ANALYSIS OF IMPACT ON DOMESTIC AGRICULTURE OF WTO MARKET ACCESS POLICY WITH THE HAMI SIMULATION MODEL

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Abstract

A simple but new theoretical approach is used to analyse ex-ante the impact of tariff reduction. This methodology is based on the assumption of a constant price relation between each direct substitutable product. No elasticities are needed, but accurate import and domestic prices of the most sensitive and representative product of each tariff line are required. The present contribution forms a partial sector static simulation model that minimises the reduction of domestic production prices for the agricultural sector consecutive of the WTO market access negotiations of the Doha round. Results are shown on two levels whereas one of them provides rapidly a preliminary hierarchy of the sensitive products tariff lines and their optimal number. The second level provides a post-WTO maximal domestic price for aggregated products for which demand and supply elasticities are known. These maximal prices can be used as exogenous variable in dynamic models.

Keywords

Maximal domestic price, Sensitive products, Partial Sector Simulation, Market Access Simulation, World Trade Organization

1 Introduction

1.1 Problem description

In the negotiations of the Doha round within the World Trade Organization (WTO), various formulas for agricultural tariff reductions are considered. Taking the example of tiered formula, in August 2007 a proposal for developed countries in the "WTO Revised draft modalities for agriculture"[1] was published: tariffs in excess of 75 percent shall be cut by [66-73] percent; tariffs between 50 and 75 percent are foreseen to be cut by [62-65] percent; tariffs between 20 and 50 percent by [55-60] percent and tariffs less than 20 percent shall be cut by [48-52] percent. Following this proposal, each Member is supposed to have the right to designate up to [4][6] per cent of dutiable tariff lines as so-called "Sensitive Products" (SeP) which then can benefit from a lower (1/3 to 2/3) tariff reduction than would otherwise have been required by the tiered formula. In counterpart of this favourable treatment, new access opportunities in form of tariff quotas equivalents have to be granted. These are supposed to have no less than [3]-[6] per cent of domestic consumption expressed in terms of physical units. The same kind of new access opportunities should be granted if there is more than 5% tariff lines in excess of 100 percent *ad valorem* (capping) after application of the tariff reduction commitments. This WTO negotiation proposal sets up the problem for industrialised countries such as Switzerland that impact estimation of the declaration of sensitive products and/or exceptions to capping have to be carried out.

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[1] WTO (2007)

1.2   Objectives

Following the problem description, a first research objective is to achieve a minimisation of the loss of production and added value for the Swiss agricultural sector by the selection of flexibilities such as the prioritisation of sensitive products and/or exceptions to capping and their optimal number. The second objective is the determination of exogenous variables for dynamic models (e.g. "SILAS-model"; see Mack, 2006 or the "Simulationsmodell Milch- und Fleischmarkt"; see Flury and Rieder, 2005). Such variables are, after a given *specific*[2] tariff duty cut, the maximal domestic prices for each agricultural sector (e.g. beef meat; butter, wheat) for which the demand and supply elasticities are known.

2   Innovative theoretical and conceptual framework

A simple but new methodology is applied in a static partial sector model (HAMI[3]) based on MS Excel. The model displays the border protection of the Swiss agricultural branch. The quantities of production, export and import are set as being unchanged in this model whereas the *maximum* domestic prices after tariff cuts are estimated. Elasticities are not required whereas accurate import and domestic prices of the most sensitive but representative product of each of the 1871 individual bound tariff lines on HS8[4] level of the Swiss agricultural coverage are necessary.

It is assumed that a perfect *domestic* market law determines the prices and that the (Swiss) domestic market is too little to influence the world market price.

2.1   Maximum domestic price after a tariff cut

The maximum wholesale domestic price of one isolated product after a tariff cut is presented at the Chapter 2.1.1. The most sensitive product for a tariff cut, inside one bound tariff line is defined at the Chapter 2.1.2. The maximum wholesale domestic price of the products inside one entire sector after tariff cuts is presented at the Chapter 2.1.3. The relation between maximum wholesale domestic prices of different sectors is given at the Chapter 2.1.4.

2.1.1 Basic principle

Basically, the maximum domestic price of one product (Pch max or Wn) is equal to the import cost price (PR) inclusive the bound duty (Dn). The reduction of domestic wholesale price (dPch) after a bound tariff cut (dDn) is equal to this cut minus the part of the bound tariff (Dn) that is not effective ("Water"). This part is the maximum of the three following elements. The first element "Pn" is the difference between the import cost price after bound duty (Wn) and the wholesale domestic price (Pch). The second one "Pi" is the bound duty (Dn) minus the applied tariff (Da), known as "binding

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[2] The Swiss agricultural tariff duties are "specific" it means expressed in Swiss franc per unit of volume. But the methodology proposed in the present paper can be applied also for *ad valorem* duties.
[3] „Hauptabteilung Märkte und Internationales" (HAMI) of the Swiss Federal Office for Agriculture (FOAG)
[4] Refering to the international Harmonized Commodity Description and Coding System (HS), administered by the World Customs Organization in Brussels

overhang". The third one "Piu" is the difference between the import cost price after preferential duty for a big trade partner (Wau) and the import cost price after bound duty (Wn).

$$(1) \qquad dPch_{tariff.line} = MIN\big[MAX(Pn;Pi,Piu) - dDn;0\big]$$

where

$$(2) \qquad Pn = Wn - Pch$$
$$(3) \qquad Pi = Dn - Da$$
$$(4) \qquad Piu = Wn - Wau$$

The bound duty (Dn) used is generally the out-of-quota tariff rate, except for the case where the tariff quota is not filled, where the tariff rate of the quota (TRQ) is used to estimate the domestic price reduction. Due to difference of consumer's perception of quality (Swissness) between domestic and import goods, "Pn" is not always greater than "Pi" or "Piu" and can even be negative. Figure 1 shows in a glance different values used for each bound tariff line.

