

Shipping The Good Beef Out: EU Trade Liberalization to Mercosur Exports*

Maria Priscila RAMOS[†], Jean-Christophe BUREAU[‡] and Luca SALVATICI[§]

August 2007

Abstract

The European Union tariff schedule includes a large number of specific and composite tariffs as well as many tariff-rate quotas (TRQs), which affect the composition of imports. By altering price ratios between products with different unit values, both can generate the typical Alchian-Allen '*shipping the good apples out*' effect in foreign countries' exports to the EU. Different patterns of trade liberalization, either through tariff reduction or an expansion in preferential-access quotas, might have different consequences for producers and consumers because of changes in the composition of trade. We illustrate the issues at stake in the beef sector, focusing on Mercosur exports to the EU. We model import demand for different qualities in the presence of a TRQ and we derive comparative statics results for changes in various policy variables.

Keywords: Mercosur, European Union, quality, trade, tariff, tariff-rate quota.

JEL classification: F13, F15, F17, Q17.

*The authors acknowledge support from the Agricultural Trade Agreements Project (TRADEAG), funded by the Directorate of General Research, European Commission (Contract no. 513666). The authors are solely responsible for the content of the paper. We wish to thank Alexandre Gohin for his helpful comments to a previous version of the paper.

[†]Corresponding author: UMR Economie Publique (INRA-AgroParisTech) and CEPPII, 9 rue Georges Pitard 75015 Paris, France; tel: +33 1 53685577; fax: +33 1 53685501; e-mail: ramos@agroparistech.fr

[‡]UMR Economie Publique (INRA-AgroParisTech), Paris, France and IIIS, Trinity College Dublin, Ireland; e-mail: bureau@grignon.inra.fr

[§]University of Molise, Campobasso, Italy; e-mail: luca.salvatici@unimol.it

1 Introduction

Most applied models used in trade analysis can only distinguish a small number of aggregated products. This is typically the case with computable general equilibrium models that have increasingly been used for policy-oriented analysis in recent trade negotiations. Multi-country models are constrained by data availability. Products aggregates must be consistent with the level of aggregation required by social accounting matrices and consumption statistics. Computer limitations and numerical optimization constraints prevent the use of too many product categories in large scale models.¹ As a result, quantitative assessments of the impact of a trade agreement can seldom take into account the trade composition effects within a particular product category. Such effects can nevertheless raise important issues, especially in the agricultural sector (Lavoie, 2005). The case of beef is an illustration.

In the Doha trade negotiation on agriculture, most large scale models used by policy analysts lead to the conclusion that a large decrease in EU tariffs on beef products would be required in order to result in significant imports, because of the existing binding overhang (i.e., the fact that bound tariffs exceed the actual gap between world and domestic prices). Market analysts are skeptical. They argue that imports of high unit value products have been increasing rapidly since 2000 in spite of very high tariffs. They believe that even a small tariff cut would generate significant trade flows in this market segment, and that users of large scale models underestimate the future growth in imports by considering beef as a commodity (EC, 2006).

This debate has important consequences. Agricultural liberalization has been a major obstacle to an WTO agreement. Beef is one of the main sectors blocking the negotiations on market access is concerned. Beef production is a politically sensitive issue in the EU. EU policymakers are not willing to commit to large tariff cuts without reliable evidence of the degree in which imports will increase. Because more than two thirds of EU beef consumption is supplied by the dairy herd and is therefore quite price inelastic, the adjustment in domestic production would be borne mainly by the suckling cow sector, of one great social and political importance throughout the EU. A more detailed investigation of the trade composition effects of the present tariff structure is needed to determine the consequences of a multilateral tariff cut in this sector.

WTO negotiations aside, the beef sector is also a major bone of contention in the EU-Mercosur negotiations going on since 1995. No agreement has yet been reached on the issue of agricultural market access. The EU has offered to open Tariff Rate Quotas (TRQs) for beef products. Mercosur countries have insisted on a decrease in tariffs rather than on an expansion of the present quotas. The two options differ significantly in terms of their effects on trade composition. A cut in tariffs or an expansion of the TRQs are likely to result in imports of very different types of products, with different consequences for the stakeholders both in the EU and Mercosur countries. Here too, aggregate models that treat beef as a commodity and ignore the changes in import composition are unlikely to provide a good image of the consequences for the various types of producers.

Several features of the EU tariff structure suggest that the import composition effects of trade liberalization options are complex. First, there is a large dispersion of tariffs within the beef product category in the EU.² The *ad valorem* equivalents of the bound tariffs in the beef sector range between

¹Typical Computable General Equilibrium (CGE) models, such as the Global Trade Analysis Project model, the World Bank's LINKAGE model or the MIRAGE model developed by the Centre d'Etudes Prospectives et d'Informations Internationales, distinguish at best 30 agricultural and food products. The EU tariff schedules include some 2,200 products for these categories at the eight-digit level (the level at which the EU bound its tariffs under the WTO), and some 3,500 products at the ten-digit level (the level at which tariffs are actually set by EU customs). Given the rather complex structure of modern CGE models, which include imperfect competition and recursive time linkages, and the empirical need to distinguish a large number of countries and regions for policy analysis, agricultural products are often aggregated into 10 to 20 categories and average tariffs are used for these categories. It is worth noting that recent works have both attempted to model the trade sector in a much more disaggregated way (Grant et al., 2006; Laborde and Gohin, 2006) and to analyze the causes (prices and trade elasticities) of the trade and welfare biases introduced by lack of product differentiation (Decreux et al., 2006; Hertel et al., 2004; Martin et al., 2003; Hallak, 2006).

²The EU tariff structure for beef includes 34 products at the eight-digit level. The EU customs actually apply tariffs

zero and 140 percent across the different tariff lines. Even a minor radial cut in tariffs would lead to significant change in the relative (tariff inclusive) import price of, say, boneless cuts, carcasses and offals. Second, the largest component of EU protection in the beef sector is a specific tariff, i.e. a tariff per ton. The *ad valorem* component is relatively minor. Specific tariffs impose a proportionally higher protection on low unit value products. They provide an incentive to export higher quality products, and therefore have a quality-upgrade effect. A cut in such tariffs could significantly modify the relative price of the various types of meat. Third, the EU tariff structure includes a variety of TRQs. They were opened either to fulfill the minimum market access commitments of the 1994 Agricultural Agreement of the Uruguay Round, or to maintain existing arrangements that resulted in preferential trade flows. Quotas also have an import composition effect. An exporter facing a quantity constraint ships higher unit value products. In the case of certain EU quotas, particularly those granted to Argentina, Brazil and the United States, this import composition effect is strengthened by the fact that only high-quality beef is eligible for the TRQ. Fourth, there are other provisions, such as complying to minimum quality standards, segregating hormone-treated and hormone-free animals and providing sanitary certificates also involve fixed costs. Although these issues are not formally addressed in this study, they also affect the composition of imports towards higher quality products.³

The aforementioned features of the EU tariff structure are such that a tariff cut or a TRQ expansion are likely to result in a significant change in the composition of imported beef products. A large increase in imports of one type of beef rather than another would benefit different exporters, even within the same group of countries. For example, Argentina is relatively more specialized in high-quality products than Brazil. It would also affect different producers within the EU, as some regions specialize in small production of young bulls from feedlots, which produce what is considered to be lower quality beef than more extensive production of more mature animals. A change in relative prices would affect French and Italian consumers (who consume a larger proportion of grilled boneless cuts from rear ends of animals) in a way that would not be the same as British and German consumers (who consume more meat from the front end of the animals considered as lower quality) because of cooking habits. The various policy options for liberalizing trade would also result in changes in consumer's access to a particular quality of variety of beef. The effects on welfare are, overall quite complex.⁴

In the following sections we analyze the different components of the trade policy that affect the composition distribution of beef products imported in the EU. Explicit consideration is given to imports from Mercosur countries. Such imports are of particular importance to the EU beef sector given the prospect of a regional agreement. Mercosur countries are also likely to be the main exporters to the EU in the case of multilateral trade liberalization, given the low production costs in these countries, the present ban on US hormone-treated beef, and the difficulty for African countries to meet EU sanitary and certification standards. Using a partial equilibrium model with different product qualities, we investigate how a set of trade policy instruments affect the composition of imports. These instruments include the *ad valorem* and specific tariffs applied to in-quota and to out-of-quota imports, and the quota level itself. The impact of different scenarios of trade liberalization on the import composition is then assessed. Finally, we draw policy lessons from numerical simulations under a simplified framework.

at an even more detailed level, i.e. ten-digit level and up to twelve-digit level if one considers all the additional codes in the Integrated Tariff of the European Communities. In practice, the number of tariff lines is therefore larger than the 34 products that we consider here.

³The EU bans imports of beef produced with hormonal growth activators. It also requires some traceability inspection and certification procedures, all of which involve significant fixed costs.

