Do price uncertainties affect the use of policy flexibilities? The selection of sensitive products in WTO agricultural negotiations

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Abstract

In a context in which price uncertainty is likely to increase, expected market trends need to be taken carefully into account while negotiating international trade policy rules. This paper aims at analyzing what is their influence on the use of policy flexibilities in the context of WTO agricultural negotiations. In particular, within the market access pillar, we focus on the selection of sensitive products. 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, accounting for various future international price scenarios. Furthermore, we test the use of alternative options for the implementation of "tariff simplification". Findings confirm that the future expected development of world and domestic prices plays an important role in the selection of sensitive products, and that tariff simplification doesn't affect the results, if provisions to ensure the neutrality of the exercise are put in place. 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.

1. Introduction

The recent developments of world prices brought renewed interest into the factors that drive long term agricultural prices and trade, and the needs of future international agricultural policy rules (see Sarris, 2009; Baffes and Haniotis, 2010). At the same time, they also made clear, on the one side, the relevance of the uncertainty about prices in the markets for agricultural inputs and outputs, and on the other of the "policy risk" resulting from an uncertain international context (OECD, 2009). In this respect, a successful conclusion of the Doha Round of WTO negotiations could avoid incentives to pursue non-cooperative strategies via the adoption of protectionist policies (Bouët and Laborde, 2009). It is clear that the expected trends of world markets will need to be taken into account while negotiating international trade policy rules. In a world in which uncertainty and price volatility are likely to increase (Sarris, 2009), their analysis is essential for a successful elaboration of the negotiating strategy of the various countries.

In this work, we aim at analyzing what is the influence of the development of world prices on the use of policy flexibilities in the context of WTO agricultural negotiations. The current basis for the discussion is constituted by the draft modalities agreed in December 2008 (WTO, 2008). In particular, within the market access pillar, we focus on the selection of sensitive products. According to the general "tiered" formula, tariffs classified in higher "bands" are subject to proportionally higher cuts. However, developed WTO members are allowed to select up to 4% of their tariff lines as sensitive[1]. For these lines, the tariff cut shall be 2/3, 1/2 or 1/3 of the otherwise applicable formula. These gentler cuts must be compensated by the expansion of import tariff rate quotas (TRQs[2]). 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. 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. On the contrary, agricultural exporters argue that the effects of even a limited number of exceptions to the general rule could be remarkable. For all these reasons, the possibility of selecting sensitive products has then drawn considerable attention in the empirical literature. Notably, it is a well known issue that some elements of uncertainty are very likely to affect the selection, such as the relative development of world and domestic prices (Gohin, 2008). In addition, various developments of future world prices might *indirectly* affect the selection of sensitive products, through their influence on other parameters of the modalities. In particular, it is the future evolution of world prices that will determine whether or not tariffs expressed in specific terms will have to be converted into their ad valorem equivalents, an issue known as "tariff simplification". This issue might be relevant for countries, like Switzerland, whose agricultural tariff schedule is composed only by specific tariffs. Specific provisions have been set to ensure the neutrality of the conversion exercise. However, whether the

[1] See paragraphs 71 to 83 of the December 2008 draft modalities (WTO, 2008). Members with more than 30% of their tariffs in the top band can select up to 6% of sensitive lines.

[2] For an analysis of origin, operating and economic impact of TRQs see Skully (2001). Although, in principle, products without TRQs cannot be selected as sensitive, it could be possible for a very limited number of lines to create new TRQs (paragraph 83 in WTO, 2008).