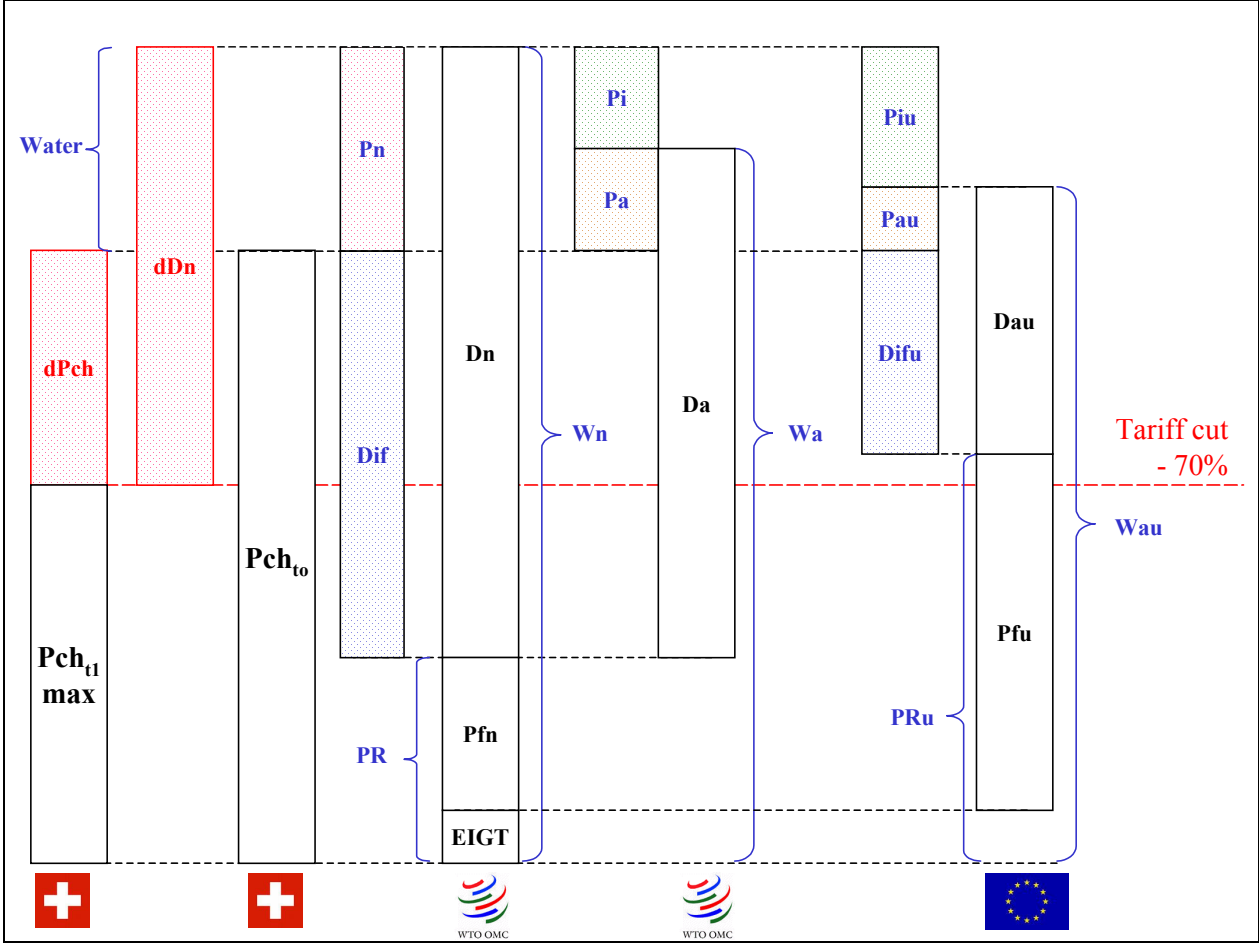Figure 1. The reduction of domestic wholesale price (dPch) of a product after a bound tariff cut (dDn) is equal to this cut minus the part of the bound tariff that is not effective ("Water").

In the Figure 1, the abbreviations used can be explained as follows:

Da   WTO applied MFN duty

Dau   "Da" for a preferential trade agreement with a big supplier

dDn   reduction of WTO bound MFN duty

Dif	difference between domestic wholesale price and import cost price before duty. Dif = Pch - PR
Difu	"Dif" for a preferential trade agreement with a big supplier
Dn	WTO bound MFN duty
dPch	reduction of domestic wholesale price
EIGT	administrative cost of importers, transport cost inside the country and margin of the wholesaler
Pa	surplus of WTO applied MFN duty = Wa – Pch
Pau	"Pa" for a preferential trade agreement with a big supplier
Pch	domestic wholesale price
Pfn	cost insurance and fret (c.i.f.) import price
Pfu	"Pfn" for a preferential trade agreement with a big supplier
Pi	WTO MFN duty not used = Wn – Wa = Dn - Da
Piu	"Pi" for a preferential trade agreement with a big supplier = Wn - Wau
Pn	surplus of bound MFN duty = Wn - Pch
PR	import cost price before duty. PR = EIGT + Pfn
PRu	"PR" for a preferential trade agreement with a big supplier
Wa	import cost price inclusive WTO applied MFN duty. Wa = PR + Da
Wau	"Wa" for a preferential trade agreement with a big supplier
Wn	import cost price inclusive WTO bound MFN duty. Wn = PR + Dn