⁴Here we consider that *quality* refers to a vertical differentiation framework and *variety* to a horizontal one. Consider the effect of a prohibitive tariff on a particular variety or quality. In a horizontal differentiation framework, consumers experience a loss in utility because a larger number of available varieties increase welfare (the so called "love of variety" effect). In a vertical differentiation framework, the segment of consumers with a limited willingness to pay and who prefer lower quality and cheaper products than those available will also experience a welfare loss.

2 Trade Barriers and Import Composition

The study of trade policy effects on import quality composition dates back to the 19th century, to the famous case of *shipping the good apples out*, whose analytical version later became known as the Alchian-Allen effect. This effect dictates that fixed per unit transport costs result in a bias towards the exports of more expensive goods (Alchian and Allen, 1983). Because such transport costs result in a higher relative price of the least expensive quality, they shift the composition of imports so as to raise the relative consumption of the higher priced product. The Alchian-Allen effect is intimately tied to microeconomic consumer theory and the quality-upgrade effect of exports is only warranted under certain conditions of substitutability when there are more than two goods.⁵ A condition for the Alchian-Allen effect to hold is that high and low qualities from the same product are closer substitutes than those of other (different) products; that is it requires that low and high quality are not close complements. These conditions are usually met in practice and the Alchian-Allen proposition is supported by the empirical literature (Borcherding and Silberberg, 1978; Umbeck, 1980; Bauman, 2004).⁶

In addition to the well-known transport cost effect, trade policy instruments also cause a Alchian-Allen type affect on the composition of imports. In a small country, when world prices are fixed, if the only policy is an *ad valorem* tariff and if there is a radial move towards freer trade, there will be no change in the composition of imports. *Ad valorem* tariffs do not alter relative prices under normal conditions (Boorstein and Feenstra, 1991; Falvey, 1979). However, in the presence of a specific tariff (Borcherding and Silberberg, 1978; Hummels and Skiba, 2004), a quantitative restriction (Anderson, 1985, 1988, 1991; Aw and Roberts, 1986; Feenstra, 1987), or a quality control (Rodriguez, 1979), trade liberalization will lead to changes in import composition. In practice, the widespread use of specific tariffs and quantitative ceilings in the EU agricultural and food sectors is such that any trade liberalization scenario, either regional or multilateral, is likely to significantly affect the composition of trade.

In practice, the link between trade liberalization and import composition is not limited to the simple quality upgrade effect described by Alchian and Allen. For example, in the presence of more than one distortion, the introduction of an *ad valorem* tariff may reduce relative import demand for high-quality imports (Hummels and Skiba, 2004). In addition, in the real life situation of the EU, the widespread use of TRQs in agriculture introduces extra complexity. TRQs differ from regular quotas as the exporter has to pay the Most Favored Nation (MFN) tariff beyond a certain volume of exports. This kind of protection introduces three regimes (in-quota, at-quota and out-of-quota), depending on whether the quota is binding or not.

3 The Model

In order to investigate the import composition effects caused by a TRQ and/or a composite tariff, we assume a representative consumer who maximizes his utility, choosing between three goods: a domestic good (d) and two qualities of the imported goods (m_h, m_l) where the subscript h denotes higher quality, and l lower-quality imports throughout the paper. The domestic product is the *numeraire*. For clarity of exposition, in this section, we assume that consumer's preferences are

⁵The Alchian-Allen effect results from the properties of the Hessian matrix of the expenditure function; see Silberberg and Suen (2001, pg.335). The Alchian-Allen effect is intuitive in a two-goods case where higher and lower quality goods are substitutes. With more than two goods, there are theoretical cases in which this effect is inverted. Such is the case if the premium good is a close substitute for the third composite good, and when the inferior good is a complement to the third good. However, these are rare phenomena.

⁶There are potentially two distinct types of quality upgrading: changes in characteristics of given varieties, and a shift in demand towards higher-quality varieties. This study focus on the latter, and it is worth emphasizing that the quality change is purely a consequence of changes in consumption patterns, not changes in the quality of any individual goods within the category. However, both aforementioned quality-upgrade effects are complementary, so our measure of quality upgrading will be a lower bound.

represented with a Cobb-Douglas utility function U . Under this assumption, and after a monotonic transformation, U can be written as a compound function built-up from lower levels of subutility functions, u_d and u_m .

$$U(d, m) = \alpha_d \log(u_d(d)) + \alpha_m \log(u_m(m_h, m_l)). \quad (1)$$

Under these assumptions, the marginal sub-utility $u'_m(m_h, m_l)$ is not affected by changes in consumption of d , the domestic goods. We assume that the consumer solves the utility maximization problem in two stages, first choosing between domestic and imported products, maximizing the overall utility function, and then choosing between the two imported qualities. Since we are interested in trade policy effects, we only focus on the second stage, considering that import expenditure is equal to $R = I - d$, where I denotes the total consumer income and d is the domestic goods expenditure. We assume that $u_m(m_h, m_l)$ can be represented by a CES function in equation (2). Clearly the Cobb-Douglas assumption is highly restrictive and implies constant relationship between imports and domestic production in terms of budget shares: accordingly, in our simulations we relax this hypothesis by replacing the Cobb-Douglas by a LES-CES specification for $U(d, m)$. In the next sections we focus on the composition of imports and on the maximization of u_m :

$$u_m(m_l, m_h) = (\lambda_h(m_h)^\rho + \lambda_l(m_l)^\rho)^{1/\rho}, \quad (2)$$

where m_h denotes the demand for high-quality imports and m_l the demand for low-quality imports. All parameters are positive and $\rho \leq 1$. The share parameters of the CES function represent the consumer's relative preferences for the two qualities of imported products. The quality parameters are such that $\lambda_h > \lambda_l$.⁷ We first consider this maximization problem under a free trade situation. We then introduce a TRQ on high-quality imports and a composite tariff on low-quality imports so as to match the actual EU policy.

3.1 Free Trade

In the absence of trade policies, and assuming exogenous world prices (p_{hw} , p_{lw}), the consumer's problem is:

$$\begin{aligned} \text{Max} \quad & u_m(m_l, m_h) \\ \text{s.t.} \quad & R = p_{lw}m_l + p_{hw}m_h \quad \text{and} \quad m_h, m_l \geq 0. \end{aligned} \quad (3)$$

The Marginal Rate of Substitution (MRS) between qualities and the Marshallian demand functions, m_h and m_l , are derived from the first-order conditions:

$$MRS = \left(\frac{m_h}{m_l}\right)^{(1/\sigma)} \frac{\lambda_l}{\lambda_h} = \frac{p_{lw}}{p_{hw}}, \quad (4)$$

$$m_h = \left(\frac{\lambda_h}{p_{hw}}\right)^\sigma \frac{R}{(\lambda_l^\sigma p_{lw}^{1-\sigma} + \lambda_h^\sigma p_{hw}^{1-\sigma})}, \quad (5)$$

$$m_l = \left(\frac{\lambda_l}{p_{lw}}\right)^\sigma \frac{R}{(\lambda_l^\sigma p_{lw}^{1-\sigma} + \lambda_h^\sigma p_{hw}^{1-\sigma})}. \quad (6)$$

From (5) and (6) we obtain the demand for the high-quality imports relative to the low-quality ones (7). This expression is used to analyze variations in the composition of imports due to relative price changes.

$$\frac{m_h}{m_l} = \left(\frac{\lambda_h p_{lw}}{\lambda_l p_{hw}}\right)^\sigma \quad (7)$$

⁷Here, we consider that the λ_i parameters represent the quality preferences as in Hummels and Skiba (2004). Note that it is possible to introduce an income effect through these parameters, as in Hallak (2006), who specifies a variable $\theta_i^{\nu_i^k}$ as our λ_i , where ν_i^k is the income parameter that varies across countries k (richer or poorer countries) and remains constant across all qualities i . In our paper, since we work with a single representative consumer for only one importing country, there is no need to detail the effect of the income parameters, though it is implicitly taken into account.

3.2 The EU Trade Policy, TRQ's and Composite Tariffs

We now introduce a stylized representation of the EU trade policy, which includes two main instruments that affect imports. The first instrument is a TRQ for high-quality imports. This TRQ includes a quantitative ceiling on imports (\bar{q}_h) for which the in-quota *ad valorem* tariff (t_h) is lower than the out-of-quota tariff. The EU out-of-quota tariff includes both an *ad valorem* component (t) and a specific component (T). The low-quality product is not affected by quantity restrictions but faces the same out-of-quota tariff as the high-quality product. How complicated this policy may look, it corresponds to the present regime that countries like Brazil or Argentina face when they export into the EU. The TRQ leads to a nonlinear import possibility curve, given the budget constraint, with an inflexion point at (\bar{q}_h).

