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**IMPORT QUOTAS AND WELFARE.**  
**The case of Mercosur automobile industry**  
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**PAPER**

Title: “Import quotas and welfare. The case of Mercosur automobile industry”

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Abstract: The increasing importance of imperfect markets and intra – industry trade have much stimulated the development of a new body of international trade theory that provides strong arguments in favour of active commercial policies. In virtue of the importance of that approach, this work applies a model of imperfect competition to explain the impact that the progressive elimination of current import quotas would have on welfare, prices and activity level of the automobile industry of the Mercosur countries. For that purpose, changes in market conditions are simulated employing a simple Cournot oligopolistic model, along with data on production, prices and costs provided by the firms.

## Introduction<sup>1</sup>

During the last two centuries the theory of the comparative advantages of international economics which essentially assumes that world markets are competitive, has demonstrated that countries trade in order to mutually benefit from their efficiency and productive resource endowment differences, and it has suggested free trade as an economic policy instrument, because as part of *laissez faire* it enables an invisible hand to drive the world economic system to a Paretian optimum.

But the growing importance of market imperfections, the strong growth of intra-industry trade and the theoretical evidence that in a second best situation government intervention can increase economic welfare instead of reducing it, have stimulated the development of new models which in spite of their diversity form an orderly set of ideas that constitutes the kernel of a new international economics. Their central contributions generally depart from the assumption that the international trade of competitive products is accomplished in imperfect markets developed through the scale effects that induce economic concentration, and demonstrate that it is not only due to differences in resource endowments that exist among countries, but also to the similarities of their economic activity.

But this approach also changes the government role. Being the economy in a second best situation, it provides new arguments in favour of intervention and confers great importance to the theory of commercial policy. In the first case, because the market structure prevents it from reaching Paretian optimality and in the second, because governments have now incentives for developing active commercial policies, mainly oriented towards the intervention in imperfect markets, controlling multinational firms, and protecting spillovers generating activities, for instance.

### The new theoretical developments

In a seminal work about the new theory of the international economics, Krugman (1979) developed a model where trade among countries is not caused by differences in preferences, technology or resource endowments from each country, but rather by the economies of scale that characterise markets of monopolistic competition. The model's

principal results show that trade among two initially closed countries with the same preferences and technologies would have an impact similar to that of an expansion in the labour force in both countries, since in such case, the scale of production and the quantity and number of available goods will increase, and so will economic welfare.

In another pioneer work that employs an oligopolistic model, Spencer and Brander (1983) showed that when a national firm competes against a foreign one in a third market (a simplification that discards changes in consumer welfare), government intervention through a subsidy allows the national firm to increase output and profits and, if the rent obtained is superior to the cost of the grant, it also improves national economic welfare. Later, Eaton and Grosman (1986) extended the analysis and demonstrated under different conditions of demand, costs and firms' behaviour, the appropriate instruments to implement optimum commercial policies guiding to the improvement of economic welfare.

The dynamic of multinational firms, that mainly seems to be explained by the pecuniary or technical advantages derived from certain common activities such as those of R&D, marketing and advertising, was carefully examined by Markusen (1984). Employing some simplifying assumptions he demonstrated that when common activities do not exist, monopolies in both countries would achieve similar levels of output and prices and trade between them would not take place, but when the existence of common activities allows a multinational company to produce one good at increasing returns to scale, the host country benefits and if the guest one also improves, government intervention could increase economic welfare by taxing the repatriation of the multinational firm's profits.

In many cases, companies also benefit from the spillovers that reduce their production costs. The new international economy confers great interest to that circumstance for two reasons. On the one hand, because it perceives that a meaningful part of world trade is accomplished in imperfect markets developed by returns to scale, which increasingly depend on technological change, a well known generator of externalities. On the other, because as the economy is in a second best situation, governments have incentives to promote those activities by employing different commercial policy instruments<sup>2</sup>. For those reasons the dynamic feature of the comparative advantages due to technological change would require an active government intervention if it is sought that domestic firms participate in world trade, since market failures caused by the externalities constrain their activity level.

