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BARRIERS TO ENTRY IN MONOPOLY MARKETS: AUTOMOBILE DISTRIBUTION IN BRAZIL

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BARRIERS TO ENTRY IN MONOPOLY MARKETS: AUTOMOBILE DISTRIBUTION IN BRAZIL

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RESUMO

O objetivo deste trabalho é analisar os efeitos da entrada de uma segunda concessionária de automóveis em mercados previamente monopolizados. Para tanto, construiu-se um banco de dados com a localização de concessionárias de automóveis em microrregiões e características demográficas e econômicas destas microrregiões. A partir desse banco de dados e de modelos de escolha binária, foram identificadas variáveis que condicionam a existência e o número de concessionárias em microrregiões. Utilizando-se de um modelo adaptado de Bresnahan e Reiss (1990), foram estimados os custos fixos de entrada de concessionárias em mercados monopolizados. Os resultados obtidos sugerem que as barreiras à entrada não são significativas, o que aumenta a probabilidade de que a cláusula de exclusividade nos contratos de concessão não cause danos à concorrência no mercado brasileiro de distribuição de automóveis.

PALAVRAS CHAVES

Defesa da Concorrência, Restrições Verticais, Barreiras à entrada, Distribuição de Automóveis

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CLASSIFICAÇÃO JEL

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ABSTRACT

This paper investigates the effects of new automobile dealers' entry in previously monopolized markets. To do so, we have used data on both the location of automobile dealers, and automobile demand and supply variables. First, we identify relevant variables which influence the existence and the number of automobile dealers in a geographical area. Then, using a model adapted from Bresnahan and Reiss (1990), we estimate the fixed costs of auto dealers and the marginal effect of the market size on the variable profit. The estimated results suggest that the fixed costs of entry of a second automobile dealer seem to be significantly lower than the fixed costs of entry of the first one and that the increase in the profit margin resulting from product differentiation more than offsets its decrease resulting from competition. This conclusion increases the probability that the clause of exclusivity present in concession contracts does not harm the competition in the Brazilian automobile distribution market.

KEY WORDS

Antitrust, Vertical Restrictions, Barriers to Entry, Automobile Distribution

1. Introduction: objective and recent history of the relationship between auto dealers and manufacturers.

This paper investigates the existence of possible barriers to entry imposed on a second dealer in markets monopolized by a dealer of a specific brand, based on a model adapted from Bresnahan and Reiss (1990) and on a database especially constructed for this exercise.

During the nineties, we have witnessed a growing tension between auto manufacturers and retail dealers in Brazil, which resulted in a preliminary investigation by the Brazilian antitrust authority, CADE,[1] about manufacturers' allegedly restrictive practices imposed on the dealers.[2] According to Graph 1, the number of auto-dealers in Brazilian market increased from 2,604 in 1990 to 2,996 in 1997, then decreased to 2,646 in 2004; the ratio between domestic wholesales and the number of auto dealers increased from 274 in 1990 to 649 in 1997, then decreased to 597 in 2004.[3]