Tariffs do not change the maximization problem (3) but the existence of a TRQ for high-quality imports introduces extra restrictions. The first restriction ($m_{hin} \leq \bar{q}_h$) refers to in-quota imports m_{hin} . It makes it possible to define a marginal tariff (t_m), depending on whether the quota is filled or not. The new problem (8) can be solved as a mixed-complementarity problem or MCP (Rutherford, 1995).

$$\begin{aligned}
 &Max \quad u_m(m_l, m_h) \\
 &s.t. \\
 &\quad R = p_l m_l + p_h m_h \\
 &\quad m_h = m_{hin} + m_{hout} \\
 &\quad m_{hin} \leq \bar{q}_h \\
 &\quad t_m \leq \frac{T}{p_{hw}} + t - t_h \\
 &\quad m_h, m_{hin}, m_{hout}, m_l, t_m \geq 0,
 \end{aligned} \tag{8}$$

where m_{hout} denotes the out of quota imports of high quality. We find the same expressions for the demands as in (5) and (6), except that domestic prices are no longer equal to world prices. The in-quota and out-of-quota prices for high-quality imports are determined by both exogenous world prices and by the tariffs, but the at-quota price varies with the marginal tariff, t_m that is bounded by $0 \leq t_m \leq (t + \frac{T}{p_{hw}} - t_h)$, where the right hand side expression is the value of the quota rent in the out-of-quota equilibrium situation. The value of t_m determines the domestic price for high-quality goods when the quota is just binding, i.e., $p_h = p_{hw}(1 + t_h + t_m)$ where p_{hw} is the CIF high-quality price and t_m varies according to the TRQ regime:

$$\begin{aligned}
 \text{In-quota regime} & \quad t_m = 0 & \text{if } m_h < \bar{q}_h \\
 \text{At-quota regime} & \quad 0 < t_m < (t + \frac{T}{p_{hw}} - t_h) & \text{if } m_h = \bar{q}_h \\
 \text{Out-of-quota regime} & \quad t_m = t + \frac{T}{p_{hw}} - t_h & \text{if } m_h > \bar{q}_h.
 \end{aligned}$$

We now turn to the import composition effect of the specific and *ad valorem* components of the EU tariff. The introduction of a composite tariff affects low-quality imports and changes the domestic low-quality price so that $p_l = p_{lw}(1 + t) + T$ where p_{lw} is the transportation cost including price (i.e. CIF price) for low-quality. We assume that the CIF high-quality price exceeds the CIF low-quality price. The TRQ introduces changes in relative prices and relative import volumes according to the three different possible outcomes, i.e. in-quota, at-quota or out-of-quota regimes for high-quality beef. In order to facilitate the use of MCP techniques, we introduce the complementarity conditions to the problem (8):

$$m_{hin} \leq \bar{q}_h \quad \text{and} \quad t_m \geq 0; (m_{hin} - \bar{q}_h)t_m = 0, \tag{9}$$

$$t_m \leq (t + \frac{T}{p_{hw}} - t_h) \quad \text{and} \quad m_{hout} \geq 0, \quad (t + \frac{T}{p_{hw}} - t_h - t_m)m_{hout} = 0. \tag{10}$$

We obtain an in-quota solution if the TRQs' constraints ($m_{hin} \leq \bar{q}_h$ and $t_m \leq (t + \frac{T}{p_{hw}} - t_h)$) are non-binding. In this case t_m is equal to zero and $m_h \geq 0$, $m_h = m_{hin} \leq \bar{q}_h$ and $m_{hout} = 0$. We obtain an at-quota solution if t_m is positive but smaller than the difference between the out-of-quota

low-quality imports. The consequence is an increase in the relative share of the low-quality imports.

$$\frac{\partial m_h/m_l}{\partial T} = \frac{\sigma \lambda_h \left(\frac{(p_{lw}(1+t)+T)\lambda_h}{p_{hw}(1+t_h)\lambda_l} \right)^{\sigma-1}}{p_h w(1+t_h)\lambda_l} > 0 \quad \text{if } m_h < \bar{q}_h. \quad (13)$$

When high-quality imports exceed the quota, a reduction in the specific tariff also results in a quality downgrade due to the typical Alchian-Allen effect. The following equation 14 shows the maximum effect of an increase in T :

$$\begin{aligned} \frac{\partial m_h/m_l}{\partial T} = \sigma \left(\frac{\lambda_h}{(p_{hw}(1+t)+T)\lambda_l} - \frac{(p_{lw}(1+t)+T)\lambda_h}{(p_{hw}(1+t)+T)^2\lambda_l} \right) \\ \left(\frac{(p_{lw}(1+t)+T)\lambda_h}{(p_{hw}(1+t)+T)\lambda_l} \right)^{\sigma-1} > 0 \quad \text{if } m_h > \bar{q}_h. \end{aligned} \quad (14)$$

Finally, when high-quality imports are exactly at the quota level there are two possible effects, because T affects p_l but also affects the upper bound of t_m . The latter introduces a possible shift from an at-quota to an out-of-quota regime. If the variation of T leaves the TRQ regime unaffected (at-quota regime), we have a quality-downgrade effect due to the increase in m_l . But if the decrease in T switches the TRQ regime from at-quota to out-of-quota regime, not only does m_l increase but so does m_h . Even in that case a cut in the specific tariff results in quality downgrading, because a reduction in T has a greater impact on m_l than on m_h , according to the Alchian-Allen effect. The magnitude of this positive effect will vary between the two cases depicted in (13) and (14).

The partial derivatives of the relative functions for both the in-quota and the out-of-quota demands are positive. In brief, when the specific tariff decreases, consumers demand relatively less of the expensive high-quality product, in line with the traditional Alchian-Allen conjecture.

- **If the out-of-quota ad valorem tariff varies:**

The case is more complex when the *ad valorem* component of the EU tariff t varies, since t is imposed on imports of both qualities. The partial derivatives relative to t show opposite signs depending on the fill rate of the TRQ.

If high-quality imports are below the quota, a reduction in t affects only low-quality beef, and results in larger m_l imports (quality downgrading).

$$\frac{\partial m_h/m_l}{\partial t} = \frac{p_{lw}\sigma\lambda_h \left(\frac{(p_{lw}(1+t)+T)\lambda_h}{(1+t_h)p_{hw}\lambda_l} \right)^{\sigma-1}}{(1+t_h)p_{hw}\lambda_l} > 0 \quad \text{if } m_h < \bar{q}_h. \quad (15)$$

When high-quality imports exceed the quota, the left hand side of (18) is negative since p_{hw} is greater than p_{lw} . The reduction of an *ad valorem* component increases the relative quality of beef imports under our assumptions. This result seems to be at odds with Falvey (1979) and with Boorstein and Feenstra (1991). Both find that in a first-best setting an *ad valorem* tariff has no effect on the quality composition of trade. In our case, however, the specific tariff plays a role similar to that of the per-unit cost in Hummels and Skiba (2004). The *ad valorem* tariff dampens the effect of the specific tariff on the relative demand for the high-quality product.

$$\begin{aligned} \frac{\partial m_h/m_l}{\partial t} = \sigma \left(\frac{p_{lw}\lambda_h}{(p_{hw}(1+t)+T)\lambda_l} - \frac{p_{hw}(p_{lw}(1+t)+T)\lambda_h}{(p_{hw}(1+t)+T)^2\lambda_l} \right) \\ \left(\frac{(p_{lw}(1+t)+T)\lambda_h}{(p_{hw}(1+t)+T)\lambda_l} \right)^{\sigma-1} < 0 \quad \text{if } m_h > \bar{q}_h. \end{aligned} \quad (16)$$

If the high-quality quota is just binding, a change in t affects not only p_l but also the upper bound of t_m . There is a possible shift from one regime to another. If t decreases and the regime remains unchanged, p_l also decreases and there is a quality-downgrade effect. However, in the case of a shift to the out-of-quota regime, the average quality of imports increases (quality upgrading). For the at-quota regime the effect of the *ad valorem* component of the out-of-quota tariff is ambiguous.

In brief, the consequences of a change in the *ad valorem* tariff on the composition of imports are ambiguous. When high-quality imports are below the quota a reduction in t has a quality-downgrade effect. The opposite result holds true when imports exceed the quota. The effect on quality cannot be determined in a general case, under the at-quota regime.

- **If the ad valorem in-quota tariff varies:**

The *ad valorem* in-quota tariff t_h appears in the relative demand function only when high-quality imports are below the quota level. When the quota is not binding, a reduction of t_h has a quality-upgrade effect.

$$\frac{\partial m_h/m_l}{\partial t_h} = -\frac{(p_{lw}(1+t) + T)\sigma\lambda_h\left(\frac{(p_{lw}(1+t)+T)\lambda_h}{(1+t_h)p_{hw}\lambda_l}\right)^{\sigma-1}}{(1+t_h)^2 p_{hw}\lambda_l} < 0 \quad \text{if } m_h < \bar{q}_h. \quad (17)$$

When the quota is binding (both when imports are at-quota and exceed the quota), the only effect is an increase in the quota rent. As a result, p_h and m_h remain unchanged and a change in the *ad valorem* in-quota tariff has no impact on the quality composition of imports.