2.1.2 Most sensitive product inside a bound tariff line

The most sensitive product inside a bound tariff line (MSPtl) is defined as representative for the other products inside its tariff line and presented the highest absolute difference (Dif) between the domestic wholesale price (Pch) and the import cost price before tariff duty (PR) during the domestic production season. For example the MSPtl of the "HS 0201.3099 chilled boneless beef" can be the filet.

$$(5) \qquad\qquad\qquad Dif = Pch - PR$$

The MSPtl presents therefore, after a tariff cut, the highest relative wholesale price reduction (dPch / Pch) among all the representative products inside its single bound tariff line (HS8).

2.1.3 Constant price relation between each product of the same sector

A "sector" or "family" is defined as a group of directly *substitutable* individual products or bound tariff lines (e.g. HS 0201.30 chilled boneless beef, HS 0202.30 frozen boneless beef tariff line, etc.) each represented by its most sensitive product (MSPtl) (e.g. filet for the HS 0201.30, and rump for the HS 0202.30).

Based on the 1871 tariff lines, there are:
- 113 sectors of basic agricultural products (e.g. breeding bovine, calve meat, soft cheese, strawberry, apple, wheat, sugar);
- 13 sectors of processed agricultural products (e.g. chocolate, pastries, soup, confectionary);
- 12 sectors of agricultural inputs (e.g. energy forages, protein forages).

Due to different ad valorem (AV) or ad valorem equivalent (AVE) tariffs between single tariff lines inside the same sector, different tariff cuts (tiered formula) are applied. Different relative domestic price reductions occur, one for each product of the same sector. Due to the definition of the sector, a constant price relation between each product inside one single sector before and after a tariff reduction is assumed.

(6)
$$\left(\frac{Pch_i}{Pch_j}\right)_{t0} = \left(\frac{Pch_i}{Pch_j}\right)_{t1}$$

"i" and "j" are two of any products inside one sector
"t0" and "t1" the time respectively before and after the tariff reduction.

In consequence of the previous assumption (Equation 6), after different tariff cuts, the highest relative domestic wholesale price reduction (dPch / Pch) observed among all the products inside one sector is applied to all the products of this sector as shown in Equation (7).

The product (the MSPtl) that presents the highest relative price reduction inside one sector is also named the most sensitive product of the sector (MSPse) or alpha 1 (α1) product of its sector. The second highest sensitive one is named α2 of the relative sector, etc.

(7)
$$\left(\frac{dPch}{Pch}\right)_{\sec tor} = \left(\frac{dPch}{Pch}\right)_{\alpha 1} = MAX\left[\left(\frac{dPch}{Pch}\right)_i, \left(\frac{dPch}{Pch}\right)_j, ..., \left(\frac{dPch}{Pch}\right)_k\right]$$

where i, j, …, k are the products inside one sector
α1 is the most sensitive product of the sector (MSPse)

After a cut of all the bound tariff lines inside one sector, the maximum wholesale domestic price of a product inside this sector is equal to its domestic price before the tariff cut (Pch_{t0}) reduced by the (highest) relative price reduction observed on the most sensitive tariff line inside this sector (MSPse)[5].

(8)
$$Pch_{i.t1}\max = Pch_{i.t0} * \left(1 - \left(\frac{dPch}{Pch}\right)_{\alpha 1}\right)$$

"i" is a product belonging to the same sector

Taking the Liebig's law of the minimum[6] can be used to illustrate this assumption: the length of its shortest stave limits the capacity of a real barrel. In analogy, the maximum domestic price of a product is limited by the shortest *effective* duty (α1 tariff line) of its sector as shown in the Figure 2.

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[5] By hypothesis, all products inside one bound tariff line are directly substitutable between each other and belong to the same sector. Therefore the Equations (6) to (8) could also be applied for each product inside one tariff line where the most sensitive product inside a bound tariff line (MSPtl) (Chapter 2.1.2) has the same function as the most sensitive product of the sector (MSPse).
[6] The Liebig's Law is a principle developed in agricultural science by Carl Sprengel (1828)
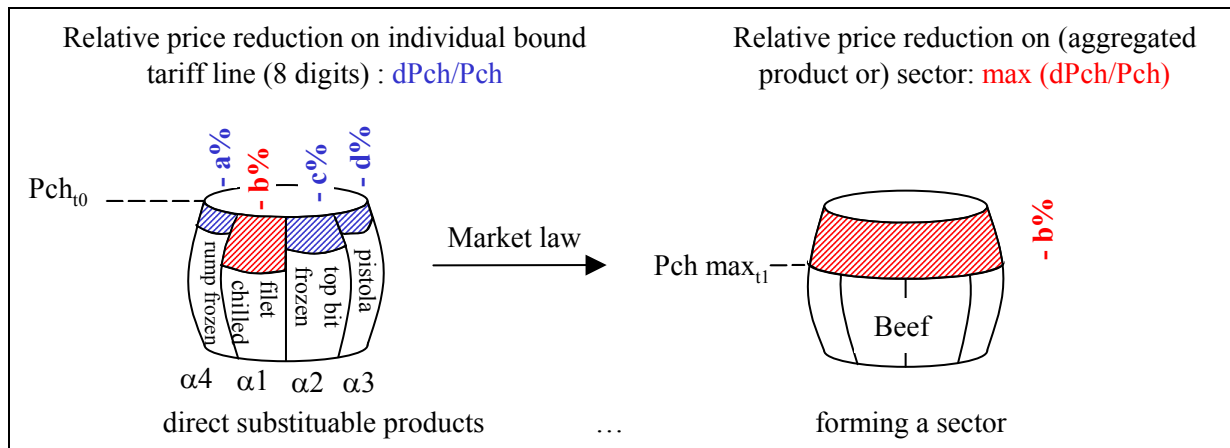
Figure 2. Application of the Liebig's law for the example of beef sector