But the possibilities for intervention are limited. In the first place, because the designing of optimum commercial policies is a hard task due to the strong conjectural content of the behavioural models that are employed, and to the consequent specific nature of the

recommendations deriving from them. In the second place, because it must be added to the previous problem the difficulty in detecting and quantifying the externalities generated by the industries whose promotion is sought<sup>3</sup>. Finally, if some powerful rent-seeking groups improve their benefits by virtue of a commercial policy whose costs relay on the rest of the community, the intervention could have undesirable effects on income distribution. Furthermore, the predatory character of rent-captive policies in international markets could provoke retaliation by other countries, in which case it is probable that they will all lose<sup>4</sup>.

### **Quantitative restrictions, oligopoly and welfare**

In spite of the limitations of the models, this study attempts to measure the impact that some adjustments in commercial policies, mainly based on import quotas which protect the Argentine and Brazilian automobile industry, would have on economic welfare, prices and the activity level of the sector. To this end and following Rodrik (1988), the paper basically employs a Cournot model along with some simplifying assumptions about technology, the factor market structure and firms' behaviour. It then uses data from those companies that control local production, and finally examines the market equilibrium conditions under different scenarios, which in all cases assume the reduction of existing import quotas<sup>5</sup>.

#### *Mercosur automobile industry*

Table 1 presents some Argentine and Brazilian data that show the importance of the Mercosur automobile industry. Those figures show that both countries currently produce a little over two million vehicles altogether, that international trade is moderate, and 125 thousand workers are employed. The last column also shows that the industry experienced an important expansion over the last two decades since the annual growth rate of 1.3 and 3.2% increased production in the first country by fifty percent and doubled it in the second, that the technological change induced a labour by capital substitution causing a drop in employment and that the increase in production was accompanied by a downward trend in prices, which decreased at annual rates of 1.1 and 1.5% respectively.

Table 1  
**Mercosur automobile industry**  
*(Thousands)*

| Concept                   | <i>Years</i> |                  |           |                        |
|---------------------------|--------------|------------------|-----------|------------------------|
|                           | 1975         | 1985             | 1996      | Annual growth rate (%) |
|                           |              | <i>Argentina</i> |           |                        |
| Vehicles produced         | 240          | 138              | 313       | 1.3                    |
| Exports and imports       | 14 (1)       | 1(1)             | 109 (161) |                        |
| Employees                 | 55           | 21               | 23        | -4.1                   |
| Average prices (1993=100) | 124          | 131              | 99        | -1.1                   |
| Vehicle fleet (millions)  | 2.3          | 3.9              | 4.8       | 3.5                    |
| Population (millions)     | 25.6         | 30.0             | 35.0      | 1.5                    |
|                           |              | <i>Brazil</i>    |           |                        |
| Vehicles produced         | 930          | 967              | 1,804     | 3.2                    |
| Exports and imports       | 73 (0)       | 208 (0)          | 296 (224) |                        |
| Employees                 | 104          | 122              | 102       | -0.1                   |
| Average prices (1993=100) | 113          | 125              | 82        | -1.5                   |
| Vehicle fleet (millions)  | 6.7          | 11.5             | 18.2      | 4.9                    |
| Population (millions)     | 106.2        | 135.6            | 157.9     | 2.0                    |

Source: ADEFA (1996), ANFAVEA (1996)

*The conceptual framework and data employed*

Assuming that firms are similar in scope and profits maximisers, their fixed costs assure returns to scale, their marginal costs are constant and also that input markets are competitive, the equilibrium for each firm can then be summarised with the expression:

$$(1.1) \quad \frac{(p - CM)}{p} = \frac{s_i}{e}$$

where  $p$  is the market price,  $CM$  the marginal cost,  $s_i = [q_i / (q+M)]$  the company's share in the market supply,  $q = n \cdot q_i$  total output,  $n$  the number of firms,  $M$  the net imports (i.e., total imports less exports, which are almost completely carried out by the companies considered here) and  $e$  the elasticity price of demand<sup>6</sup>.