- **If the high-quality quota level varies:**

When the equilibrium is in-quota, an increase in the high-quality quota level has no effect on the relative quality of imports. When the high-quality quota is binding, if the quota level increases, the high-quality imports increase as well. The expansion of \bar{q}_h reduces t_m and then p_h ($\frac{\partial t_m}{\partial \bar{q}_h} < 0$). Provided that m_l and m_h are gross Marshallian substitutes ($\sigma > 1$), a reduction of p_h implies a reduction of m_l . So, when \bar{q}_h increases, there is a quality-upgrade effect:

$$\begin{aligned} \frac{\partial m_h/m_l}{\partial \bar{q}_h} &= \frac{(p_{lw}(1+t) + T)^\sigma}{\lambda_l^\sigma R} \\ &\quad \left((\lambda_h^\sigma (p_{hw}(1+t_h + t_m))^{1-\sigma} + \lambda_l^\sigma (p_{lw}(1+t) + T)^{1-\sigma})^2 + \right. \\ &\quad \left. (1-\sigma)\lambda_h^\sigma \frac{\bar{q}_h p_{hw}}{(p_{hw}(1+t_h + t_m))^\sigma} \frac{\partial t_m}{\partial \bar{q}_h} \right) > 0 \quad \text{if } m_h = \bar{q}_h. \quad (18) \end{aligned}$$

When high-quality imports exceed the quota there are two possible results. If the increase in the quota level is such that the quota is still lower than the high-quality equilibrium value, the result is merely a change in the allocation of high-quality imports in and out of quota, but the import mix is not affected. If the new quota level is larger than the initial high-quality equilibrium, the new equilibrium will be either at-quota or in-quota. In both cases m_h increases while p_h and m_l decrease, resulting in a quality-upgrade effect through the same mechanisms as for the previous result (see (18)).

In brief, starting from an out-of-quota equilibrium, a quota increase can result in two possible outcomes: no quality effect if the equilibrium remains out of quota; or a quality-upgrade effect if the new equilibrium shifts to either at-quota or in-quota equilibrium.

Table 1: **Alchian-Allen effect under TRQ and specific tariff: summary of comparative statics results**

	In-quota	At-quota	Out-of-quota
t_h	<0	0	0
t	>0	><0	>0
T	>0	>0	>0
\bar{q}_h	0	>0	0 or >0

3.4 Welfare variations

The previous results confirm that binding quotas and/or specific tariffs lead to quality upgrading, i.e. a shift in the mix of traded products towards more expensive goods. Any trade restriction will impose efficiency costs. In the case of specific tariffs and TRQs, however, there is an extra welfare effect caused by the composition of imports. Feenstra (1995, pg. 1578) shows that quality upgrading in such situations results in an excess welfare cost, that tops the standard distortion, that would result from *ad valorem* tariffs, for example. To isolate the welfare effect of the quality change, let us consider an *ad valorem* tariff that has the same effect on the aggregate import expenditure as the actual (or assumed) policy mix. More specifically, the uniform *ad valorem* tariff (τ) satisfies the following condition:

$$E(t, t_h, T, \bar{q}_h, p_w, u_m^0) = E(\tau, p_w, u_m^0), \quad (19)$$

where $E(t, t_h, T, \bar{q}_h, p_w, u_m^0)$ is the total expenditure in the beef sector with a TRQ. Note that \bar{q}_h denotes the quota level for the TRQ, p_w the vector of world prices and m the quantity of imports as before. Variables u_m^0 and τ are the initial expenditure/utility level and the uniform *ad valorem* tariff respectively, calculated for each scenario.

If the actual policy mix of quotas and tariffs did not lead to a shift in demand towards higher-quality varieties, it would have the same deadweight loss as the uniform tariff. To evaluate the welfare cost of a given trade policy mix we shall use the conventional deadweight loss definition, based on the difference between the rise in import costs due to the trade restrictions and the revenue or rents generated from it. More specifically, we compare the deadweight loss due to the actual trade policy mix (Lq) with the loss introduced by a uniform *ad valorem* price-equivalent tariff ($L\tau$) applied over all imports:

$$Lq = E(t, t_h, T, \bar{q}_h, p_w, u_m^0) - E(p_w, u_m^0) - TR(m, p_w, t, t_h, T) - QR(p_w, t, t_h, T, \bar{q}_h), \quad (20)$$

$$L\tau = E(\tau, p_w, u_m^0) - E(p_w, u_m^0) - TR(m, p_w, \tau), \quad (21)$$

where $E(p_w, u_m^0)$ is the total expenditure under free trade and $E(\tau, p_w, u_m^0)$ is the total expenditure when protection is provided through the uniform *ad valorem* tariff equivalent. $TR(m, p_w, t, t_h, T)$ denotes the tariff revenue and $QR(p_w, t, t_h, T, \bar{q}_h)$ the quota rent which is assumed to be transferred to exporters.⁸

$$TR(m, p_w, t, t_h, T) = t_h m_{hin} + (t_h + t_m) m_{hout} + \left(t + \frac{T}{p_{tw}} \right) m_l \quad (22)$$

$$QR(p_w, t, t_h, T, \bar{q}_h) = t_m \bar{q}_h \quad (23)$$

⁸This assumption is controversial, and there is some debate on who keeps the rent, depending on the TRQ administration method. However, in the particular case of the Mercosur exports of high-quality beef to the EU, there is evidence that at least some of the rent is kept by exporters, as we will explain later.

Following Boorstein and Feenstra (1991) we define the welfare cost of a quality upgrading due to both the TRQ components and the low-quality protection, as:

$$WCofQ = (Lq - L\tau). \tag{24}$$

The total welfare cost of any non-uniform *ad valorem* or specific tariff structure is equal to the conventional deadweight loss triangle because of a uniform price increase, plus the extra loss due to quality upgrading *WCofQ*.

4 Mercosur Exports to the EU: Tariffs and TRQs

4.1 EU Trade Policy and the Mercosur

Mercosur countries are eligible for the EU Generalized System of Preferences (GSP), but most beef products are excluded from this scheme. Mercosur exporters can export under the minimum-access TRQs, normally open to all WTO members in 1995 to match the requirements of the Uruguay Round. Brazil, Argentina, Uruguay and Paraguay also export high-quality beef under current-access TRQs allocated to particular countries. Recently, significant exports of beef originating mainly from Brazil have also taken place outside the TRQs, under the MFN regime, in spite of very high tariffs, which exceed 80 percent in *ad valorem* equivalent (see figures 2 and 3).

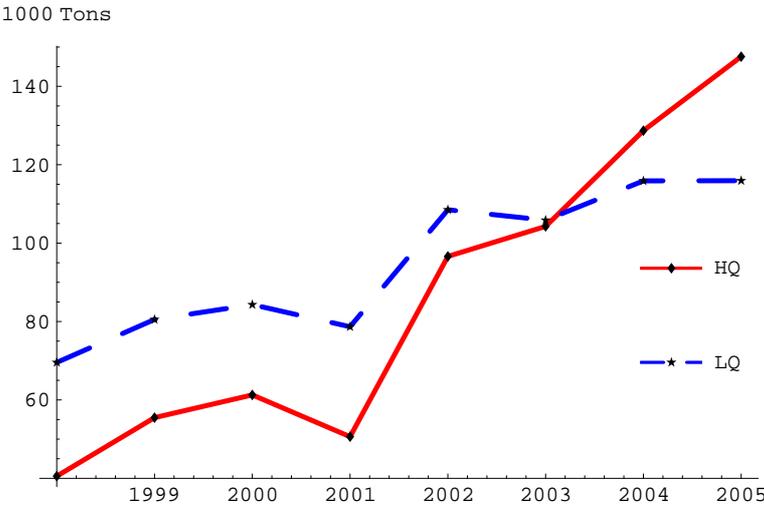


Figure 2: EU15 beef imports by quality from Mercosur in thousand tons (COMEXT)

In the ongoing WTO negotiations, the EU resists the large tariff cuts in beef imports, requested by Mercosur countries in the “G20” group or the Cairns group. In regional negotiations, the EU favors a managed-trade scenario, implying an increase in existing TRQs and the possible opening of new TRQs, rather than large tariff cuts that might open the door to unlimited imports.⁹

⁹The EU-Mercosur Interregional Framework Cooperation Agreement was signed on December 15th, 1995. Since 1999, the two parties have been engaged in several rounds of negotiations. In the 9th round, agricultural products were grouped into 5 categories (A, B, C, D and E). Beef falls in the category E, which includes the most sensitive products under negotiation. Since then, Mercosur countries have requested much larger access to the EU market. In October 2004, the EU offered to open or expand several TRQs.