implementation of tariff simplification might cause variations in the relative protection of the various goods, then affecting the selection of the sensitive products, is an empirical question. In the existing literature, various methodologies have been proposed for the selection of sensitive products (for example, see Jean et al., 2010; Listorti et al., 2011; Gohin, 2008). They mostly rely on the analysis of tariffs and trade flows. Although of a simple application even at a very detailed level (since the selection of sensitive products will have to be made at the tariff line level, or 8-digit in the Harmonized System, HS[3]) they usually do not provide information concerning the impact of the selection on specific groups of stakeholders (notably, the agricultural production sector), nor allow to take into consideration future developments of world markets. On the contrary, this can be done by standard partial or general equilibrium models, but often with a relatively high level of aggregation, although some developments have been made in this respect (Gouel et al., 2010; Pelikan et al., 2010; Ramos et al., 2010; Binfield et al., 2009; Piketty et al., 2009; Gohin, 2008; Grant et al. 2008). To fill this gap, we developed a model, TRIMAG (Tariff Reduction Impact Model for Agriculture), defined at the 8-digit level of the HS, that 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 consequent domestic price changes are estimated for about 90 agricultural commodities. Then, 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. Alternative future developments of domestic and world prices can also be tested.
In this paper, we aim at verifying if, and to which extent, different future price scenarios influence the selection of sensitive products when tariff simplification is accounted for. The work is structured as follows: in section 2, tariff simplification is introduced. Section 3 explains the functioning of TRIMAG. The results of the simulations are presented in section 4. Section 5 concludes.

2. Tariff simplification

Many different kinds of import tariffs are notified in WTO members' schedules (see for example Bouët et al., 2008). In this work we will refer only to specific and ad valorem tariffs. Specific tariffs are expressed as a fixed charge per physical unit of imports. They are relatively easy to apply and administer. However, the degree of protection that they grant varies inversely with the value of the imported good, implying that they become more protective when world prices go down (Bouët and Laborde, 2008). Analogously, specific tariffs impose relatively higher protection on lower-unit-value products and give exporters an incentive to ship higher quality products, affecting also the composition of imports (Ramos et al., 2010). After the Uruguay Round Agreement on Agriculture of 1994, specific tariffs are still applied especially in the agricultural sector and in countries such as Switzerland, Japan, Malaysia and the European Union (Bouët et al., 2008). Ad valorem tariffs are instead expressed as a fixed fraction of the value of the product. They can distinguish among small differentials in product quality to the extent that they are

[3] 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.

reflected in the product price. They maintain a constant relative rate of protection at all price levels; on the other hand, in absolute terms, the tariffs will vary according to the world prices and exchange rates. The use of ad valorem tariffs implies the administrative complexity of determining the value of the imported good (Carbaugh, 2009).

WTO negotiations are based on bound tariffs, incorporated as part of a country schedule of concessions. The tariff rates charged at the border, that in practice determine trade flows, also called applied tariffs, can be at most equal to bound tariffs. In the remainder of this section, we will assume that bound tariffs are equal to applied tariffs.

Within agricultural negotiations on market access, 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. In order to allocate tariffs to the various tiers, the *Draft guidelines for the conversion of final bound non-ad valorem duties into ad valorem equivalents* (WTO, 2006) are intended to establish a common methodology for the calculation of ad valorem equivalents for the specific bound tariffs. In general, the determination of the ad valorem equivalents (or AVEs) depends on the import prices used and, if applicable, on the exchange rate. In WTO negotiations, agreement was reached over a methodology making use of 1999-2001 reference prices. Furthermore, for tariffs that are not expressed in ad valorem form, these AVEs are relevant also in another respect: indeed, the December 2008 version of the WTO modalities sets out that "*No tariff shall be bound in a form more complex than the current binding. [...]"* (WTO, 2008; paragraph 103 and the following). In the negotiations' jargon, this is what "tariff simplification" means. This provision reflects a widespread agreement over the fact that ad valorem tariffs are more transparent than specific tariffs. The AVEs agreed in the course of WTO negotiations will then also be used for the conversion of the specific tariffs. Some indications on the methodology to be followed are included in Annex N of the December 2008 draft modalities (WTO, 2008). The text indicates that "*non-ad valorem bound tariffs where the AVE from the Agreed Methodology using the 99-01 base is comparable to the current AVE calculated using the average unit import value for the Member concerned [...] shall be converted to simple ad valorem tariffs [...]*". In this context, the term "comparable" is crucial. In fact, since the AVEs have been calculated by using the years 1999 to 2001 as a reference period, it is clear that the conversion of specific tariffs into ad valorem ones might not be a neutral exercise. For example, if the import prices at the time of conversion are higher than those of 1999-2001, the conversion of a specific tariff into its AVE determined with the 1999-2001 prices might result in a sudden increase of the border protection in absolute terms. The contrary would apply if the current prices are lower than the reference ones[4]. For this reason, the WTO draft modalities impose that comparability should be checked before implementing the conversion. This operation shall be repeated three times: at the beginning, following and three years after the end of the implementation period. As far as the definition of comparability is concerned, Annex N only provides some scarce indications. In a rather complex formulation[5], the text suggests to assess comparability by

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[4] It is important to notice that price variations between current and reference prices might also be due to the specific methodology used to determine prices for the calculation of the agreed AVEs.