2.1.4 Impact of price reduction of the processed product

Higher relative domestic price reduction of the processed agricultural product sectors (PAPS) can accentuate the relative price reduction of the basic agricultural product sector (BAPS) if the volume share of the basic product which is affected in this processed product, is sufficient. Taking the example of a higher price reduction on the sector "Chocolate", an impact on a price reduction on the sugar sector can be considered (and vice versa if the domestic competition is active enough). This relation is given in Equation (9).

$$(9) \qquad \left(\frac{dPch}{Pch}\right)_{BAPS} \geq \left(\frac{dPch}{Pch}\right)_{PAPS} * \frac{Qy_{BAPS.in.PAPS}}{Qy_{total.BAPS}}$$

The same kind of price reduction adjustment is possible in the agriculture sector itself. Taking the forage domestic price, it might further decrease if the prices of pig and poultry decrease relatively more than forage price (and vice versa if the domestic competition is active enough).

2.2 Loss of output of agricultural activities and gross value added as a result of tariff cut

The reference used for evaluating the effect of tariff cut on agricultural goods is the output of agricultural activities (OAA) in value at the market (farm gate) prices[7], the "intermediate consumption" (IC) and the gross value added (GVA) of the Economic Accounts for Agriculture (EAA)[8] of 2000 - 2002.

$$(10) \qquad OAA = Pch * Q_y$$

$$(11) \qquad IC = Pch * Q_x$$

$$(12) \qquad GVA = OAA - IC$$

Where "Pch" is the domestic price at farm gate of product or factor of production, Q_y the volume of production and Q_x the volume of intermediate consumption.

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[7] Output of agricultural activities (OAA) at the "market price" is the OAA at the "basic prices" minus subsidies, plus twice the value of taxes.
[8] Swiss Federal Statistical Office (2006)

The 10.6 billions Swiss francs[9] of the OAA are attributed to the 113 basic product sectors (Chapter 2.1.3). The 5.9 billions Swiss francs[10] of the "intermediate consumption" are affected to 12 sectors of inputs. The turnover of the Swiss agro-industry is distributed to the 13 sectors of agricultural processed product.

Due to the static nature of the present model, the volumes of the output (Q_y) of agricultural activities as well as of the intermediate consumption (Q_x) remain unchanged, whereas the prices are reduced. The static loss of in-value-OAA (at the farm gate) after a tariff cut for one output sector ($dOAA_{sector}$) is estimated as the initial output multiplied by its relative wholesale price reduction.

(13) $$dOAA_{sector} = \left(\frac{dPch}{Pch}\right)_{sector} * OAA_{sector} = \left(Pch_{t1.sector} - Pch_{t0.sector}\right) * Q_y$$

This static loss for the overall agricultural branch ($dOAA_{agriculture}$) is estimated as the sum of the losses of each of its constituent output sectors.

(14) $$dOAA_{agriculture} = \sum_{a=1}^{total.number.of.sectors} dOAA_{sector.a}$$

"a" is the number of the output sector

In analogy to the static reduction of the in-value-"intermediate consumption" (IC) after a tariff cut for one input sector (dIC_{sector}) is estimated as the relative wholesale price reduction multiplied by its initial consumption.

(15) $$dIC_{sector} = \left(\frac{dPch}{Pch}\right)_{sector} * IC_{sector} = \left(Pch_{t1.sector} - Pch_{t0.sector}\right) * Q_x$$

This static reduction of the IC for the whole agricultural branch ($dIC_{agriculture}$) is estimated as the sum of reductions of each of its constituent input sectors.

(16) $$dIC_{agriculture} = \sum_{b=1}^{total.number.of.sectors} dIC_{sector.b}$$

"b" is the number of the input sector

The new "gross value added" (GVA) after tariff cut is computed as the difference between the OAA and the IC after the tariff cut.

(17) $$GVA_{after.tariff.cut} = \left(OAA + dOAA_{agriculture}\right) - \left(IC + dIC_{agriculture}\right)$$

If the changes of OAA (at the farm gate) and the IC are estimated for each sector and then aggregated for the agricultural branch, on the contrary, the GVA is defined only for the whole agricultural branch because the IC is not allocated to each individual sector in the EEA.

It is presumed that the relative domestic wholesale price reduction of one sector (dPch / Pch), is applied equally to all the processing stages. This implies that the farmer price and the margins of the

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[9] 1 billion Swiss francs are not attributed due to corresponding to services for which the tariff cut has no substantial effect.

[10] 3 billions Swiss francs are not attributed due to corresponding to services for which the tariff cut has no substantial effect or corresponding to energy, fertilisers, pesticides for which the duty is already free.

transformer and the wholesaler are reduced in the same proportion. Should the intermediate industries not reduce their margin, the farm gate price reduction calculated in the present model would be underestimated of a factor 1 / (1- margin/domestic wholesale price) (i.e. 1.4 for a margin of 30%).