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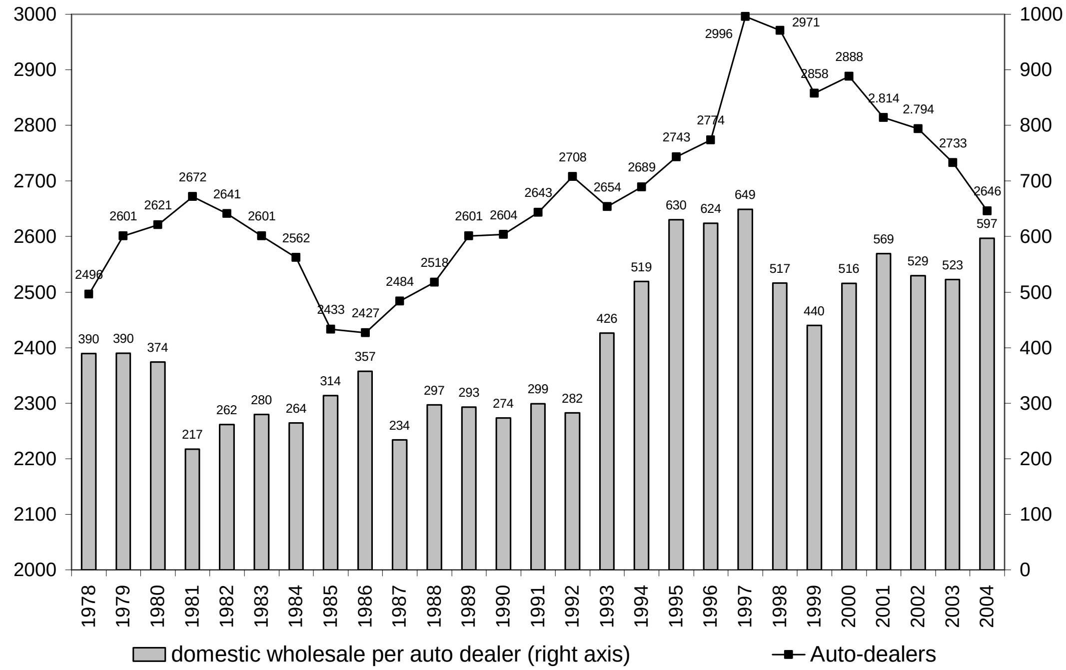
[1] CADE, the Brazilian antitrust agency, stands for the Portuguese acronym of Administrative Council for the Economic Defense.

[2] It is the preliminary investigation no. 08012.000487/00-40, of 2001. Please see Andrade and Alves (2001).

[3] ANFAVEA, 2005.

Graph 1: Brazil, number of auto-dealers and domestic wholesales per auto-dealers, 1978-2004.



Source: based on ANFAVEA's data (ANFAVEA, 2005)

This tension can be associated to changes in the automobile retail business environment, which was influenced by a combination of two factors. The first is the technological development of automobiles, which reduced the importance of after-sales service and increased the economies of scope; the second is the advent of new information technologies, which among other innovations enabled sales over the internet[4]. In Brazil, we have two additional factors. One is the revision of the Automobile Distribution Law (also known as "Renato Ferrari Law") in 1990,[5] which intended to allow more intraband competition among dealers, and the other is the arrival of

[4] Please see, among others, the reports prepared by Price Waterhouse & Coopers (1999), McKinsey and The Economist Intelligence Unit (2000), and the Consumer Federation of América (Cooper, 2001 and 2002). In Brazil, please see also Arbix and Veiga (2003).

[5] Law no. 6279/1979, named after the congressman Renato Ferrari, altered by Law no. 8132/1990

new auto makers in the second half of the 90s, which tended to increase both intrabrand as well as interbrand competition.[6]

Among other changes, the 1990 revision of the Ferrari Law revoked Article 14, which fixed the dealers' margins; in Article 5, which governed dealers' activities, it replaced the term "assigned region" with the term "operating area", in practice allowing consumers to buy their new vehicles wherever they wished; on the other hand, the 1990 revision preserved the principle of exclusive distribution, which prohibited dealers from selling new autos manufactured by other makers (Article 3). Also, the partially changed Article 5 of the Ferrari Law has maintained "minimum distances between dealers of the same maker, established according to market potential criteria". In the USA, the pertinence of these two vertical restrictions – exclusive distribution and territory restriction – still imposed by some states, has been challenged by some consumer organizations.[7]

In addition to this introduction, this paper is organized into four other sections. The second one briefly describes empirical studies of vertical competition issues found in automobile distribution. The third one discusses the Bresnahan and Reiss (1990) model. The fourth section describes the database constructed for this paper and brings estimated results for the Brazilian market. Finally, the last section summarizes the main conclusions and discusses the implications and limitations of the findings.

