



CAHIER 28-2001

**TRADE LIBERALIZATION AND THE  
PROFITABILITY OF DOMESTIC MERGERS**

Gérard GAUDET and  
Rams KANOUNI

**Centre de recherche  
et développement en économique**

C.P. 6128, succursale Centre-ville  
Montréal QC H3C 3J7

Téléphone : (514) 343-6557  
Télécopieur : (514) 343-5831  
crde@crde.umontreal.ca  
<http://www.crde.umontreal.ca/>

Université   
de Montréal

**CAHIER 28-2001**

**TRADE LIBERALIZATION AND THE  
PROFITABILITY OF DOMESTIC MERGERS**

Gérard GAUDET<sup>1</sup> and Rams KANOUNI<sup>2</sup>

<sup>1</sup> Centre de recherche et développement en économie (C.R.D.E.) and Département de sciences économiques, Université de Montréal

<sup>2</sup> Département d'économie, Université Laval

November 2001

---

The authors wish to thank Abraham Hollander and Ngo Van Long for their comments on this paper.

## **RÉSUMÉ**

Contrairement à une certaine idée reçue, nous montrons que l'ouverture du marché domestique par l'abolition d'un tarif douanier ne va pas nécessairement rendre moins profitable les fusions domestiques. Cette idée suppose implicitement que le tarif en question est prohibitif avant son abolition et qu'il le demeure après une fusion. Or ce n'est souvent pas le cas. Nous montrons, à l'aide d'un exemple, que l'abolition du tarif pourrait, dans certains cas, rendre la fusion domestique plus profitable.

Mots clés : fusions, lois sur la concurrence, libéralisation du commerce

## **ABSTRACT**

It is often thought that a tariff reduction, by opening up the domestic market to foreign firms, should lessen the need for a policy aimed at discouraging domestic mergers. This implicitly assumes that the tariff in question is sufficiently high to prevent foreign firms from selling in the domestic market. However, not all tariffs are prohibitive, so that foreign firms may be present in the domestic market before it is abolished. Furthermore, even if the tariff is prohibitive, a merger of domestic firms may render it nonprohibitive, thus inviting foreign firms to penetrate the domestic market. In this paper, we show, using a simple example, that in the latter two cases, abolishing the tariff may in fact make the domestic merger more profitable. Hence, trade liberalization will not necessarily reduce the profitability of domestic mergers.

Key words : mergers, antitrust, free trade

## 1 Introduction

It is often thought that tariff reduction should lessen the need for a policy aimed at discouraging domestic mergers. The reasoning is that the abolition of a tariff on imports would encourage foreign firms to enter, thereby increasing the number of firms serving the domestic market. Since the merger of a subset of firms in an oligopolistic Cournot equilibrium is profitable only if the number of firms in the subset is sufficiently large relative to the number of firms in the industry (see Salant, Switzer, and Reynolds, 1983, and Gaudet and Salant, 1991), increasing the number of firms in the domestic market will make it less likely that the merger is profitable and, presumably, less likely that it would occur.<sup>1</sup>

The above argumentation implicitly rests on the assumption that the tariff in question is sufficiently high to prevent foreign firms from selling in the domestic market. However, not all tariffs are prohibitive. Hence foreign firms may be present in the domestic market before it is abolished. Furthermore, even if the tariff is prohibitive, a merger of domestic firms may render it non prohibitive, thus inviting foreign firms to penetrate the domestic market. We show in this paper, using a simple linear demand and zero marginal cost example, that in the later two cases, abolishing the tariff may in fact make the domestic merger more profitable.