2.3   Prioritisation and optimal number of sensitive tariff lines

As mentioned in the introduction, the "sensitive products" (SeP) are bound tariff lines that can benefit from a lower tariff reduction than is otherwise required by the tiered tariff cut formula. In counterpart of this favourable treatment, new access opportunities in form of tariff quota equivalents (dTRQ) have to be granted. It is assumed that it is profitable to choose a sensitive product if the "output of agricultural activities" (OAA) with the sensitive tariff cut minus the loss of the TRQ expansion is higher than with the formula cut. Due to the static nature of the present model, the volume of production (Q_y) is supposed to be fixed before and after price reduction.

(18) $$OAA_{sensitive.cut} - dTRQ * Pch_{i.sensitive.cut} > OAA_{formula.cut}$$

"i" is a sensitive product

The same equation can be written as follow.

(19) $$Pch_{sector.sensitive.cut} * (Q_y - dTRQ) > Pch_{sector.formula.cut} * Q_y$$

In consequence, a sensitive product (SeP) is profitable if the difference between the gain of OAA (dOAA$_{sensitive.cut-formula cut}$) procured by the sensitive tariff cut and the loss of the TRQ expansion, defined here as the net gain of OAA (dOAAn$_{sensitive.cut-formula cut}$), is positive.

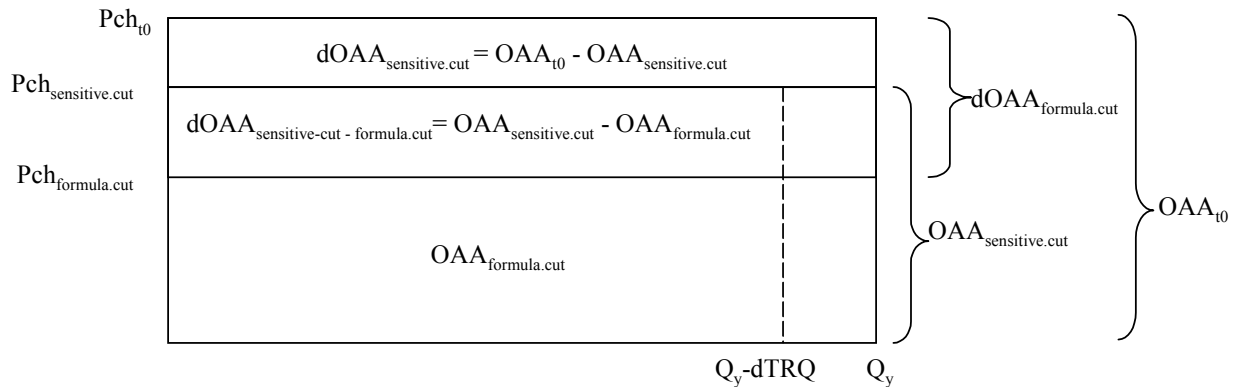(20) $$dOAAn_{sensitive.cut-formula.cut} = dOAA_{sensitive.cut-formula.cut} - dTRQ * Pch_{i.sensitive.cut} > 0$$

Figure 3. Gain of "output of agricultural activities" (dOAA$_{sensitive.cut-formula cut}$) with sensitive tariff cut

The gain of OAA (dOAA$_{sensitive.cut-formula cut}$) offered by the sensitive tariff cut is the multiplication of the volume of the sector (Q_y) by the lower domestic price reduction (dPch) induced by the sensitive cut (Equation 13). The potential of domestic price saving of an alpha c product of the formula cut (Chapter 2.1.3) is proportional to the difference between relative price reductions of the alpha c and alpha c+1 of this formula cut. However, the alpha 1 product of the sensitive cut limits the potential of domestic price saving. Moreover this gain is granted only if the alpha c-1 tariff line is already chosen as sensitive product (see Figure 4).

(21) $$dOAA_{sensitive.cut-formula.cut} = \left(MIN\left(Pch_{formula.cut.\alpha.(c+1)}; Pch_{sensitive.cut.\alpha1}\right) - Pch_{formula.cut.\alpha.c}\right) * Q_y$$

where "c" is the number of order of the alpha product (positions).