[5] Three footnotes explain that "*the term "comparable" here shall be deemed to exist only where it can be demonstrated that the effective final tariff cut resultant from calculating the AVE on the basis of the average unit import value [...] would be no more than 4.9 percent ad valorem percentage points less (i.e. higher) than the effective tariff cut would have been if based on the 99-01 base period"* (WTO, 2008).

looking at the resulting tariff cuts using the agreed and the current AVEs. This implicitly conveys information on the evolution of world prices from the reference period to the year in which the conversion is made. Indeed, if the effective tariff cut using the current AVE is much higher than the one considering the agreed AVE, indicating that world prices have decreased in the meanwhile, the conversion would result in higher cut than the one prescribed by the modalities; and the other way round (a simple example is reported in Box 1). In this respect, the most obvious interpretation of Annex N is that the conversion of specific tariffs into their AVEs should be implemented only if the difference between the effective cut calculated using the agreed AVE and that using the current AVEs doesn't exceed 4.9 percentage points[6].

The comparability criterion could be satisfied or not even for similar products. This might lead to a very burdensome situation with high administrative and information costs for the operators. Our aim is to study if, and to which extent, tariff simplification by considering various possible world price scenarios might affect the selection if sensitive products. To the Authors knowledge, no similar studies have been conducted.

Box 1: Example on the calculation of the effective cut.

Bound specific tariff : 100 CHF / 100 kg
1999-2001 reference price : 500 CHF /100kg
The 99-01 agreed AVE is given by $AVE_{99-01} = \frac{100 \text{ CHF / 100 kg}}{500 \text{ CHF / 100 kg}} = 20\ \%$
The effective cut prescribed by the modalities being -50%, the final AVE shall then be equal to 10%.

Case I
Reference price at the time of conversion: 800 CHF /100kg
The AVE at the time of conversion is then $AVE_{cur} = \frac{100 \text{ CHF / 100 kg}}{800 \text{ CHF / 100 kg}} = 12.5\ \%$.
The effective cut at the time of conversion is given by $ecut_{cur} = \frac{10\% - 12.5\%}{12.5\%} = -25\%$
Since the current price is higher than the 99-01 price, the current AVE is lower than the agreed one. Reducing the current AVE to the final AVE requires a lower effort.

Case II
Reference price at the time of conversion: 400 CHF /100kg
The AVE is at the time of conversion $AVE_{cur} = \frac{100 \text{ CHF / 100 kg}}{400 \text{ CHF / 100 kg}} = 25\%$
And the effective cut at the time of conversion is $ecut_{cur} = \frac{10\% - 25\%}{25\%} = -60\%$
Since the current price is lower than the 99-01 price, the current AVE is higher than the agreed one. Reducing the current AVE to the final AVE requires a stronger effort.

3. The TRIMAG model

In this section, the Tariff Reduction Impact Model on Agriculture (TRIMAG) will be briefly presented (for further reference, see Listorti et al., 2011). TRIMAG 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, the effects on domestic prices of the standard and of the sensitive tariff cut are assessed (section 3.1). The price effects of various combinations of sensitive lines are then derived

[6] Rather surprisingly, in Annex N the band is set only to avoid that the real cut would not be too much lower than the cut foreseen in the modalities; here, we will assume that the suggested threshold will apply in both directions.

at a more aggregated commodity level. The corresponding reduction of the added value of the domestic production is calculated (section 3.2). 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 3.3). The implementation of tariff simplification (3.4) and of the effect of varying world prices (3.5) are finally described.

3.1 Estimating the effect of tariff reductions at the 8-digit level

The TRIMAG database contains information at the 8-digit level on Swiss tariffs, prices and import flows from the European Union (EU) and the Rest of the World (RW). In addition, domestic prices at the 8-digit level, the data on domestic consumption as calculated in the context of WTO negotiations and the values of domestic agricultural production for about 90 agricultural commodities (source: Swiss Federal Statistical Office and Federal Office for Agriculture) are also included. In general, the average of the yearly values of the years 2004-2009 is used.