A number of authors have in the past studied various normative or positive issues related to mergers in a multi-country context. Some have looked at the welfare effects of international (i.e., cross-border) mergers or its comparison with the effect of national mergers (for instance Barros and Cabral 1994, Falvey, 1998, Kabiraj and Chaudhuri, 1999), while others have stressed the interaction of competition policy and optimal trade policy in the context of oligopolistic competition (for instance Collie, 2000 and Horn and Levinsohn, 1997). This paper is more closely related to those that consider explicitly the effect of tariff reductions on potential merger behavior of the firms. This is the case in Ross (1988), Falvey (1998) and Long and Vousden (1995). Ross analyzed the effect of a tariff reduction on the anticompeti-

---

<sup>1</sup>For an analysis of the endogenous decision to merge, see Kamien and Zang, 1991, and Gaudet and Salant, 1992.

tive consequences, or price raising properties, of a reduction in the number of firms through merger. He models both a domestic dominant oligopoly and an international oligopoly and finds that in some cases a lower tariff serves to restrain price increases subsequent to a merger and in other cases it does not. In particular, he concludes that in an international oligopoly context, a unilateral tariff reduction should tend to discourage mergers between domestic firms and encourage them between foreign firms serving the domestic market. Falvey (1998) discusses various implications of trade liberalisation for the profitability of mergers. One of his findings is that trade liberalisation is likely to generate merger activity between firms in the previously protected market. Long and Vousden (1995) also arrive at the conclusion that a unilateral tariff reduction will tend to increase the incentive to merge between domestic firms, but show that the effect on the gain from merging depends on the size of the savings in marginal costs which results from the merger<sup>2</sup>.

Each of those last three papers has looked at the effects of a *marginal* variation in the tariff and hence cannot completely answer the problem addressed here. The question we pose requires that we consider the effect of a *non marginal* change in the tariff, i.e., its abolition. This involves comparing the equilibria that occur before and after the abolition of the tariff. A by-product of our analysis is that it may also serve to illustrate the fact that the effect of the marginal variation in the tariff is likely to depend on the level of the tariff at which these variations are evaluated.

In section 2, we briefly describe the model and its equilibrium. In section 3, we compare the profitability of a merger in equilibrium with and without the tariff, for different levels of the tariff. Brief concluding remarks follow in section 4.

---

<sup>2</sup>It is interesting to note their finding that if the savings in marginal costs involved is small, or zero as in the example considered here, then the gains from merging are negative. This is an illustration of the well known result of Salant Switzer and Reynolds (1983). Of course if the gains from merging are negative, then logically a *marginal* change in the tariff should have no effect on the incentive to merge.

## 2 The model

Let  $P_d$  and  $P_f$  denote the market price on the domestic and on the foreign (rest of the world) markets respectively and let  $Q_d$  and  $Q_f$  denote the corresponding aggregate quantities on each market. The linear inverse demand functions will be denoted  $P_d = \beta - Q_d$  and  $P_f = b - Q_f$ . We will assume that three firms produce the homogeneous good: one foreign firm (firm 0) and two domestic firms (firms 1 and 2). This means that  $Q_j = \sum_i q_i^j$ ,  $i = 0, 1, 2$ ,  $j = d, f$ , where  $q_i^d$  and  $q_i^f$  denote the sales of firm  $i$ ,  $i = 1, 2$ , in the domestic and foreign markets respectively. For simplicity, we assume that there are no variable costs of production and no transport costs. The per unit tariff imposed on the exports of the foreign firm to the domestic market will be denoted  $t$  ( $t \geq 0$ ).

The profits of the firms are then

$$\pi_0 = (b - Q^f) q_0^f + (\beta - Q^d) q_0^d - t q_0^d \quad (1)$$

$$\pi_1 = (\beta - Q^d) q_1^d + (b - Q^f) q_1^f \quad (2)$$

$$\pi_2 = (\beta - Q^d) q_2^d + (b - Q^f) q_2^f. \quad (3)$$

and the unique Cournot equilibrium is given by

$$q_0^f = q_1^f = q_2^f = q^f = \frac{b}{4}, \quad Q^f = \frac{3b}{4} \quad (4)$$

and

$$q_1^d = q_2^d = q^d = \frac{\beta + t}{4}, \quad q_0^d = \frac{\beta - 3t}{4}, \quad Q^d = \frac{3\beta - t}{4}. \quad (5)$$

We will assume interior solutions for all quantities except possibly  $q_0^d$ , which may be zero if  $t$  is prohibitively high. This will be the case if  $t \geq \frac{\beta}{3}$ . Otherwise, if  $0 \leq t < \frac{\beta}{3}$ , all three firms sell on both markets.