The first best profitable sensitive tariff line in terms of gain of OAA is the alpha 1. The two best profitable sensitive tariff lines are two alpha 1 or a combination of alpha 1 and alpha 2 of the same sector. Taking the example of the best selection of sensitive tariff lines of pork and beef presented in Figure 4 is α1beef if one line (dOAA = 72 mio US$), α1pork and α2pork if two lines (dOAA = 218 mio US$), α1pork, α2pork and α2beef if three lines (dOAA = 290 mio US$) are selected. Thereby, in the Figure 4, alpha tariff lines with formula and sensitive cuts determine the OAA of the sectors. This simplified and theoretical example computed can be seen in Chapter 4.1.The lines α3pork and α4beef deliver no advantage as the α1 sensitive cut imposes already a larger price reduction. The maximum "gain of OAA" (Max dOAA) is limited by the α1 sensitive cut.
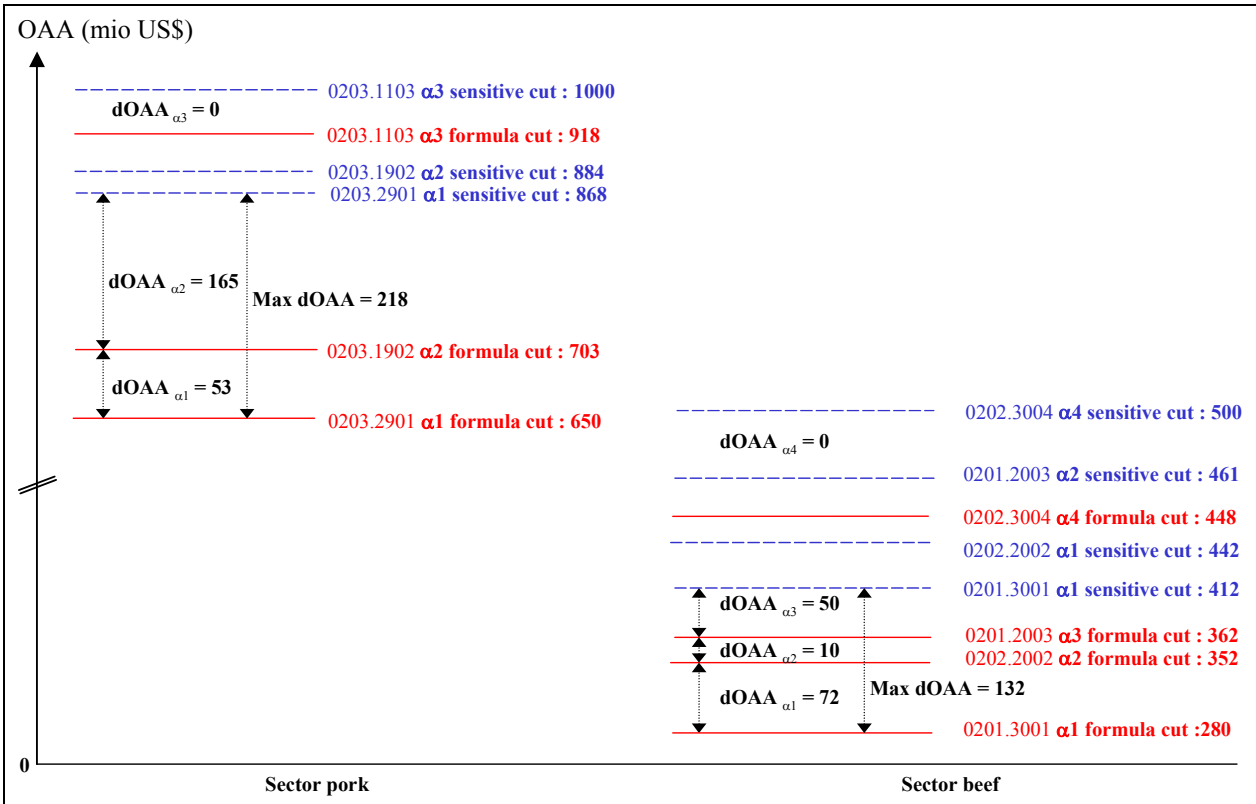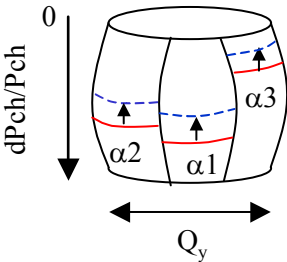

Figure 4. OAA of the sectors pork and beef.

Figure 5. A lower (sensitive) tariff cut applied to the tariff line α3pork permit no higher price for the pork sector

The criterion of prioritisation of sensitive tariff lines is the level of the "net gain of OAA" (dOAAn) (see Equation 20) procured by the sensitive cut. This net gain is diminishing with the number of sensitive tariff lines (law of diminishing returns). The last sensitive tariff line that delivers a positive "dOAAn" define the optimal number of sensitive tariff lines. Thereby, the net OAA (OAAn), defined as the OAA after sensitive tariff cut minus the loss of turnover generated by the tariff rate quota expansion (dTRQ), is maximised.

$$(22) \qquad OAAn_{sensitive.cut} = OAA_{sensitive.cut} - \sum_{i=1}^{nb.sensitive.tariff.lines} dTRQ * Pch_{i.sensitive.cut}$$

"i" is a sensitive product

3 Methods of data collection and analysis

3.1 Data sources

Results of market observation are required to implement the present methodology: 1871 import prices and their corresponding domestic prices have to be estimated. The five following principles are respected in the selection of the 1871 comparing (Chapter 2.1.2) import and domestic prices:

1. Equivalence in terms of nature (production method, quality), form (packaging, bulk) and marketing stage (factory gate, wholesaler, geographical situation) between domestic and imported products,
2. Representativeness of the product for its tariff line and the domestic production,
3. Simultaneity (season) of the measure of its price,
4. A three year price average,
5. Verifiability of the price sources.

In case where the domestic price is unknown, it is estimated based on the Integrated Data Base[11] import unit value (Pfn) and the price relation between domestic and import prices of a similar product. For products with threshold prices, it is retained in case no more accurate domestic price are known. The output of in-value-agricultural activities (OAA) at the market (farm gate) prices[12], the "intermediate consumption" (IC) and the gross value added (GVA) of the Economic Accounts for Agriculture (EAA) of 2000-2002 are used (see Chapter 2.2). The Integrated Data Base (IDB) for unit value, the Consolidated Tariff Schedules Database (CTS) of the WTO for the specific tariffs and the WTO definition of the AVE are used.

3.2 Methods of analysis

The conceptual framework is simple and allows simulations in MS Excel where notably the function pivot is used.

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[11] The IDB database is a uniform, standardized database containing import value and quantity data for the respective WTO member country.

[12] Output of agricultural activities (OAA) at the "market price" is the "basic prices" minus subsidies, plus twice the value of taxes.