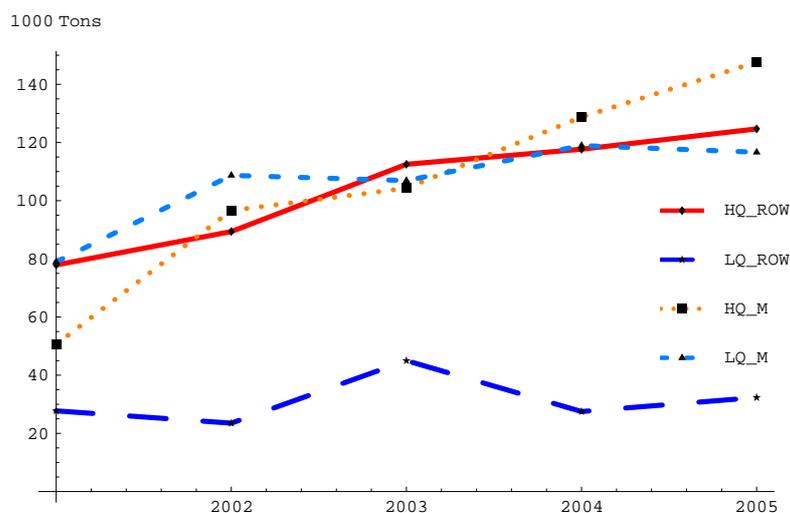


Figure 3: EU25 beef imports by quality from Mercosur and the Rest of the World in thousand tons (COMEXT)

4.2 Data and Model Calibration

We consider EU beef imports from Mercosur (in thousands of tons) and their CIF value (in millions of Euro) to be at the eight-digit level of the EU classification, a domestic subdivision of the International Harmonized System. The eight-digit level is that at which the EU has bound its tariffs under the 1994 WTO agreement. Proxy variables are often utilized when quality is not directly observable (Crozet and Erkel-Rousse, 2004). We classified the different types of beef imports as “high” or “low” quality according both conservation mode (fresh or chilled or frozen),¹⁰ the final use of the imports (final consumer or processing) and an *ad hoc* distinction for some particular cuts known as being offered in the highest quality segment of the market, relying on the classification used by the EU Commission.¹¹ Unit values of imports are used to approximate CIF prices. The high-quality beef quota, the in-quota and out-of-quota tariffs for high-quality beef and the import tariff for low-quality beef are found in the TARIC database while import figures come from Eurostat’s COMEXT data. The European domestic beef expenditure (d) in Euro is obtained from the French marketing board OFIVAL. For elasticities of substitution we used the GTAP elasticity for bovine meat products. As usual with CES specifications, results are very sensitive to the elasticity chosen (Hertel et al., 2004). Here we therefore carried out a sensitivity analysis using alternative values for the elasticities.¹² In Table 2 we present the calibration data, which correspond to the situation in 2005. The 2005 benchmark is characterized by an out-of-quota equilibrium, as the EU imports of beef far exceed the quantities under TRQs.

In the numerical simulations, we replace the Cobb-Douglas specification for $U(m, d)$ that was used to keep simple the comparative statics results, by a LES-CES one, that makes more realistic assumptions as far as the substitution between domestic production and imports are concerned. This utility specification introduces a subsistence quantity for which no utility is obtained. Given the

¹⁰Fresh and chilled are normally denoted high-quality and frozen low-quality beef.

¹¹The statistical codes the Harmonized system of the United Nations are used as the following: 020110, 020120 and 020130 for high-quality beef and 020220, 020220, 020230, 020230 and 020230 for low-quality beef. The actual lines at the eight-digit level are subdivisions of these HS codes at the six-digit level.

¹²Hertel et al. (2004) compare the GTAP elasticities of substitution to their own elasticity estimates. For the beef case, GTAP elasticity of substitution is 4.4 and their estimated elasticity of substitution is 7.7.

subsistence expenditure, the rest of income is allocated between the domestic good and two imported beef qualities. The coefficients of the LES-CES function are calibrated according to the data presented in Table 2.

Table 2: **Calibration Data (2005)**

Variables and Parameters	Initialization Values	Source
m_h	147.56 (Th. tons)	COMEXT
m_l	115.93 (Th. tons)	COMEXT
d	7500 (1000 tons)	OFIVAL
R	$d p_d + m p_m$	
p_{hw}	4.81 (Mil. Euro/Th. tons)	COMEXT
p_{lw}	2.75 (Mil. Euro/Th. tons)	COMEXT
t	12.8%	TARIC
t_h	20%	TARIC
T	3.02 (Mil. Euro/Th. tons)	TARIC
\bar{q}_h	40.3 (Th. tons)	TARIC
p_h	$p_{hw}(1 + t_h + t_m)$ (Mil. Euro/Th. tons)	
p_l	$p_{lw}(1 + t) + T$ (Mil. Euro/Th. tons)	
p_m	$m_h p_h + m_l p_l$	
p_d	5	INRA/OFIVAL
σ	4.4	GTAP
$\lambda_d, \lambda_m, \lambda_h, \lambda_l, d_{min}$ and m_{min}	calibrated	

4.3 Scenarios of trade liberalization

We now compare the 2005 situation to various trade liberalization scenarios. We focus on the impact of various forms of trade liberalization on the composition of EU beef imports from Mercosur. In the bilateral negotiations, it is proposed that market access be achieved through different channels, including a quota expansion and tariff cuts. In the Doha negotiation, tariff cuts are normally the standard way to liberalize trade, but the 2004 Framework Agreement states that a WTO member might declare some sensitive products. In such a case, tariffs might be cut less dramatically but TRQs would have to be expanded, also allowing some arbitration between tariffs and quota.

The first scenario considers the elimination of in-quota *ad valorem* tariffs (t_h) for high-quality beef. The second scenario consists of eliminating the *ad valorem* component of the out-of-quota tariff (t), a relatively minor component of the composite tariff. The third scenario eliminates the specific component of the out-of-quota tariff (T). Finally, the fourth scenario considers an increase in the TRQ for high-quality beef (\bar{q}_h). In practice, Mercosur countries have proposed an expansion of the high-quality beef quota by a factor of eight,¹³ while the EU has offered to expand the existing TRQ to 100,000 tons. These two cases are considered in Table 2 as Scenario 4-A for the small quota expansion and Scenario 4-B for the large quota expansion.

Table 3 presents the effects of the scenarios on prices and quantities, as well as on the quota rent (QR), the export revenues (XR), tariff revenue (TR) and equivalent variation (EV). Results regarding the welfare effects of the change in import composition are provided in Table 4. The variables $WCofQ$ and τ are those defined in Equations (24) and (19), with $QRatio = (m_{hin} + m_{hout})/m_l$. All scenario results are compared to the initial situation shown in Table 2.

As expected, results for the first scenario show that the elimination of the in-quota tariff for high-quality beef has no effect on the composition of imports, but only only affect rents, given that in the initial situation the TRQs are filled. In a general case, there is a considerable controversy regarding who keeps the benefits of the rent, between exporters and importers (Skully, 1999; Olarreaga and Ozden, 2005; Abbott, 2002). In the case of the high quality beef quotas allocated to Mercosur

¹³Mercosur countries request a 315,000-ton quota, a quantity which represents 5% of EU beef consumption and is significantly larger than the present TRQ, 40,300 tons of "Hilton beef", i.e. high-quality beef. Note that an extra 10,000-ton quota was exceptionally granted to Argentina in 2002 and 2003.