If the tariff is prohibitive, the equilibrium profits are

$$\pi_1 = \pi_2 = \pi^d = \frac{\beta^2}{9} + \frac{b^2}{16}, \quad \pi_0 = \frac{b^2}{16}. \quad (6)$$

Otherwise, with all three firms present on both markets, they are

$$\pi_1 = \pi_2 = \pi^d = \frac{(\beta + t)^2}{16} + \frac{b^2}{16}, \quad \pi_0 = \frac{(\beta + t)(\beta - 3t)}{16} + \frac{\beta}{16}. \quad (7)$$

Suppose now that the two domestic firms merge and let  $q_m^d$  and  $q_m^f$  denote the sales of the merged firm in the domestic and foreign markets respectively. The equilibrium quantities are then given by

$$q_m^f = q_0^f = \frac{b}{3}, \quad Q^f = \frac{2b}{3} \quad (8)$$

and

$$q_m^d = \frac{\beta + t}{3}, \quad q_0^d = \frac{\beta - 2t}{3}, \quad Q^d = \frac{2\beta - t}{3}. \quad (9)$$

After the merger, the tariff therefore becomes prohibitive whenever  $t \geq \frac{\beta}{2}$ . Otherwise, if  $0 \leq t < \frac{\beta}{2}$ , the two firms are present on each market.

Whenever the tariff is prohibitive, the equilibrium profits will now be

$$\pi_m = \frac{\beta^2}{4} + \frac{b^2}{9}, \quad \pi_0 = \frac{b^2}{9}, \quad (10)$$

whereas if both firms are present on each market, they are

$$\pi_m = \frac{(\beta + t)^2}{9} + \frac{b^2}{9}, \quad \pi_0 = \frac{(\beta + t)(\beta - 2t)}{9} + \frac{b^2}{9}. \quad (11)$$

We have so far assumed that there are no fixed costs. It is well known from Salant, Switzer and Reynolds (1983), and it can be easily verified from the above, that in the absence of fixed costs, the merger just described is not profitable. However, it will become profitable if sufficient fixed cost is avoided by merging. Assume then that each firm faces an identical

fixed cost of  $F > 0$  and, following Gaudet and Salant (1992), let  $\theta$  denote the threshold level of this fixed cost which would make the merger just profitable. The value of  $\theta$  is given by

$$\pi_m - \theta = 2(\pi_d - \theta). \quad (12)$$

By the definition of  $\theta$ , the merger will be strictly profitable if and only  $F > \theta$ . In this sense, any intervention that increases  $\theta$  renders the merger less profitable. In the case at hand, the value of  $\theta$  will depend on  $t$ .

The preceding analysis suggests that it is useful to distinguish four cases, along with the corresponding values for the threshold level of fixed cost:

**Case 1**  $t = 0$ , in which case the threshold level is  $\theta_1 = \frac{\beta^2}{72} + \frac{b^2}{72}$ ,

**Case 2**  $0 < t < \frac{\beta}{3}$ , in which case the threshold level is  $\theta_2 = \frac{(\beta+t)^2}{72} + \frac{b^2}{72}$ ,

**Case 3**  $\frac{\beta}{3} \leq t < \frac{\beta}{2}$ , in which case the threshold level is  $\theta_3 = \frac{2\beta^2 - (\beta+t)^2}{9} + \frac{b^2}{72}$ ,

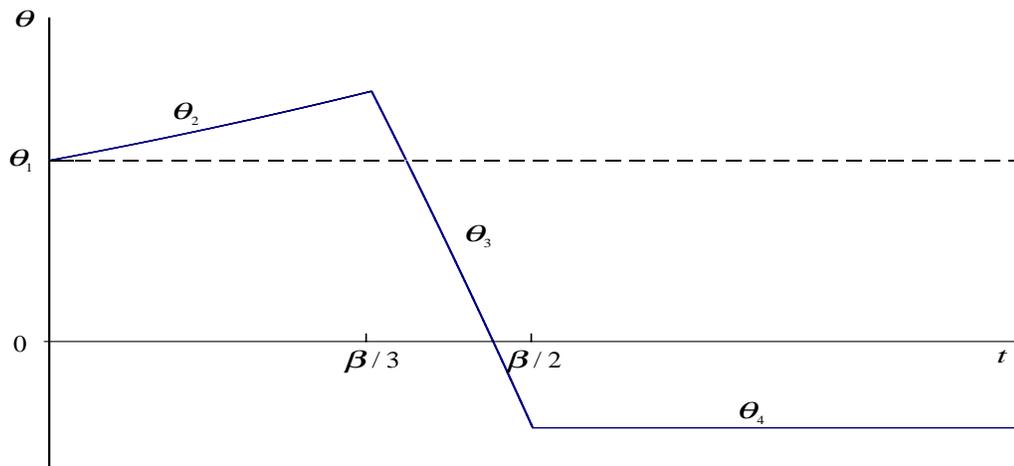
**Case 4**  $\frac{\beta}{2} \leq t$ , in which case the threshold level is  $\theta_4 = -\frac{\beta^2}{36} + \frac{b^2}{72}$ .