4   Results

Two kinds of results are obtained. The first one is the prioritization and the optimal number of the sensitive products. These results are presented for a simplified and theoretical example (Chapter 4.1). The second one is the maximum domestic price (Chapter 4.2).

4.1   Prioritization and optimal number of sensitive products

As can be seen in Table 1 (and Figure 4), if the domestic consumptions of pork and beef per tariff line are respectively 15 000 and 10 000 tons, and if the tariff rate quota expansion (dTRQ) is 4% of this consumption, the first sensitive tariff line that *preliminary* maximise the "net gain of output of agricultural activities" (Equation 20) is the $\alpha1$ beef (HS 0201.3001): $dOAAn_{sensitive.cut\text{-}formula\ cut}$ = 352 mio US\$ - 280 mio US\$ - 0.04*10 000 t*48 US\$/kg*(1-0.30) = 59 mio US\$. The $\alpha1$ pork (HS 0203.2901) presents a lower dOAAn (48 mio US\$). Could two alpha positions be taken, the $\alpha1$ beef is rejected and replaced by the $\alpha1$ pork (HS 0203.2901) and $\alpha2$ pork (0203.1902): $dOAAn_{sensitive.cut\text{-}formula\ cut}$ = 868 mio US\$ - 650 mio US\$ - 0.04*15 000 t*12 US\$/kg*(1-0.13) - 0.04*15 000 t*20 US\$/kg*(1-0.13) = 201 mio US\$. The $\alpha1$ beef (HS 0201.3001) and $\alpha2$ beef (HS 0202.2002) present a lower dOAAn (65 mio US\$). The $\alpha1$ beef (HS 0201.3001) combined with $\alpha1$ pork (HS 0203.2901) present also a lower dOAAn (107 mio US\$). The two positions $\alpha4$ beef and $\alpha3$ pork are never selected due to the absence of gain of output of agricultural activities (dOAA).

Table 1   Gain of output of agricultural activities (dOAA) of sensitive tariff lines and maximal domestic price

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
		OAA	MSP	Dn	Da	AVE	dDn / Dn	dDn / Dn	PR	Wau	Pch	Pn	Pi	Piu	dPch/Pch	Alpha i	OAA	dPch/Pch	Alpha i	OAA
Tariff line	Sector	Output agricultural activities	Most sensitive but representative product	Bound tariff	Applied tariff	Ad valorem equivalent	Falconer formula tariff cut	Sensitive tariff cut	Import cost price before MFN duty	Import cost price after preferential duty	Domestic price	Surplus of bound MFN duty rate	MFN duty available but not used	MFN duty available but not used because of preferential trade	Relative loss of domestic price per sector (formula cut)	Highest relative price reduction per sector (formula cut)	Output Agricultural activity after formula cut	Relative loss of domestic price (sensitive cut)	Highest relative price reduction per sector (sensitive cut)	Output Agricultural activity after sensitive cut
												PR + Dn - Pch	Dn - Da	PR+Dn-Wau	(dDn - max(Pn,Pi,Piu)) / Pch		OAA*(1+dPch/Pch)	(dDn - max(Pn,Pi,Piu)) / Pch		OAA*(1+dPch/Pch)
code	text	mio USD	text	USD/kg	USD/kg	%	%	%	USD/kg	USD/kg	USD/kg	USD/kg	USD/kg	USD/kg	%	texte	mio USD	%	texte	mio USD
0203.2901	pork	1000	loin frozen	9.0	8	40	-58%	-29%	4	12	12	1.0	1.0	1.0	-35%	alpha 1	650	-13%	alpha 1	868
0203.1902	pork	1000	filet chilled	11.3	10	60	-64%	-32%	10	20	20	1.3	1.3	1.3	-30%	alpha 2	703	-12%	alpha 2	884
0203.1103	pork	1000	side chilled	3.4	3	45	-58%	-29%	5	7	7	1.4	0.4	1.4	-8%	alpha 3	918	0%	alpha 3	1000
0201.3001	beef	500	filet chilled	36.2	32	90	-70%	-35%	16	48	48	4.2	4.2	4.2	-44%	alpha 1	280	-18%	alpha 1	412
0202.2002	beef	500	top bit frozen	6.8	6	70	-64%	-32%	6	12	12	0.8	0.8	0.8	-30%	alpha 2	352	-12%	alpha 2	442
0201.2003	beef	500	Pistola chilled	12.4	11	60	-64%	-32%	10	20	20	2.4	1.4	2.4	-28%	alpha 3	362	-8%	alpha 3	461
0202.3004	beef	500	rump frozen	6.3	5.6	55	-64%	-32%	9	12.6	12.6	2.7	0.7	2.7	-10%	alpha 4	448	0%	alpha 4	500