Table 3: Prices, Trade and Welfare results (in millions of Euros and in tons)

Variables	Initial Sit.	Scenario 1	Scenario 2	Scenario 3	Scenario 4A	Scenario 4B
$\sigma = 4.4$						
p_h (Mll. Euro)	8.43	0%	-7%	-32%	0%	-23%
p_l (Mll. Euro)	6.11	0%	-6%	-46%	0%	0%
m_h (Th. tons)	147.56	0%	20%	119%	0%	113%
m_l (Th. tons)	115.93	0%	12%	521%	0%	-31%
d (Mll. Euro)	37500	0%	0%	-6%	0%	-2%
EV (Mll. Euro)	0	0	142.92	1439.66	0	420.07
TR (Mll. Euro)	817.77	-5%	3%	-14%	-19%	-30%
QR (Mll. Euro)	107.44	36%	-23%	-100%	148%	119%
XR (Mll. Euro)	1027.9	0%	18%	243%	0%	69%
$\sigma = 2.5$						
p_h (Mll. Euro)	8.43	0%	-7%	-32%	0%	-32%
p_l (Mll. Euro)	6.11	0%	-6%	-46%	0%	0%
m_h (Th. tons)	147.56	0%	12%	63%	0%	96%
m_l (Th. tons)	115.93	0%	7%	195%	0%	-24%
d (Mll. Euro)	37500	0%	0%	-1%	0%	-1%
EV (Mll. Euro)	0	0	138.41	1059.51	0	553.41
TR (Mll. Euro)	817.77	-5%	-4%	-49%	-19%	-30%
QR (Mll. Euro)	107.44	36%	-23%	-100%	148%	-100%
XR (Mll. Euro)	1027.9	0%	10%	104%	0%	59%
$\sigma = 6.5$						
p_h (Mll. Euro)	8.43	0%	-7%	-20%	0%	-16%
p_l (Mll. Euro)	6.11	0%	-6%	-37%	0%	0%
m_h (Th. tons)	147.56	0%	31%	59%	0%	113%
m_l (Th. tons)	115.93	0%	17%	644%	0%	-34%
d (Mll. Euro)	37500	0%	-1%	-8%	0%	-2%
EV (Mll. Euro)	0	0	148.22	1113.4	0	305.51
TR (Mll. Euro)	817.77	-5%	11%	67%	-19%	-31%
QR (Mll. Euro)	107.44	36%	-23%	-64%	148%	274%
XR (Mll. Euro)	1027.9	0%	27%	241%	0%	68%

Note: Author's calculations

Table 4: Welfare cost of quality change (in millions of Euros)

Variables	Initial Sit.	Scenario 1	Scenario 2	Scenario 3	Scenario 4A	Scenario 4B
$\sigma = 4.4$						
L_q (Mll. Euro)	2515.99	2515.99	2141.07	232.51	2515.99	2062.24
L_τ (Mll. Euro)	2171.81	2171.81	1791.98	191.92	2171.81	1183.37
$WCofQ$ (Mll. Euro)	344.18	344.18	349.09	40.59	344.18	878.87
$Qratio$	1.27	1.27	1.37	0.45	1.27	3.96
τ	0.9	0.9	0.77	0.17	0.9	0.57
$\sigma = 2.5$						
L_q (Mll. Euro)	917.16	917.16	761	76.51	917.16	655.18
L_τ (Mll. Euro)	824.31	824.31	665.7	69.06	824.31	280.16
$WCofQ$ (Mll. Euro)	92.86	92.86	95.3	7.45	92.86	375.03
$Qratio$	1.27	1.27	1.33	0.7	1.27	3.29
τ	0.9	0.9	0.77	0.18	0.9	0.46
$\sigma = 6.5$						
L_q (Mll. Euro)	5832.74	5832.74	5048.37	1654.17	5832.74	5266.03
L_τ (Mll. Euro)	4820.75	4820.75	4027.65	1405.89	4820.75	3322.9
$WCofQ$ (Mll. Euro)	1012	1012	1020.72	248.28	1012	1943.12
$Qratio$	1.27	1.27	1.42	0.27	1.27	4.1
τ	0.9	0.9	0.77	0.34	0.9	0.66

Note: Author's calculations

countries, there are reasons to believe that exporters keep a significant share of the quota rent, given the method used to allocate TRQ licenses and the rather competitive structure of the beef industry in the EU. This suggests that the elimination of tariffs within the TRQs is a policy that would be favored by those producers who currently export under the TRQs. They have made it explicit that this option was attractive to them, compared to a more general decrease in EU out-of-quota tariffs, but have not been followed by their governments in the negotiation. Typically, this scenario would be of particular interest to Argentinean producers, who specialize in high unit-value products exported under the current quotas. It would, however, bring little benefit to Brazilian producers who presently export outside the TRQs.

The *ad valorem* tariff is a small component of the out-of-quota protection, and the elimination of the *ad valorem* tariff (the second scenario) would only have a limited impact on the overall trade. It would nevertheless affect the composition of imports, since the high-quality imports would increase more than low-quality ones. Even though the *ad valorem* tariff is a distortion in itself, it helps to reduce the quality-upgrade bias caused by the specific tariff, according to the effect described by Hummels and Skiba (2004). The welfare loss associated with the quality-upgrade effect (WC_{ofQ}) appears slightly higher than in the initial situation (Table 4). Overall, Mercosur countries would benefit from an increase in export revenue (Table 3) but the quota rent would be lower than that of the first scenario. Brazil could participate more in high-quality trade by expanding its recent out-of-quota exports to the EU. However, those producers who currently have access to the EU TRQ, e.g. producers of high-quality beef in Argentina in particular, are likely to benefit less under the second scenario than under the first one.

The third scenario, i.e. the elimination of the specific component of the out-of-quota tariff the scenario that is closest to what might actually occur in a future Doha agreement, given that the largest component of the bound tariffs is the specific one. As predicted, the elimination of the specific tariff would reduce the present bias towards high-quality exports. The quota rent would decrease.¹⁴ EU consumers would reap large gains due to lower import prices. All exporting countries would benefit from larger access to the EU market. Brazil would perhaps benefit more than Argentina, given the import composition effect, as Brazilian producers are less specialized in high-quality cuts than Argentinean exporter. Simulation results for the two cases under the fourth scenario are conditional to the fact that the present level of the TRQ is binding for high-quality beef and that the EU imports beef from Mercosur out of the quota. Under Scenario 4-A, the expansion of the TRQ level is limited and the quota is still binding. Because the initial situation is an out-of-quota equilibrium, a small quota increase has no effect on either trade creation or quality composition of imports. On the contrary, the only impact would be a reduction in the tariff revenue for the EU and an increase in the quota rent for exporters of high-quality beef. Scenario 4-B considers the result of a much larger increase in the TRQ for high-quality beef. The quota would no longer be binding. The EU domestic price for high-quality beef would fall. High-quality imports would increase significantly, while low-quality imports would decrease. The reduction in price and the increase in imports would benefit EU consumers, even though EU tariff revenue would go down. High-quality producers, particularly those of Argentina, are likely to be the main beneficiaries of this scenario due to the trade creation in the high-quality segment of the market.

Scenario 3 would result in a reduction of the deadweight loss caused by the bias in import composition. This is noteworthy, even though this particular deadweight loss is only a small component of the welfare changes. On the other hand, a large expansion in the high-quality beef TRQ (Scenario 4-B), which would result in a very large quality-upgrade effect, is likely to result in a significant welfare loss because of the import composition bias (Table 4).

¹⁴In Table 2, the quota rent (QR) falls to zero as there is a complete elimination of the specific tariff, i.e. the in-quota and out-of-quota tariff become the same. This is obviously a particular case.

Conclusion

The EU has recently become a net importer of beef, after being a major exporter during decades. Changes in domestic policy, in particular the progressive decoupling of direct support since 1992, are perhaps a more compelling explanation than the tariff cuts resulting from the 1994 Uruguay Round Agreement. Mercosur countries have now become the largest source of imports and have taken a significant share of the EU market. The particular tariff structure, the reduction in transport costs for beef, and the exchange rate between currencies, explain why imports have been highly biased towards high-quality products, namely fresh boneless cuts. Indeed, the combination of high specific tariffs, low *ad valorem* tariffs and TRQs, some of which are restricted to high-quality beef imports, have resulted in a significant Alchian-Allen effect.

Most large scale models have not yet taken into account the fact that EU imports are biased towards a particular quality. In this market segment, the import elasticity may be different from what one might expect when looking at the traditional flows of frozen carcasses. These models have not taken into account all the non-linear effects of trade liberalization that may result from the complex EU tariff structure. Even though we only address this issue under simplifying assumptions, without an explicit modeling of EU supply and of the complex interactions with the dairy production, so as to focus on the comparative statics, the analytical framework developed in this paper could be adapted for simulation purposes in large scale models.

Under the bilateral negotiation between the EU and Mercosur, the proposals of the two parties differ on whether trade liberalization in the beef sector should rely on a tariff reduction or a quota expansion. A quota expansion might favor high-quality imports, while a cut in the current specific tariff might reduce the present bias towards higher-quality imports. For Mercosur countries, this involves larger rents in one case but larger possibility of expanding exports in the second case. For the EU, managed trade through quantitative ceilings might provide some insurance that some domestic production will persist, in a sector that is socially important, but high prices for consumers and topped by a specific welfare cost resulting from quality upgrading “à la Boorstein and Feenstra (1991)”, should this quota expansion increase the existing bias in quality composition of imports. These trade-offs could perhaps lead to designing a combination of instruments leading to a compromise acceptable for the different parties.