Case 1 represents the free trade reference case. In Case 2, the tariff is positive, but not sufficiently so to be prohibitive. In Case 3, the tariff is prohibitive before the merger, but not after the merger. In Case 4, the tariff is prohibitive both before and after the merger. This is illustrated in Figure 1, which depicts,  $\theta$ , the threshold level of fixed cost as a function of the tariff. The figure is drawn with values of the parameters set at  $\beta = b = 1$  for illustrative purposes<sup>3</sup>. Notice that  $\theta_4$  is always smaller than  $\theta_1$ , independent of the values of  $\beta$  and  $b$ , but it is not necessarily negative — it will be positive if the slope of the demand curve in the foreign market ( $b$ ) is sufficiently larger than that in the domestic market ( $\beta$ ).

---

<sup>3</sup>The strict convexity of the segment  $\theta_2$  and the strict concavity of the segment  $\theta_3$  is only slightly apparent on the graph because of scale effects, but it is real.

Figure 1: Fixed Costs Profitability Threshold as a Function of the Tariff



### 3 The effect of removing the tariff

The question we now want to ask is whether abolishing the tariff will render the merger more or less profitable. We do this by comparing the threshold levels for each of Cases 2, 3 and 4 to that in Case 1. If, for some  $i = 2, 3, 4$ ,  $\theta_i > (<)\theta_1$ , then, in that case, the merger has to save a larger (smaller) amount of fixed costs than under free trade in order to be profitable, which means that abolishing the tariff makes the merger more (less) profitable.

#### 3.1 The tariff is not prohibitive

When the tariff is not prohibitive to begin with (Case 2), we verify that

$$\theta_1 - \theta_2 = \frac{\beta^2 - (\beta + t)^2}{72} < 0.$$

This means that the cost saving required for the merger to be just profitable in the presence of the tariff is greater than under free trade: paradoxically, trade liberalization increases the profitability of the merger. The reason why this can occur is quite simple. Although abolishing the tariff reduces the joint profits (gross of fixed cost) of the domestic firms whether they are merged or not, it reduces it less if the two firms are merged than if they are not.

Notice that it is perfectly possible for an unprofitable merger to become profitable after trade liberalization. This is the case when  $\theta_1 < F < \theta_2$ .

#### 3.2 The tariff is not prohibitive only if the firms are merged

In Case 3, the tariff is prohibitive when the domestic firms are not merged, but not otherwise. The reason is that, given the tariff, turning a monopoly on the domestic market into an asymmetric duopoly is attractive to the foreign firm, but turning a symmetric duopoly into an asymmetric triopoly is not.

In this case, the difference in the threshold levels of fixed costs is given by

$$\theta_1 - \theta_3 = \frac{\beta^2}{72} - \frac{2\beta^2 - (\beta + t)^2}{9},$$

and we verify that<sup>4</sup>

$$\theta_1 - \theta_3 = \begin{cases} < 0 & \text{if } \frac{\beta}{3} \leq t < \beta \left( \frac{\sqrt{30}}{4} - 1 \right) \\ = 0 & \text{if } t = \beta \left( \frac{\sqrt{30}}{4} - 1 \right) \\ > 0 & \text{if } \beta \left( \frac{\sqrt{30}}{4} - 1 \right) < t < \frac{\beta}{2} \end{cases}$$

Therefore the merger may be more profitable under free trade in this case as well, provided the tariff is not too high. This will occur if  $\beta/3 < t < \beta(\sqrt{30}/4 - 1)$ . However, for a sufficiently high tariff ( $\beta(\sqrt{30}/4 - 1) < t < \beta/2$ ), abolishing it will make the merger less profitable. This is because, for  $t < (>) \beta(\sqrt{30}/4 - 1)$ , the loss in joint profits to the domestic firms which results from abolishing the tariff is greater (smaller) if they are not merged than if they are, and is exactly equal if  $t = \beta(\sqrt{30}/4 - 1)$ .