Relying on the information available, a simple approach is taken for the estimation of the domestic price drop at the 8-digit level caused by the reduction of import tariffs. 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. We assume that the applied tariff after reduction is equal to the minimum between the reduced bound rate and the currently applied rate[7], and that reductions of the bound tariffs will have an effect only when the "water" contained both in the bound and in the applied tariffs is completely eroded. 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[8] (Armington, 1969). Secondly, the resulting effect on the domestic price is calculated by an import weighted average between EU and RW drops. For every tariff line, these calculations are repeated applying the general tiered formula with a capping at 100% (*f*) and the gentler tariff cut granted by the sensitive product status, plus the exception from capping (*s*, applying the maximum possible deviation of 2/3)[9]. 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.

3.2 From the tariff line to the commodity level

In a nutshell, a CES framework is applied to aggregate price effects from 8-digit tariff lines to the agricultural commodity level (90 commodities). The 2302 tariff lines of the Swiss schedule are classified in 145 products (90 basic and 55 processed products) according to their substitutability in consumption. For each product, aggregate price effects of various tariff reduction formulas applied at the 8-digit level are derived within a CES framework. Each commodity corresponds to one basic product and up to 7 processed products. Substitution effects between processed products and price

[7] 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).

[8] This ratio reaches its lower value of one when there is water in the applied tariff.

[9] 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.

transmission from processed to basic products are considered. Price effects at commodity level are finally used to optimize the selection of sensitive lines.

Put it more formally, first of all, the effect of tariff reduction at the 8-digit level is derived at a more aggregated product level. Clearly, heterogeneous changes in prices lead to changes in the consumption pattern due to substitution effects. All i =1…2302 8-digit tariff lines have then been classified in $m= 1….145$ product groups according to their degree of substitutability in consumption. Each product m contains i = 1…n tariff lines. The price index of m (p_m) is calculated as a consumption (*CONS*) weighted average of the prices of the corresponding i tariff lines (equation 1).

$$p_{m,\propto} = \frac{\sum_i [ps_i I_{i,\alpha} + pf_i(1 - I_{i,\alpha})] CONS_{i,\alpha}}{\sum_i CONS_{i,\alpha}} \qquad (1)$$

ps_i is the expected price if the i tariff line 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 $\alpha = 2^n$ combinations of tariff cuts. Each of them requires a specific number of sensitive tariff lines and will yield a certain $p_{m,\alpha}$. Following Britz and Witzke (2008), the total utility of consumption within each product is given by the Constant Elasticity of Substitution (CES) framework of equations (2) and (3)

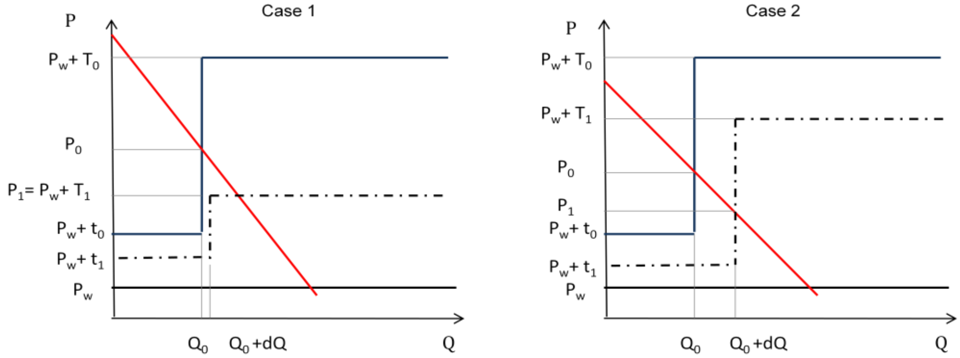
$$U_{m,\alpha} = \left[\sum_{i=1\dots n} \delta_i * \left(CONS_{i,\alpha}\right)^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}} \qquad (2)$$

$$CONS_{i,\alpha} = CONS_{NUM,\alpha} \left[\frac{\delta_i}{\delta_{NUM}} \frac{ps_{NUM} I_{NUM,\alpha} + pf_{NUM}(1 - I_{NUM,\alpha})}{ps_i I_{i,\alpha} + pf_i(1 - I_{i,\alpha})}\right]^{\sigma} \qquad (3)$$