If consumers have a preference function of the type  $U = \{k[e/(1+e)]\}(q+M)^{[(1/e)+1]}$ , where  $k$  is a constant, the market (inverse) demand function would at the same time be:

$$(1.2) \quad p = k \cdot (n \cdot q_i + M)^{\frac{1}{e}}$$

When barriers to entry exist, those two equations provide equilibrium quantities and prices. But if there exists free entry, as it is supposed here, it is also necessary to determine the number of firms and for that reason this additional condition of zero profits is added:

$$(1.3) \quad (p - CM) \cdot q = F$$

where  $F$  represents total fixed costs. Finally, economic welfare and its changes can be measured with the expression:

$$(2) \quad W = \frac{1}{(e-1)} k(n \cdot q_i + M)^{\frac{1}{e}+1} + n[(p - CM)q - F] + (p - p^*)M$$

where  $p^*$  is the international price and the first term on the right hand side represents the consumer surplus, which is obtained from the utility function, the second term the companies' benefits, and the last one the government's tariff income (or the importers' economic rents).

The data of the Argentine automobile industry for 1994 were obtained from ADEFA (1994) and the firms' financial statements. Imports for that year, mainly composed of cars and commercial vehicles, could only be carried out by licences<sup>7</sup>. The analysis is based on the companies *Autolatina* (Ford and Volkswagen), *Ciadea* (Renault) and *Sevel* (Fiat and Peugeot), which are basically devoted to car and commercial vehicle production (391 thousand units from a total production of 409 thousand for the whole industry). The data of the Brazilian industry were obtained from ANFAVEA (1996) and correspond to 1996. The companies analysed are *Fiat*, *Ford*, *General Motors* and *Volkswagen*, which produced 1.735 million cars and commercial vehicles from a total of 1.765 for all the industry; moreover, imports for non-based terminals were limited to fifty thousand units that year.

Based on that information prices, sales margins, marginal costs and total fixed costs were first calculated; then equilibrium positions in different scenarios were obtained and finally welfare changes associated with each scenario were measured for both countries. For the Argentine industry, the average price was calculated dividing total firms' sales revenues by the number of vehicles sold, by means of making  $p = V/Q$  where  $Q$  measures output  $q$  plus imports carried out by such companies according to the current automobile industry regime arrangements at that moment. The data employed were obtained from the financial statements. The gross sales margin was defined then as:

$$(3) \quad m = (V-CV)/V$$

where  $CV$  is total variable cost, calculated for each company as the sum of expenses in raw materials and other inputs  $I$  (approximated by purchases less inventory changes), wages and social contributions  $S$  and energy expenses  $E$  as detailed in their financial statements. The marginal cost  $CM$  (which is supposed constant and consequently equal to the average cost) was then estimated by dividing numerator and denominator by the units sold, that's to say  $m = (V-CV)/V = (p-CM)/p$  since  $CV = CM \cdot Q$  which by rearranging yields:

$$(4) \quad CM = p \cdot (1 - m)$$

Fixed costs  $F$  were calculated by subtracting both total variable costs and recovered costs from total expenses, and adding then the opportunity cost of capital, estimated by applying a ten percent rate of return on the companies' equity capital<sup>8</sup>. Finally, frontier prices  $p^*$  were obtained by dividing automobile imports CIF value by quantities, the elasticity of demand was supposed equal to -1.5 and the parameter  $k$  was calculated as  $(1.2)^9$ .

For the Brazilian industry the average price was calculated by dividing sales revenues in the domestic market by the number of vehicles sold (obtained by adding output to the imports and subtracting then the exports). In contrast to the previous case, the lack of detailed information compelled the calculation of a gross sales margin for all the industry by doing  $m = -H/e$ , where  $H$  is the Herfindahl concentration index and  $e$  the automobile demand elasticity<sup>10</sup>. The marginal cost was then obtained making use of that result along with expression (4). Total fixed costs were estimated by subtracting net profits from gross benefits  $(V-CVT)$  and adding the opportunity cost of capital<sup>11</sup>.