### 3.3 The tariff is prohibitive whether the firms are merged or not

Finally, the tariff may be so high that it is prohibitive whether the domestic firms are merged or not. This is Case 4, for which

$$\theta_1 - \theta_4 = \frac{\beta^2}{24} > 0.$$

In this case, trade liberalization always reduces the profitability of the domestic merger. In fact, if  $\theta_4$  is negative, then the merger is profitable even in the absence of fixed costs, something which is not possible when there is no tariff, as  $\theta_1$  is always positive.<sup>5</sup> This occurs

---

<sup>4</sup>There is a second root to  $\theta_1 - \theta_3 = 0$ , which we neglect, since it is negative.

<sup>5</sup>The fact that  $\theta_1$  is positive is a simple illustration of the result of Salant, Switzer and Reynolds (1983) that, in a Cournot equilibrium with linear demand, linear costs and no fixed costs, a merger which includes

when  $\beta^2 > b^2/2$ , which means that the domestic market is sufficiently more important than the foreign market.

#### 4 Concluding remarks

Some of the quantitative results obtained clearly depend on the simplifying assumptions of linearity and on the fact that the number of domestic firms is twice the number of foreign firms. Those simplifying assumptions were made only to facilitate the demonstration that the argument that trade liberalization reduces the profitability of domestic mergers is not a clear cut one: it depends on the level of the tariff that is being abolished. The demonstration can easily be extended to more general assumptions on the demand and costs functions and on the number of firms.

---

less than eighty percent of the firms is not profitable.

## References

- Barros, Pedro P. and Luis M.B. Cabral, “Merger Policy in Open Economies”, *European Economic Review* 38(1994): 1041–1055.
- Collie, David R., “Mergers and Trade Policy under Oligopoly”, *Review of International Economics* (2000): forthcoming.
- Falvey, Rodney, “Mergers in Open Economies”, *The World Economy* 21(1998):1061–1076.
- Gaudet, Gérard and Stephen W. Salant, “Increasing the Profits of a Subset of Firms in Oligopoly Models with Strategic Substitutes”, *American Economic Review* 81(1991): 658–665.
- Gaudet, Gérard and Stephen W. Salant, “Towards a Theory of Horizontal Mergers”, in George Norman and Manfredi La Manna (eds.), *The New Industrial Economics: Recent Developments in Industrial Organisation, Oligopoly and Game Theory*, Aldershot, England: Edward Elgar Publishing, 1992, pp. 137–58.
- Horn, Henrik and James Levinsohn, *Merger Policy and Trade Liberalization*, National Bureau of Economic Research Working Paper No. 6077, 1997.
- Kabiraj, Tarun and Manas Chaudhuri, “On the Welfare Analysis of a Cross-Border Merger”, *The Journal of International Trade and Economic Development* 8(1999): 195–207.
- Kamien, Morton I. and Isreal Zang, “The Limits of Monopolization Through Acquisition”, *Quarterly Journal of Economics* 105(1990): 465–500.
- Long, Ngo Van and Neil J. Vousden, “The Effects of trade Liberalisation on Cost-Reducing Horizontal Mergers”, *Review of International Economics* 3(1995): 141–155.
- Ross, Thomas W., “On the Price effects of Mergers with Freer Trade”, *International Journal of Industrial Organization* 6(1998): 233–246.
- Salant, Stephen W., Sheldon Switzer and Robert J. Reynolds, “Losses from Horizontal Merger: The Effects of an Exogenous Change in Industry Structure on Cournot-Nash Equilibrium”, *Quarterly Journal of Economics* 98(1983): 185–200.