$U_{m,\alpha}$ is the utility associated to the consumption of product m, $CONS_{i,\alpha}$ is the consumption of tariff line i when a certain combination of tariff cuts α is applied and $\sigma > 0$ is the elasticity of substitution[10]. 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 (2) and (3) 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.
However, additional complexity arises from the WTO modalities. Whenever a tariff line is selected as sensitive, a certain expansion of its TRQ must be granted. The impact on domestic prices of this TRQ expansion should also be considered. As shown in Figure 1, assuming that Switzerland is a price taker, and considering that TRQs are binding[11], in Case 1, the lowering of the out of quota tariff from T_o 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 (although it clearly affects the quota rent). 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. $P_1 < P_{w} + T_1$[12].

[10] σ is assumed to be equal to 4. Various values of the substitution elasticities have been tested across all products (with $0.1 < \sigma < 10$).
[11] 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.
[12] For a diagrammatic supply and demand model on TRQs, see Skully (2001); de Gorter and Kliauga (2006).

Figure 1. Price effects of TRQ expansion: an example



Source: own elaboration

The price drop consequent to the enlargement of the TRQ is estimated at the aggregate product level according to the *m* net import demand elasticity[13] and to the increase in imports, the latter simply assumed to be equal to the TRQ expansion[14], which in turn is, according to the modalities, equal to a certain percentage of domestic consumption of the *i* tariff lines selected as sensitive. 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, to calculate correctly the consequences on market access, we correct the aggregated prices derived from the CES framework for these effects, by taking for further analysis the minimum *m* price resulting from the increased market access and the out of quota tariff reduction.

For each of the *m* products, it is now possible to select those combinations of sensitive lines yielding the highest aggregate price $p_{m,\alpha}$ at a given number of sensitive lines. This reduces the complexity of $\alpha = 2$^n potential combinations of sensitive lines to $\alpha = n$ favorable combinations.

At this point, the price effects of the *m* products ($p_{m,\alpha}$) need to be aggregated to the *c* commodity level ($p_{c,\alpha}$). Where applicable, the price transmission effects from processed products $p_{c,\alpha}^{proc}$ to the base agricultural product $p_{c,\alpha}^{base}$ are considered. Every commodity is assigned a unique basic product *m*, and $k = 1 \dots z$ (z is at maximum equal to 7) processed products. $p_{c,\alpha}^{base}$ can simply be taken from the corresponding $p_{m,\alpha}$. Since several groups of processed products can be mapped to one commodity, a CES framework is applied to determine the processed averaged price $p_{c,\alpha}^{proc}$ and the required number of sensitive lines in the *k* processed products. $p_{c,\alpha}^{proc}$ is derived, by applying the same scheme of equations (1), (2) and (3), in which weights are given by current shares of use of the basic product (equations 6,7 and 8).

As explained in equation (4), the model minimizes the number of required sensitive lines by searching over all possible $\hat{\alpha}$ combinations in the *k* processed products corresponding to the same *c* commodity and ensures that the averaged price $p_{c,\alpha}^{proc}$ is higher than the price of the basic product group for certain α.

$$min \sum_{i \in C} I_{i,\alpha} \qquad (4)$$

[13] Net import demand elasticities have been calculated using the demand and supply elasticities of Ferjani (2008) and import penetration ratios (see Sharma, 2006). They have been bounded between -0.1 and -20 (see Sharma, 2006). Sensitivity tests have been run by using the net import demand elasticities used by Ferjani (2008).