### *Empirical results*

The data employed and the results obtained for the *Argentine automobile industry* are shown in the first column of the upper part of Table 2. It can be observed there that in 1994, 116 thousand vehicles competitive with national production have entered the country (a result obtained by subtracting from the 150 thousand imported units the 34 thousand ones exported by the three companies considered). Furthermore, they produced 391 thousand units at a cost of \$10.9 thousand each, selling them at an average price of \$13.6 thousand. Their total revenue was \$5,952 billion, the variable costs \$4,752 billion and the fixed ones \$908 million,



which yielded economic benefits of \$292 million. At the same time, the on-border imported vehicle average price was \$10.7 thousand each.

With those data, prices, output and the number of companies were then calculated, solving the model under three alternative scenarios. The first supposes that firms behave in a collusive manner, which implies a monopolistic behaviour; the second that they react as the Cournot model predicts, and the last one that they are price takers, assuming that the market stands as a competitive structure. A common additional assumption is that import quotas are doubled in all cases and therefore increase to 232 thousand annual vehicles. The results obtained are presented in the last three columns of Table 2.

Table 2  
**Argentine automobile industry**  
*Trade restrictions, markets and welfare - 1994*

| Concept                              | <i>Initial Situation</i> | <i>Oligopoly</i> |         |                    |      |       |      |
|--------------------------------------|--------------------------|------------------|---------|--------------------|------|-------|------|
|                                      |                          | Collusion        | Cournot | <i>Competition</i> |      |       |      |
| <i>Market conditions</i>             |                          |                  |         |                    |      |       |      |
| Average price (thousand of US\$)     | 13.630                   | 15.5             | 13.0    | 10.9               |      |       |      |
| Marginal cost (idem)                 | 10.882                   | 10.9             | 10.8    | 10.9               |      |       |      |
| Domestic output (thousand of units)* | 391.481                  | 187              | 315     | 479                |      |       |      |
| Imports (idem)**                     | 116.073                  | 232              | 232     | 232                |      |       |      |
| Total supply (idem)                  | 507.554                  | 419              | 547     | 711                |      |       |      |
| Number of firms                      | 3                        |                  | 2       |                    |      |       |      |
| <i>Economic Welfare (W)</i>          |                          |                  |         |                    |      |       |      |
|                                      | Millions of US\$         | DW               | %       | dW                 | %    | dW    | %    |
| Consumer surplus                     | 13,836                   | -856             | -6.0    | 353                | 2.5  | 1,649 | 11.5 |
| Firms' profits                       | 168                      | -215             | -1.5    | -168               | -1.2 | -168  | -1.2 |
| Government tax collection            | 341                      | 772              | 5.4     | 185                | 1.3  | -297  | -2.1 |
| Total economic welfare               | 14,344                   | -299             | -2.1    | 370                | 2.6  | 1,184 | 8.3  |

Notes: \* Autolatina produced 108 thousand units, Ciadea 105 and Sevel 179 and from those totals they exported 17, 6 and 11 thousand, respectively. \*\* These firms imported 21, 10 and 14 thousand vehicles.

The first column, which corresponds to the collusive behaviour, shows that the price is higher than its initial level, total supply is lower (\$15.5 thousand and 419 thousand units respectively) and there is a substitution of national by foreign production, since imports increase while local output drops. This smaller scale affects the revenues, costs and benefits of the whole sector. Whereas the first two fall, profits become initially negative due to the greater relative importance of fixed costs.

The new equilibrium position of the Cournot model presented in the next column provides both a relatively lower average price than the initial case and a smaller local output;

but when considered along with greater imports, it increases total market supply by something smaller than one tenth. That equilibrium position is associated with a decrease in the number of firms, a result that was seemingly foreseeable from the moderate scale of the companies, and because domestic prices are clearly higher than international ones. The revenues and costs also fall, although to a lower extent than in the previous case, and economic profits disappear.

The results for the last scenario, where the companies behave as if they were in a competitive market, show that the vehicles' prices drop by a fifth, a proportion considerably greater than in the previous case, because they are equalized to the marginal costs. The output increases, and so does the size of the market but by forty percent. In this scenario both total revenues and costs increase, and companies obtain only normal profits.