Flexibility in combining the two instruments is also what the “sensitive products” option agreed upon in 2004 has introduced in the WTO negotiations. In the beef sector, the cuts being proposed under the Doha Round would lead to significant increase in EU imports of high-quality products, since the present high MFN tariffs do not succeed in keeping these products out of the EU market. This scenario is particularly feared by EU producers, since it would involve a considerable adjustment in the EU beef sector. By-products of the dairy production supply two thirds of the EU beef consumption and this supply is rather inelastic in relation to beef prices, meaning that producers of suckling cows would have to bear most of the adjustment, making a large cut in tariff is politically difficult. The EU might therefore classify beef products as “sensitive” and propose a lower tariff cut or an expansion of existing TRQs. However, the impact on the composition of imports should be taken into account. A large tariff reduction would require cutting mainly the specific component (only a small reduction can be achieved by cutting the *ad valorem* component), reducing the Alchian-Allen bias towards high-quality imports. An expansion in the existing quota would have the opposite effect.

References

- Philip C. Abbott. Tariff Rate Quotas: Failed Market Access Instruments? *European Review of Agricultural Economics*, 29(1):109–130, 2002.
- Armen Alchian and William R. Allen. *Exchange and Production: Competition, Coordination and Control*. Wadsworth, 3th edition edition, 1983.
- James Anderson. The Coefficient of Trade Utilization: The Cheese Case. In Robert Baldwin, editor, *Empirical Studies of Commercial Trade*, chapter 8, pages 221–243. National Bureau of Economic Research, 1991.
- James E. Anderson. The Relative Inefficiency of Quotas: The Cheese Case. *The American Economic Review*, 75(1):178–190, 1985.
- James E. Anderson. *The Relative Inefficiency of Quota*. MIT press, 1988.
- Bee Aw and Mark Roberts. Measuring quality change in quota-constrained import markets. *Journal of International Economics*, 21(1):45–60, 1986.
- Y. Bauman. Shipping the Good Apples Out: A New Perspective. *Economic Inquiry*, 42(3):534–536, 2004.
- M.H. Bchir, Y. Decreux, J.L. Guérin, and S. Jean. MIRAGE, a Computable General Equilibrium Model for Trade Policy Analysis. *CEPII, Document de travail*, 17, 2002.
- Randi Boorstein and Robert C. Feenstra. Quality Upgrading and Its Welfare Cost in U.S. Steel Imports, 1969-74. *International trade and trade policy*, pages 167–186, 1991.
- Thomas E. Borcharding and Eugene Silberberg. Shipping the Good Apples Out: The Alchian and Allen Theorem Reconsidered. *Journal of Political Economy*, 86(1):131–138, 1978.
- Matthieu Crozet and Helene Erkel-Rousse. Trade Performances, Product Quality Perceptions, and the Estimation of Trade Price Elasticities. *Review of International Economics*, 12(1):108–129, 2004.
- Y. Decreux, S. Drogué, C. Mitaritonna, and M.P Ramos. Model Comparison: different assumption lead to different results. In *9th Annual Conference on Global Economic Analysis: Multilateralism, Bilateralism and Development*. UN Economic Commission for Africa and GTAP (Purdue University), 2006.
- Yvan Decreux and Hugo Valin. Updated Version of the Model for Trade Policy Analysis. Focus on Agriculture and Dynamics. WP 2007-07, CEPII, 2007.
- EC. Does the Trade Talk Match the Trade Walk? Monitoring Agri-Trade Policy 3-06, General for Agriculture and Rural Development, European Commission, 2006. pp 1-17.
- Rodney E. Falvey. The Composition of Trade within Import-restricted Product Categories. *Journal of Political Economy*, 87(5):1105–1114, 1979.
- R.C. Feenstra. *Handbook of International Economics Vol. 3*, chapter Estimating the Effects of Trade Policy. Elsevier Amsterdam, 1995.
- Robert C. Feenstra. Voluntary Export Restraint in U.S. Autos, 1980-81: Quality, Employment, and Welfare Effects. *International trade: Selected readings*, pages 203–230, 1987.
- J.H. Grant, T.W. Hertel, and T. F. Rutherford. Extending General Equilibrium to the Tariff Line: US Dairy in the Doha Development Agenda. In *International Agricultural Trade Research Consortium, Winter conference*, St.Petersbourg, FL., 2006.

- Juan Carlos Hallak. Product Quality and the Direction of Trade. *Journal of International Economics*, 68(1):238–265, 2006.
- Thomas Hertel, David Hummels, Maros Ivanic, and Roman Keeney. How Confident Can We Be in CGE-Based Assessments of Free Trade Agreements? *National Bureau of Economic Research, Inc, NBER Working Papers: 10477*, pages –, 2004.
- David Hummels and Alexandre Skiba. Shipping the Good Apples Out? An Empirical Confirmation of the Alchian-Allen Conjecture. *Journal of Political Economy*, 112(6):1384–1402, 2004.
- David Laborde and Alex Gohin. Simulating trade policy reforms at the detailed level: some practical solutions. In GTAP and Purdue University, editors, *9th Annual Conference on Global Economic Analysis. Addis Ababa. Ethiopia*, number 2108 in . GTAP and Purdue University, 2006.
- N. Lavoie. Price Discrimination in the Context of Vertical Differentiation: An Application to Canadian Wheat Exports. *American Journal of Agricultural Economics*, 87(4):835–854, 2005.
- Will Martin, Dominique van der Mensbrugghe, and Vlad Manole. Is the Devil in the Details?: Assessing the Welfare Implications of Agricultural and Non Agricultural Trade Reforms. Working paper, World Bank, 2003.
- Marcelo Olarreaga and Caglar Ozden. AGOA and Apparel: Who Captures the Tariff Rent in the Presence of Preferential Market Access? *World Economy*, 28(1):63–77, 2005.
- C. A. Rodriguez. The quality of imports and the differential welfare effects of tariffs, quotas, and quality controls as protective devices. *Canadian Journal of Economics*, XII(3):439–449, 1979.
- Thomas F. Rutherford. Extension of GAMS for complementarity problems arising in applied economic analysis. *Journal of Economic Dynamics and Control*, 19(8):1299–1324, 1995.
- E. Silberberg and W.C. Suen. *The structure of economics: a mathematical analysis*. Boston, Mass., McGraw-Hill, 2001.
- David Skully. Economics of TRQ Administration. International Agricultural. Working Paper 99-6, International Agricultural Trade Research Consortium, 1999.
- J. Umbeck. Shipping the Good Apples Out: Some Ambiguities in the Interpretation of Fixed Charge. *The Journal of Political Economy*, 88(1):199–208, 1980.

Appendix

MCP model

In order to model the TRQ problem in GAMS, we use the following equation system:

- Demand functions

In order to avoid known problem of the Cobb-Douglas function, for simulations we replace it by a LES-CES demand as following:

$$d - d_{min} = \alpha_d u \left(\frac{P_u}{p_d} \right)^{\sigma_u} \quad [d]$$

$$m - m_{min} = \alpha_m u \left(\frac{P_u}{p_m} \right)^{\sigma_u} \quad [m]$$

where $\sigma_u = \frac{\sigma-1}{\sqrt{2}} + 1$ as in the MIRAGE CGE model (Bchir et al., 2002; Decreux and Valin, 2007).

$$m_h = \lambda_h m \left(\frac{p_m}{p_h} \right)^{\sigma} \quad [m_h]$$

$$m_l = \lambda_l m \left(\frac{p_m}{p_l} \right)^{\sigma} \quad [m_l]$$

$$p_u u = p_d (d - d_{min}) + p_m (m - m_{min}) \quad [u]$$

- Prices equations

$$p_d = 1 \quad [p_d]$$

$$m p_m = m_l p_l + m_h p_h \quad [p_m]$$

$$p_h = p_{hw} (1 + t_h + t_m) \quad [p_h]$$

$$p_l = p_{lw} (1 + t) + T \quad [p_l]$$

where the budget constraint is:

$$R = p_d d + p_m m \quad [p_u, \bar{R}]$$

- TRQ constraints

$$m_h = m_{hin} + m_{hout} \quad [m_{hin}]$$

$$m_{hin} \leq \bar{q}_h \quad [t_m]$$

$$t_m \leq \left(t + \frac{T}{p_{hw}} - t_h \right) \quad [m_{hout}]$$

$$mp_m = p_{hw}(1 + \tau)m_h + p_{lw}(1 + \tau)m_l \quad [\tau]$$

Under a MCP program each inequality must refer to a particular variable which satisfies the complementary slackness Rutherford (1995).

Annexes (only for referees)

EU-Mercosur bilateral trade relationship

Mercosur countries export large quantities of products that face no or little protection in the EU market, such as soybeans and coffee. However, the products in which Mercosur countries are particularly competitive, including sugar and beef, face a high protection in the EU. Mercosur exports to the EU are therefore limited.