[14] Since import quotas for Switzerland are normally binding.

$$s.t.\ p_{c,a}^{proc} \geq p_{c,a}^{base} \tag{5}$$

$$p_{c,a}^{proc} = \frac{\sum_k p_{k,\hat{a}} SHARE_{k,\hat{a}}}{\sum_k SHARE_{k,\hat{a}}} \tag{6}$$

$$SHARE_{k,\hat{a}} = SHARE_{NUM,\hat{a}} \left[\frac{\delta_i}{\delta_{NUM}} \frac{p_{NUM,\hat{a}}}{p_{k,\hat{a}}}\right]^{\sigma} \tag{7}$$

$$U_{c,\hat{a}}^{proc} = \left[\sum_{k=1\ldots z} \delta_k * \left(SHARE_{k,\hat{a}}\right)^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}} \tag{8}$$

The model is solved for each of the favorable α combinations for the basic product, which gives the corresponding $\hat{\alpha}$ favorable combinations for the processed products. In other words, each of the favorable combinations for a basic product will then also imply selecting a certain combination of sensitive lines for the corresponding processed products. The model becomes infeasible, if the $p_{c,a}^{proc}$ associated with the maximal selection of sensitive lines is still lower than $p_{c,a}^{base}$ (equation 5). In this case, the results corresponding to the maximum number of sensitive lines are taken for further calculations. Finally, the price effect on the agricultural commodity is calculated by assuming that the price transmission elasticity between processed and basic products is equal to the overall share of the use for processing of the basic product, but only if the processed price is lower than the price of the basic agricultural product (otherwise, the increase in the margin is assume to be fully captured at the higher stages of the production chain; see equation 9 where *weight* indicates the share in use).

$$p_{c,a} = weight^{base}\, p_{c,a}^{base} + weight^{proc} \min\left(p_{c,a}^{proc}, p_{c,a}^{base}\right) \tag{9}$$

3.3 The optimization mechanism

All *c* agricultural commodities are assigned the corresponding value of domestic agricultural production. Finally, the best possible combination of tariff cuts is selected at the 8-digit level, by maximizing the sum over the *c* commodities of the added value of agricultural production[15] subject to a maximum number of sensitive lines (equation 10).

$$\max \sum_c V_{c,\alpha} = \max \sum_c V_{c,t0} * \left(1 + \frac{p_{c,\alpha} - p_{c,t0}}{p_{c,t0}}\right) \tag{10}$$

$$s.t. \sum_i I_{i,\alpha} \leq x\, N$$

where $V_{c,t0}$ is the domestic added value of agricultural production of commodity *c* at time *t0*, and $p_{c,t0}$ and $p_{c,\alpha}$ are the prices of the *c* commodity before and after a certain combination of tariff cuts has been applied to its corresponding basic and, where applicable, corresponding processed products. 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*. 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.

[15] 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.

3.4 Accounting for tariff simplification

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). As mentioned already, all agricultural tariffs of the Swiss schedule are specific. If tariff simplification is not considered, the tariff cuts prescribed in the modalities are just applied according to the band of the corresponding AVEs. However, if tariff simplification is to be implemented, following Annex N (see section 2), in TRIMAG a specific tariff line is converted into its AVE equivalent if the "comparability check" is passed in at least one year amongst those from the beginning of the implementation period to three years after its end[16].

3.5 Using alternative price outlooks

TRIMAG simulations can be repeated by using various price development scenarios- notably, those provided by standard partial or general equilibrium models, such as the CAPRI agricultural model[17]. This is important for at least three reasons. First of all, it is clear that the expected future behavior of domestic and world prices has an influence on the selection of sensitive products. For example, if domestic prices are expected to grow less than world prices, there will be a lower need for protection. Secondly, such future price scenarios could reflect the effects of the selection of sensitive products made by third countries, and might then be used to analyze its consequences on the Swiss choice. Thirdly, concerning tariff simplification, the whole comparability issue ultimately relies on the relative developments of domestic and world prices between the 1999-2001 reference years and the time of conversion. We here want to verify if checking for comparability ensures the neutrality of the whole "simplification" exercise also in terms of the "optimal" sensitive products' list. However, as far as the use of various price outlooks is concerned, we have to keep in mind that most available price projections fail in accounting for the increasing price volatility that agricultural markets have been experiencing in the most recent years. Such volatility could play a relevant role in the verification of "comparability". Whereas specific instruments of analysis might be used in this respect, analysis with TRIMAG could however prove to be useful.