The first column of the bottom part of Table 2 presents the level of economic welfare that corresponds to the initial situation of the industry, whereas the following three show the changes that it would experience in the new equilibrium conditions considered under each scenario. The initial economic welfare is \$14.3 thousand million; \$13.8 thousand million represent the consumers surplus, \$168 million are the firms' economic benefits and \$341 million account for government revenues and the importers' rents<sup>12</sup>. In the adjacent columns it can be seen that, according to the market organisations considered, economic welfare not only changes in the opposite direction but also does so with differing intensity.

Under the extreme case of perfect collusion, welfare would reduce by only 2.1% (\$299 million), a change which is associated with a fall in consumers surplus and in producers' profits but with an increase in government revenues. If companies show a behaviour as predicted by the Cournot model, welfare would be 2.6% greater but this change, while benefiting the government and consumers, would also eliminate firms' profits. Better results would be achieved, however, if the market were approximated to a competitive scenario, in which case welfare would increase by 8.3% and consumers surplus would grow in the same way but by more than a tenth, whereas government income would decline because domestic prices approximate international ones, and firms would no longer achieve economic benefits.

The first column of the upper part of Table 3 presents the data and the results that corresponds to the *Brazilian automobile industry*. As it can be seen there, the industry produced 1.735 million vehicles at a cost of \$11 thousand per unit and sold them at a price of \$13.5 thousand; it exported 282 thousand and imported 138 thousand units at an average price of \$10.3 thousand. Their revenues were \$23.4 billion, their total fixed and variable costs \$19.0 and \$3.2 respectively, and their economic benefits \$1.2 billion. The prices and the equilibrium output levels presented in the three last columns of the upper part of Table 3 were

then estimated considering the same scenarios, but assuming that import quotas after the liberalization episode are set at one third of the 1996 domestic production level.

In the first scenario, which supposes collusive behaviour, the price increases to \$19.8 thousands while both output and total supply drop in spite of greater imports; the total revenues and costs fall, but the latter to a larger extent than the former, thus increasing economic profits. In the second, where companies behave as predicts the Cournot model, the price and output are lower than the initial levels but total supply is higher; this new market equilibrium is associated with a smaller number of firms and with a fall in total revenues, costs and profits. In the last scenario, where companies behave as if they were in a competitive market, the output and supply increase but the price falls, reducing revenues and increasing costs on the one hand, while preventing economic benefits on the other.

Table 3  
**Brazilian automobile industry**  
*Trade restrictions, markets and welfare - 1996*

| Concept                           | Initial Situation | Oligopoly |         |             |      |      |      |
|-----------------------------------|-------------------|-----------|---------|-------------|------|------|------|
|                                   |                   | Collusion | Cournot | Competition |      |      |      |
| <i>Market conditions</i>          |                   |           |         |             |      |      |      |
| Average price (thousand of US\$)  | 13.537            | 19.8      | 12.8    | 10.9        |      |      |      |
| Marginal cost (idem)              | 10.968            | 10.9      | 10.9    | 10.9        |      |      |      |
| Domestic output (thousand units)* | 1,735             | 601       | 1,444   | 1,885       |      |      |      |
| Imports (idem)**                  | 138               | 578       | 578     | 578         |      |      |      |
| Total supply (idem)***            | 1,590             | 897       | 1,740   | 2,181       |      |      |      |
| Number of firms                   | 4                 |           | 3       |             |      |      |      |
| <i>Economic welfare (W)</i>       |                   |           |         |             |      |      |      |
|                                   | Billions of US\$  | DW        | %       | dW          | %    | dW   | %    |
| Consumer surplus                  | 43.1              | -7.5      | -16.7   | 1.3         | 2.9  | 4.8  | 10.7 |
| Firms' profits                    | 1.2               | 0.9       | 1.9     | -1.3        | -2.8 | -1.3 | -2.8 |
| Government tax collection         | 0.5               | 5.1       | 11.4    | 1.0         | 2.2  | -0.1 | -0.1 |
| Total economic welfare            | 44.8              | -1.5      | -3.4    | 1.1         | 2.3  | 3.5  | 7.8  |

Notes: \* Fiat produced 540 thousand units, Ford 137, General Motors 443 and Volkswagen 615 and from those totals they exported 100, 22, 73 and 87 thousand, respectively. \*\* These firms imported 9, 60, 13 and 57 thousand vehicles. \*\*\* These firms also exported 282 thousand units.