The EU grants large tariff preferences to a variety of countries; as a result so that EU applied tariffs are in general much lower than the tariffs bound at the WTO. However, not all countries are eligible for EU preferential regimes. Mercosur countries, in particular, only have limited preferential access to the EU market, at least since the 1995 regional ongoing negotiations, have not yet resulted in an agreement. All Mercosur countries are eligible for the EU Generalized System of Preferences (GSP). However, the GSP does not cover all agricultural products, and the preferential margins are often small relative to the MFN tariffs. Most beef products are not covered by the GSP, and Mercosur exports must also face the MFN tariffs.

In compliance with WTO requirements, the EU has opened TRQ's for some agricultural products. There are current-access quotas, related to historical trade that are therefore allocated to particular countries, and quotas under minimum access.

The EU has allocated an important "Hilton" beef quota to Mercosur. This quota has been expanding in 2002 when Argentina was granted a larger quota of 28,000 tons of high-quality beef,¹⁵ Uruguay a 6,300-ton quota of high-quality beef,¹⁶ Brazil a 5,000-ton quota.¹⁷ Paraguay was added to the list of exporters with the grant of a 1,000-ton quota of high-quality beef since 2002.¹⁸ Mercosur countries can also benefit from minimum-access quotas that are not allocated to a particular country and which are not limited to high-quality beef.

Each Mercosur country administrates the licenses for "Hilton" quotas. For example, in Argentina's case, the Secretary of Agriculture (SAGPyA) allocates the quota between exporters. In order to access in-quota tariffs for their products, exporters first need an authorization to export to the EU delivered by the EU Commission. They also have to fulfill all the tributary and sanitary obligations of their country. Then, licenses for the quotas are allocated to traditional exporters, considering their total beef export (except "Hilton" beef) during the last two years (FOB values) as proven by customs certifications. The new producers, who fulfill all sanitary conditions and have obtained EU authorization, benefit from 300-ton quota for the first year and 200 tons for the second year. Because it does not renew automatically, every year each exporter has to re-request the attribution of the "Hilton" quota-part from the SAGPyA (SAGPyA Resolutions 914/2001 and 186/2002).

For all these TRQ's the tariff in-quota is an *ad valorem* tariff of 20% and the out-of-quota tariff a combination of an *ad valorem* tariff (12.8%) and a specific tariff (from 141.4 per 100kg to 304.1

¹⁵CN codes: 0201 30 and 0206 10 95. "...Special or good-quality beef cuts obtained from exclusively pasture-grazed animals aged between 22 and 24 months, having two permanent incisors and presenting a slaughter live weight not exceeding 460 kilograms, referred to as "special boxed beef", cuts of which may bear the letters "sc" (special cuts)". Commission Regulation (EC) No.936/97.

¹⁶CN codes: 0201 30, 0202 30 90, 0206 10 95, 0206 29 91. "...Special or good-quality beef cuts obtained from exclusively pasture-grazed animals presenting a slaughter liveweight not exceeding 460 kilograms, referred to as "special boxed beef". These cuts may bear the letters "sc" (special cuts)". Commission Regulation (EC) No.936/97.

¹⁷CN codes: 0201 30, 0202 30 90, 0206 10 95, 0206 29 91. "Beef cuts obtained from steers (novilhos) or heifers (novilhas) aged between 20 and 24 months, which have been exclusively pasture-grazed, have lost their central temporary incisors but do not have more than four permanent incisor teeth, which are of good maturity and which meet the following beef-carcase classification requirements: meat from B or R class carcasses of rounded to straight conformation and a fat-cover class of 2 or 3; the cuts, bearing the letters "sc" (special cuts) or an "sc" label as a sign of their high-quality are to be boxed in cartons bearing the words "high-quality beef". Commission Regulation (EC) No.936/97.

¹⁸CN codes: 0201 30 00 and 0202 30 90. "...fillet (lomite), striploin and/or Cube roll (lomo), rump (rabadilla), topside (carnaza negra) obtained from selected crossbred animals with less than 50% of breeds of the zebu type and having been exclusively fed with pasture grass or hay. The slaughter animals shall be steers or heifers falling under category V of VACUNO carcase-grading system producing carcasses not exceeding 260 kg". Commission Regulation (EC) No.1524/2002

per 100kg) which changes for each CN code.

EU-Mercosur trade negotiation

In December 1995 the finalization of the EU-Mercosur Interregional Framework Cooperation Agreement took place in Madrid. The agreement entered into force on July 1, 1999 and the two regions began negotiations in November of that same year.

The first round of negotiations (Buenos Aires, April 2000), established the general principles of current and future talks. These included the following provisions: free trade, no exclusion of any sector, conformity with WTO rules, the reinforcement of consultations on WTO matters, the single undertaking principle, intentions to aim at comprehensive negotiations and balances results, and conclusion at the earliest possible time. The parties also set up technical groups for trade and subgroups for co-operation areas.¹⁹ They also established a working program on the objectives, methodology, information exchange, modalities on non-tariff measures, and the schedule for progressive tariffs in goods and services.

During **the second** (Brussels, June 2000) **and third** (Brasilia, November 2000) **rounds** of negotiations the parties continued to exchange information and drafts about trade, non-tariff obstacles and trade, political and co-operation objectives for a future agreement.

In **the fourth round** (Brussels, March 2001) the parties presented their proposals and working documents about non-tariff issues and "Business Facilities" such as e-commerce were introduced as new subject in the negotiations.

The fifth round (Montevideo, July 2001) was the point of "takeoff" for tariff and service negotiations. The EU presented Mercosur the tariff and negotiation texts for goods, services and government procurement. The objective of this offer was the progressive and reciprocal liberalization of almost all exchange, without exclusion of any sector and lasting for a ten-year period.

In **the sixth round** (Madrid, October 2001) Mercosur presented its tariff offer as well as negotiation texts on services and public markets. The point of contention with the EU proposal was the 33% reduction for EU import tariffs for a ten-year period. During this round and **the seventh round** (Buenos Aires, April 2002), the parties made substantial progress in the political and co-operation chapters (Science, Telecommunications, Energy, Transport). Moreover, the parties agreed on and finally adopted the Trade Facilitation Measures Package that had been discussed in Madrid.

The eighth round (Brasilia, November 2002) focused on the discussion of consolidated texts detailing for services, competition, market access for goods, technical barriers to trade, rules of origin, customs and dispute settlement. They also started discussions about trade of wine and spirits.

In **the ninth round** of negotiations (Brussels, March 2003) the discussion focused on reciprocal tariff proposals. Regarding agricultural tariffs, the parties distinguished several product categories (A, B, C, D, E) which were included in the tariff elimination agenda. The EU proposal included *ad valorem* tariff offers for all categories, except for category E for which does not yet have defined methods of tariff reduction.²⁰ However, the EU plans to propose TRQ's rather than tariff elimination for E category products and not tariff elimination. The Mercosur proposal included the tariff elimination (over ten years) of 8,042 tariff headings which account for 83,5% of Mercosur imports coming from the EU. For Mercosur, the majority of meat products (poultry, bovine, pork), fish and sugar are in category C, live animals are in categories A, B, C, while vegetables and fruits are in categories C and D along with cereals, oilseeds and vegetable oils. Mercosur does not consider agricultural imports to be sensitive under category E definition (only food and manufactures).

In **the tenth round** (Asuncion, June 2003) discussions focused again on agricultural products. The EU expressed concerns regarding the Mercosur proposal for an accelerated tariff reduction on agricultural imported products. In this round the EU made a proposal for tariffs on category E, which

¹⁹Subgroups of Technical groups:liberalization trade in goods and services, government procurement, investment, intellectual property rights, competition policies, trade defence instruments and dispute settlement mechanism

²⁰The products of E category are: cereals, rice, olives, oils, bovine and pork meat, eggs, poultry meat, sugar and fruit and vegetables.

had not been defined in the previous round. Discussions also took place on the SPS agreement, in particular on the issues of animal welfare, and wine and spirits.

The eleventh round (Brussels, December 2003) showed some progress on technical trade issues related to market access in goods, government procurement and investment, wines and spirits, business facilitation, intellectual property rights. They also agreed on the work-program for the 2004 rounds as well as the two Ministerial Meetings to conclude the EU-Mercosur Association Agreement.

The twelfth round (Buenos Aires, March 2004) saw progress on trade aspects for manufactured goods. The parties finalized the discussions about TBT, competition and customs procedures.

In **the thirteenth round** (Brussels, May 2004) the discussion about politics, co-operation and trade aspects went on but no important conclusions were reached.

After this final meeting of the Bi-regional Negotiations Committee, the parties continued to exchange of proposals and engage in informal discussions. The final proposals were exchanged in September 2004 in hopes of reaching an agreement at the end of October. However, no EU-Mercosur trade agreement was achieved because the two parties did not agree about crucial subjects such as agricultural trade liberalization and government procurement and investment. Nevertheless, dialogue between the EU and Mercosur has been recently renewed and future proposals are subject to the results of the WTO Doha Round.