4. Model results

The objective of this section is to analyze if and to which extent various future price developments have an impact on the selection of sensitive products by considering the implementation of tariff simplification. 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). The implementation of the agreement is assumed to be completed between 2012 and 2016. The simulations have been repeated first by assuming that current price relations between domestic and international products will remain constant in time (*pn*), and, second, considering the price outlook for the EU, RW and CH prices provided by CAPRI[18] (*py*). In both cases, various alternatives for the implementation of tariff simplification have been considered: in the option called s*n*, all

[16] Note that comparability is assessed by considering the tariff cut associated to each year of implementation. For this reason, even when world prices are stable, the effective cut might change over time.

[17] See Britz and Witzke (2008), and http://www.capri-model.org/.

[18] Extracted from CAPRI dataset in July 2010.

tariffs remain expressed in specific form; in *sy*, tariff simplification is implemented according to the rules currently set out in the modalities (in TRIMAG, if the comparability check is verified at least once between 2011 and 2018, then the tariff is converted in AVE); *s1* is equal to *sy*, but the time horizon for checking comparability is limited to one single moment in time, the beginning of the implementation period (2011-2013); in *s2*, not only is the time horizon for checking comparability limited at the beginning of the implementation period, but the tier for the conversion is extended to +/-10 percentage points; finally, in *sa*, all tariffs are converted[19]. Remembering that the main objective of the whole comparability exercise is to ensure that border protection is not distorted, options *s1* and *s2*, in particular, attempt at exploring the possibility of reducing the administrative costs linked to its implementation thanks to only one conversion step.
First of all, it is interesting to note that the use of the various tariff simplification options does not have a big impact on the number of tariff lines that are converted (Table 1).

Table 1. Number of tariff lines that are converted to their ad valorem form in the various price scenarios /tariff simplification options

converted	**sn**	**sy**	**s1**	**s2**	**sa**
pn	- -	371 (16%)	166 (7%)	365 (16%)	1793 (78%)
py	- -	342 (15%)	166 (7%)	337 (15%)	1793 (78%)
non converted					
pn	1793 (78%)	1422 (62%)	1627 (71%)	1428 (62%)	- -
py	1793 (78%)	1451 (63%)	1627 (71%)	1456 (63%)	- -
bound at 0	231 (10%)				
-100% cut	278 (12%)				
TOTAL	2302 (100%)				

Of the 2302 8-digit tariff lines of the Swiss schedule, 231 (10% of the total) are already bound at zero, and 278 (12% of the total) will have to be reduced to zero (tropical or in-quota lines). In these cases, tariff simplification options have no effect. For the remaining lines, in *sy*, around 15% of tariff lines are converted in ad valorem in both price scenarios; the same occurs in the option *s2*, while for *s1* the number of converted tariff lines is halved. In all simplification options, the number and the composition of lines that are converted keeps constant notwithstanding the various price scenarios considered. In terms of number of converted tariff lines, option *s2* turns out to be equivalent to option *sy*. In all the considered options, the number of converted lines is however relatively low; it is clear that converting all tariff lines into ad valorem might distort the current structure of the border protection. However, one should keep in mind that accounting for price volatility might even substantially alter these findings. The whole comparability concept is based on the proximity of 1999-2001 base prices to current unit import values. In particular, assuming that world prices have risen in the past ten years, it is possible that increasing volatility might increase the number of lines that are converted as it would possibly make world prices temporarily closer to the 1999-2001 ones.
As far as the selection of sensitive products is concerned, the use of various options for

[19] Indeed, the current draft modalities state that, at the end of the implementation period, all specific tariffs might have to be converted into ad valorem (Par. 104 of WTO, 2008); but Annex N is not fully consistent with the modalities text in this respect.

