/AG/W/4/Rev.4. Geneva: WTO.
- WTO (2004). Doha Work Program: Decision Adopted by the General Council on 1 August 2004. WT/L/579. Geneva: WTO.

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Annex 1: List of the 2-digit Chapters of the HS for Agriculture

Chapter	n. of 8-digit codes	Description	Chapter	n. of 8-digit codes	Description
01	48	Live animals	19	107	Preparations of cereals, flour, starch or milk; pastrycooks' products
02	169	Meat and edible meat offal	20	168	Preparations of vegetables, fruit, nuts or other parts of plants
04	83	Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included	21	64	Miscellaneous edible preparations
05	27	Products of animal origin, not elsewhere specified or included	22	71	Beverages, spirits and vinegar
06	60	Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage	23	69	Residues and waste from the food industries; prepared animal fodder
07	364	Edible vegetables and certain roots and tubers	24	15	Tobacco and manufactured tobacco substitutes
08	129	Edible fruit and nuts; peel of citrus fruit or melons	29	2	Organic chemicals
09	37	Coffee, tea, mate and spices	33	11	Essential oils and resinoids; perfumery, cosmetic or toilet preparations
10	93	Cereals	35	19	Albuminoidal substances; modified starches; glues; enzymes
11	155	Products of the milling industry; malt; starches; inulin; wheat gluten	38	16	Miscellaneous chemical products
12	209	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder	41	9	Raw hides and skins (other than furskins) and leather
13	16	Lac; gums, resins and other vegetable saps and extracts	43	5	Furskins and artificial fur; manufactures thereof
14	7	Vegetable plaiting materials; vegetable products not elsewhere specified or included	50	3	Silk
15	189	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes	51	11	Wool, fine or coarse animal hair; horsehair yarn and woven fabric
16	35	Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	52	6	Cotton
17	57	Sugars and sugar confectionery	53	6	Other vegetable textile fibres; paper yarn and woven fabrics of paper yarn
18	42	Cocoa and cocoa preparations			