The bottom part of Table 3 shows the initial welfare levels and its changes in each scenario. In the first one, which assumes a collusive behaviour, welfare would be reduced by 3.4% as a consequence of a significant fall in consumer surplus, a moderate rise in industry economic profits and an important increase in government tax collection. In the second scenario, economic welfare would be increased by 2.3% but this change, while benefiting the government and consumers, would eliminate firms' benefits. In the last one, where a

competitive behaviour is assumed, welfare would increase by 7.8% along with the consumer surplus, but the industry's economic profits would disappear and government revenues drop.

In spite of their simplicity, those results carry some messages regarding the consequences of intervention that are worth to summarise. On the one hand, they suggest that reduction of the QR on vehicles imports in both Argentina and Brazil: (i) could affect national economic welfare (in a significant way for the consumers), (ii) but that the direction as well as the extent of that changes depend on the structure that in fact characterises the market and (iii) for that reason, a considerable improvement in economic welfare could be achieved only if market behaviour is approximated to competitive structures. On the other, those evidences would also be contradicting those who sustain that free trade remains as a useful rule of thumb under imperfect international markets, because if the last scenario is excluded, the negative impact that import quotas have on welfare does not seem significant.

### **Summary and conclusions**

The increasing importance of market imperfections, the growth of intra - industrial trade, and the finding that in a second best situation intervention can increase welfare instead of reducing it, have much stimulated the development of a new body of international trade theory that provides strong arguments in favour of active commercial policies. Although this approach changes the government role, its recommendations should be handled with care because commercial policies can have opposite effects on efficiency and equity grounds to those which are expected and they can generate costly trade conflicts or even provide trivial benefits.

In spite of those limitations this study attempts to measure the changes in prices, activity level and economic welfare that would cause the progressive elimination of current import quotas that protects the automobile industry of the Mercosur countries, with the aim of measuring the economic cost of that commercial policy. Employing a simple Cournot oligopolistic model that simulates changes in market conditions induced by a reduction of current import quotas along with data on production, prices and costs, it finds that the magnitude of the impact varies depending on firms' behaviour.

If they act in a collusive manner, prices would increase (slightly in the first country but significantly in the second), local production would be considerably reduced and the share of

imported vehicles in total supply would grow. If, on the other hand, companies behave as the Cournot model predicts, the price would practically remain unchanged and therefore local production would be expected to fall slightly, supply would increase at the rate of imports, and the number of firms would be reduced in both Argentina and Brasil. Finally, if local producers behave as if markets were competitive, prices would drop and production would grow, but in some clearly higher proportions than before.

The analysis of the impact on economic welfare suggests, furthermore, that the QR reduction could affect it in an opposite way, depending on the structure of the market. A moderate decline would be experienced in both countries in presence of perfect collusion, a small increase if a behaviour as predicted by the Cournot model exists, and a considerable profit in both markets in a context of the competitive type. Consumers would be the most affected and their surplus would be modified in the same sense; that of the firms would fall in all cases in the first country but would increase in the second in the collusive scenario, and that of the government would improve in the first two cases and would worsen in the last.

Consequently, those results do not seem sufficient to reinforce the impression that free trade by itself is the best commercial policy recommendation in these markets, because intervention costs are not important in the scenarios that suppose concentration, or because benefits that could be obtained in the last, though considerable, assume a behaviour that does not seem to characterise the automobile industry. However, the specific characteristics of the model employed in conjunction with several predictions of the new international economic theory which suggest that such strategy is rarely an optimum, point out the need of advancing in theoretical developments as well as in empirical testing.

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## Notes

<sup>1</sup>J.A.Delfino and M.E.Delfino are Professors at Universidad Nacional de Cordoba and Universidad Blas Pascal, respectively. G.Ordóñez under the direction of the other authors carried out some of the required computations.