the implementation of tariff simplification plays a minor role (Table 2). TRIMAG selects sensitive products especially in Chapters 02 (meat), 04 (dairy products), 07 (vegetables), 08 (fruit) and 16 (preparations of meat). When 4% sensitive lines are chosen, we can notice that both in *pn* and *py*, the selection between *sn*, *sy*, *sy1*, *sy2* remains relatively stable. This would confirm that the tariff simplification exercise in all the three options is « neutral » for the degree of border protection associated to the various products.
On the contrary, there are slight differences in the selection between *py* and *pn*. For example, in the option *py*, less products are found in chapter 17. Indeed, other things equal, CH prices for sugar are projected to grow less than EU and RW prices. This confirms that the future evolution of domestic and world prices plays a relevant role for the selection of sensitive products. The same considerations apply to the case where 6% of sensitive lines is selected. Interestingly, in *py* the model doesn't reach the 6% of sensitive products. Notably, in *py*, in respect to *pn*, moving from 4% to 6% of sensitive lines fewer sensitive products are found, and the 6% is not reached. For example, not many additional products are selected in Chapters 7 and 20 (vegetables and vegetable preparations); for these products, the CH prices are projected to grow less than the EU – RW prices. However, it must not be forgotten that these simulations do not take price volatility into account, but just assume linear development trends for the price series[20].
Finally, it is interesting to note that, when all tariff lines are converted (option *sa*), TRIMAG tends to find a lower number of sensitive products. In other words, the TRQ expansion might become too costly related to the additional protection effect. This might be interpreted as an indication that, in some cases, the current prices are higher than the 1999-2001 reference ones, and then that simply converting all tariffs in AVE without accounting for comparability could leave the degree of border protection relatively higher, compared to the formula reduction applied to specific duties.

Table 2. Number of tariff lines selected as sensitive in the various price scenarios /tariff simplification options

		4% sensitive products										**6% sensitive products**									
		pn					**py**					**pn**					**py**				
Chapter		**sn**	**sy**	**s1**	**s2**	**sa**	**sn**	**sy**	**s1**	**s2**	**sa**	**sn**	**sy**	**s1**	**s2**	**sa**	**sn**	**sy**	**s1**	**s2**	**sa**
02	Meat and edible meat offal	28	30	28	29	25	31	32	31	29	25	37	39	37	38	25	36	37	36	36	25
04	Dairy products; eggs; honey	6	6	6	6	2	5	5	5	5	2	6	6	6	6	2	5	5	5	5	2
07	Edible vegetables and certain roots and tubers	20	19	20	20	26	22	20	22	20	19	37	36	37	37	30	22	20	22	20	19
08	Edible fruit and nuts	10	8	10	8	7	9	10	9	10	7	10	10	10	10	7	9	10	9	10	7
10	Cereals		1		1		1	1	1	1		1	1	1	1		1	1	1	1	
11	Products of the milling industry	1	1	1	1							1	1	1	1						
16	Preparations of meat or fish	8	8	8	8	6	6	6	6	6	7	9	9	9	9	6	7	7	7	7	7
17	Sugars and sugar confectionery	4	4	4	4	4	2	2	2	2		4	4	4	4	4	2	2	2	2	
20	Preparations of vegetables, fruit, nuts	3	3	3	3	7	3	3	3	6	6	9	9	9	9	7	7	7	7	7	6
22	Beverages, spirits and vinegar					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total		**80**	**80**	**80**	**80**	**78**	**80**	**80**	**80**	**80**	**67**	**115**	**116**	**115**	**116**	**82**	**90**	**90**	**90**	**89**	**67**

[20] Furthermore, tariff simplification is implemented assuming that the comparability tier holds in both senses.

5. Concluding remarks

Future price developments need to be taken into account while using policy flexibilities in the context of multilateral trade negotiations. The objective of this work is to analyse if and to which extent various future price developments have an impact on the selection of sensitive products by considering the implementation of tariff simplification. 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.

Some major considerations are possible. First of all, the relative evolution of domestic and world prices plays a role in the selection of sensitive products. When domestic prices are projected to come closer to international prices, there is a lower need for protection.

Secondly, although price volatility is not accounted for in the present study, still some considerations emerge on the implementation of tariff simplification. By ensuring that “comparability “ is respected, the tariff simplification exercise can be implemented in a neutral way. This “neutrality” between the various implementation options for tariff simplification is here assessed looking at the impact on the selected list of sensitive products. In this respect, the differences between the alternatives considered are not remarkable. It is interesting to explore the possibility of reducing the administrative costs by checking for comparability less than three times over the implementation period, as set out by the current modalities.

This analysis was possible thanks to a model using 8-digit tariff level information. However, some aspects of TRIMAG need to be further explored, such as 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. Such methodological developments could contribute to a better understanding of the impact of trade policy flexibilities on the domestic agricultural sector. Furthermore, TRIMAG can be considered as a tariff aggregation tool that, according to various tariff reduction formulas, can provide inputs for agricultural simulation models that operate at a higher level of aggregation.

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