4.2 Maximum domestic price as exogenous variable for dynamic model

As can bee seen in Table 1, taking the normal tariff cut the initial pork and beef wholesale prices (col. 12) are respectively reduced by ($\alpha 1$ col. 16) 35% and 44%. Taking the sensitive tariff cut, they are reduced by ($\alpha 1$ col. 19) 13% and 18% respectively. These reduced prices are the maximum domestic price (see Equation 8) which can be used as exogenous variable for dynamic model for a sector (e.g. beef meat) for which the demand and supply elasticities are known. See Mack (2006) and Flury (2006).
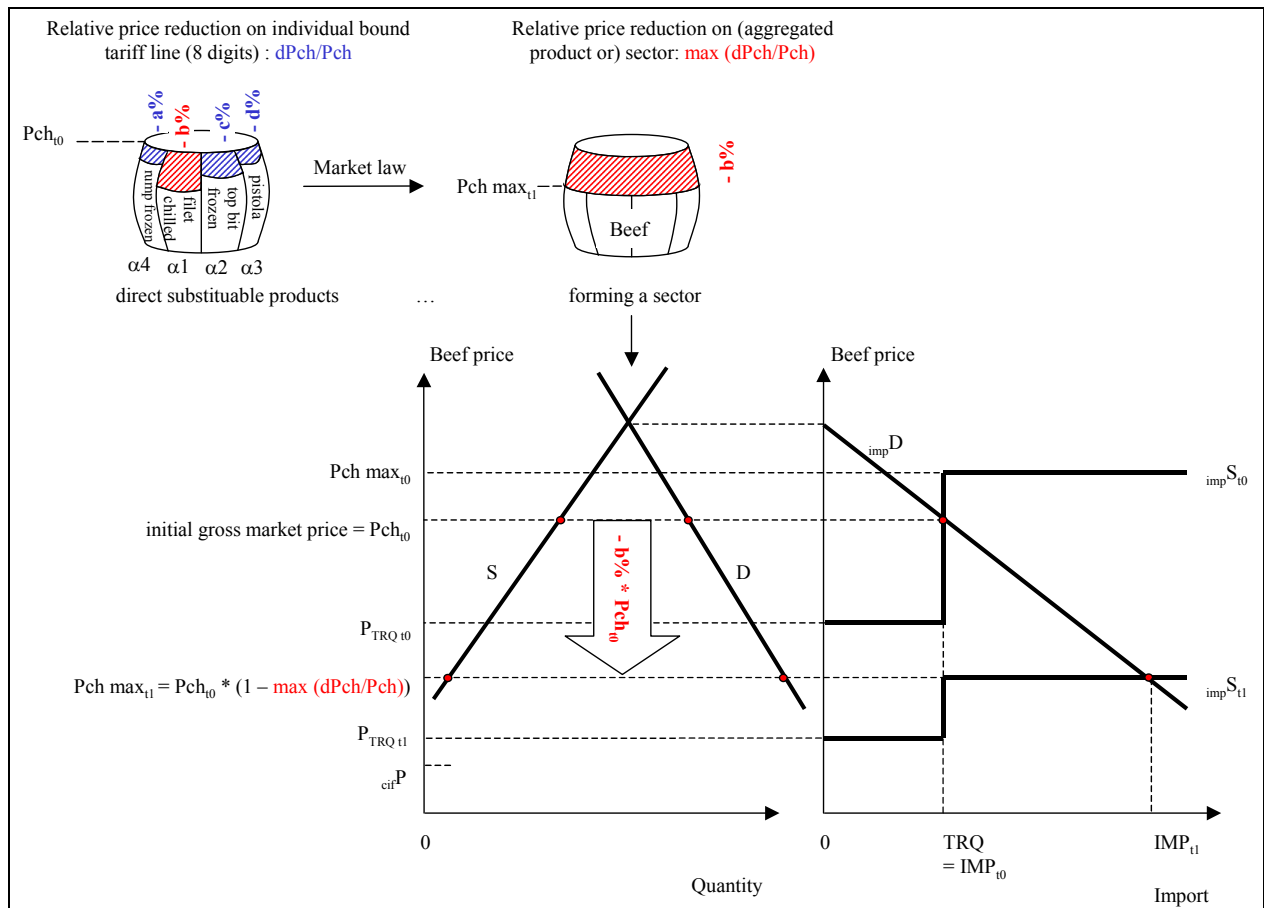

Figure 6. Price reduction and maximum domestic price (elasticities known)

5   Discussion and conclusions

The present concept provides an essential theoretical contribution to the analysis of the impact of different formulas of (WTO) tariff reduction. Two kinds of results are obtained: Firstly, the *preliminary* minimisation of the loss of production and added value for the domestic agricultural sector through the selection of the optimal number of sensitive products (and/or exceptions to capping) are feasible. These results are *preliminary* due to the static nature of the model (volumes unchanged). Secondly, post WTO maximal wholesale domestic price[13] for aggregated products are provided. The

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[13] Import cost prices as well as in and out-of-quota

present model does not replace the dynamic models themselves but delivers to these models exogenous prices for which the demand and supply elasticities are known.

The present assumption that implies that relative domestic wholesale price reduction of one sector is applied equally to all the processing stages (i.e. also at the farm gate price) is subject to discussion. Should the intermediate industries not reduce their margin, the farm gate price reduction estimated in the present model would be underestimated of a factor 1 / (1- margin/domestic wholesale price) (i.e. 1.4 for a margin of 30%). On the opposite, the hypothesis that all products inside one sector (see Chapter 2.1.3) are directly substitutable, and in consequence that the higher relative prix cut of one product can be applied to all products of the sector might lead to an overestimation of the price reduction in case this assumption is not verified.

In comparison to other dynamic simulation models like General or Partial Equilibrium models (see Lips, 2002), the present static model estimates the impact of tariff cuts not at a products aggregation level but at a more sensitive and representative product level inside one bound tariff line. Not only the difference between applied and bound duties at the bound tariff line level (P_i) but also other kinds of tariff reserves (P_n, P_{iu}) (see Chapter 2.1.1) are taken into account. Its advantage is the avoidance of the use of the average of duties usually computed inside a given sector in Equilibrium models. Such an average is not appropriate for non-homogenous tariff cuts or border protection inside one sector which, for example, can be the result of respectively the WTO tiered tariff cut formula and the calculation of Ad valorem equivalent (AVE).

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