<sup>2</sup> In industrial countries, intervention is aimed at protecting industries that generate technological externalities, since their development eases that of other related activities; in those cases the importance of R&D expenditure seems to require intervention in order to prevent the fragmenting of the market from risking the benefits for the innovative firm and consequently its incentives to create new levels of knowledge. The same argument tends to use the least developed countries to promote their incipient industries; since part of the benefits that derive from that spending favour other companies (imitations cost less, labour mobility reduces investments in human capital and the employment of inputs induced by innovative companies avoids experimental costs), it is probable that without intervention their levels will be inferior to the optimum.

<sup>3</sup> The government would select them with care and analyse carefully the impact that its intervention could have, since the advantages of commercial policy fade when the support given to some sectors prejudices others.

<sup>4</sup> They face the prisoners' dilemma: none of them wishes to eliminate intervention unilaterally because doing so would make it lose, though everyone would benefit if they all did it in a cooperative manner. To avoid those consequences, clear behaviour and easy monitoring rules should be established. In that case free trade is a good alternative, since it is simple to prove if a country establishes import quotas, for example.

<sup>5</sup> The Argentine commercial restrictions are based on the 21,931 law of 1991 that in general (i) demands an equilibrated commercial balance to the automobile industry on the one hand and (ii) establishes import quotas for final users, distributors and carriers that vary among 10 and 15% of the programmed output, on the other. In Brazil, the federal laws 9,494 (general regime) and 9,440 (regime for the north, northeast and central west regions) establish also a compensated regime (because annual imports with duty reductions of rights can not surpass the exports of the last year) and establish a 50 thousand vehicles by year quota for the terminal not based imports of Japan, Korea and the European Union (though for representatives, distributors and individuals does not establish quotas, as much as pays a duty of the order of seventy percent).

<sup>6</sup> This result comes from the benefits maximisation first order conditions  $\pi = p(X)x_i - c_i(x_i)$ . If market were competitive  $s_i$  would be 0 and  $p = CM$  and if it were a monopoly 1, and consequently  $IM = CM$ .

<sup>7</sup> It was also reached by a duty of 22%, the 'statistics rate' of 10%, other expenses that would fluctuate in a similar proportion, and the value added tax of 18%.

<sup>8</sup> Recovered cost were obtained by adding other net incomes, controlled society benefits and permanent investment net profits, and total expenses are those as presented in the Annex H of the financial statements.

<sup>9</sup> That value comes from a quickly demand estimation accomplished employing a partial adjustment model of the type  $Q_t - Q_{t-1} = \delta (Q_t^* - Q_{t-1})$ , where  $Q_t^*$  is the planned consumption in period  $t$ ,  $Q_t$  the observed and  $\delta$  the adjustment parameter. Supposing that the first depends on the product price and the consumers incomes, that is  $Q_t^* = \alpha_0 + \alpha_1 P_t + \alpha_2 Y_t$ , and by replacing that expression results  $Q_t = \beta_0 + \beta_1 P_t + \beta_2 Y_t + \beta_3 Q_{t-1}$ . This function was estimated by ordinary least squares in the logarithms of the variables and with data for the period 1970 - 1994. The automobile sales and the average prices were obtained from ADEFA (1994), while the income per capita was calculated relating the GDP, obtained from the Secretaría de Programación Económica (1997) and Domenech (1986), to the total population. The long run price elasticity is  $\alpha_1 = \beta_1 / (1 - \beta_3) = -1.5$ .

<sup>10</sup> That result is obtained multiplying and dividing (1.1) by  $q_i$  and  $Q$  and then summing, that's to say:  $(\sum_i p q_i - \sum_i CM_i q_i) / p Q = - \sum_i (s_i q_i / e Q) = (p Q - CVT) / p Q = - \sum_i s_i^2 / e$  since the marginal cost is supposed constant and equal to the average, and where  $s_i$  is the share of the  $i$ -th company on the total supply (obtained by dividing the produced and imported units by the totals), and  $H = \sum_i s_i^2$ . Elasticity was supposed equal to  $-1.5$ , as in Argentine.

<sup>11</sup> This opportunity cost, along with the frontier prices and the parameter  $k$ , was obtained according to the same procedure adopted for the Argentine case.



<sup>12</sup> The profits of the whole industry are greater, because \$124 million provided by the imported vehicles sold should be added to them, increasing total benefits to \$292 million.