2. Vertical restrictions in automobile distribution: a summary of some empirical studies.

Among empirical studies on the competition aspects associated to automobile distribution and to the relationship between dealers and manufacturers, one can find the classic study carried out by B. P. Pashigian (1961), *The Distribution of Automobiles, an Economic Analysis of the Franchise System*, and *Two Studies in Automobile Franchising*, by H. O. Helmers, C. N.

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[6] Goldbaum (2005).

[7] Cooper, 2001 and 2002.

Davisson and H. F. Taggart (1974). More recently we have *Franchise Regulation: an Economic Analysis of State Restrictions on Automobile Distribution*, by Richard L. Smith II (1982); *The effect of State Entry Regulation on Retail Automobile Markets*, by R. P. Rogers (1986); and two studies by T. Bresnahan and Peter C. Reiss: *Dealer and Manufacturer Margins*, of 1985, and *Entry in Monopoly Markets*, of 1990.

The Pashigian (1961) study is the most comprehensive. In addition to describing the relationship between dealers and manufacturers from a theoretical standpoint and detailing the auto distribution industry in the USA, the author suggests instruments to estimate the form of the dealers' long-term cost function, in order to measure the occurrence of economies of scale in this activity. According to this author, knowing the extent of the economies of scale in automobile distribution would help establish, at least in part, the number of dealers that could operate in a given market, and consequently help us find out if competition among established dealers would take place on a price or non-price basis (e.g., services). Most importantly, it would also help to measure how open the industry would be to an arriving manufacturer. To determine how quantitatively important are barriers to entry represented by economies of scale in distribution, the author suggests a method to measure the relationship between the unit costs incurred by dealers selling vehicles and by manufacturers manufacturing them.

Pashigian (1961) concluded that economies in distribution apparently extended beyond the point where economies of manufacturing had been exhausted, which would mean a substantial barrier to entry for new manufacturers.[8] When faced with the argument that new manufacturers (such as Volkswagen and Renault) enjoyed an easy and successful entrance into the US market in the late 50s and early 60s, a development which would disprove his analysis,

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[8] "Most authorities believe that production economies are exhausted once 600,000 units are produced. (…) Economies in distribution cost extend well beyond the optimum production unit. A company with 30per cent of the market has not yet completely realized all distribution economies. (…) A large part of the distribution economies are exhausted once sales reach 600,000 units. A new entrant retailing a low price auto, is not likely to be at a serious distribution cost disadvantage compared to larger producers once sales have been increased to 600,000 units. However, this represents 10 per cent of the market. It is unlikely a new entrant will succeed. (…) With the existing attachments of consumers to existing makes, it is unlikely a new entrant will be able to break into the low price market and boost sales to 600,000 units in any short period" (Pashigian, 1961, p. 263).

the author simply replied that the US manufacturers at that time had not perceived a change in the tastes of domestic consumers (Pashigian, 1961, p. 240).

Smith II (1982) describes the dealer system used for auto distribution in the USA in the early 80s, pointing out the manufacturers' need to control distribution. The author also built a model to test the hypothesis that government regulation tended to give existing dealers power over the local market by protecting them. To do so, Smith II (1982) estimated the optimum number of dealers per state, considering aspects that affected demand (such as the number of driver licenses, per capita income, driver density in the region, and unobservable license price) and supply (including, among other variables, those representing regulatory restrictions of the different US states), from 1954 to 1975. The author's analysis suggests that government regulation apparently increased the dealers' market power, to the loss of consumer welfare.

Bresnahan and Reiss (1985) describe some "intriguing questions" seen in the US industry, such as the fact that the ratio between dealer margins and manufacturer margins is independent of the size of the vehicle and its price-elasticities and cross-elasticities. Based on the analysis of successive monopolies, the authors show that the ratio between the dealers' and manufacturers' margins is equal to the ratio between the slopes of the dealers' and manufacturers' demand curves. Bresnahan and Reiss (1985) defend four propositions:

i. In a price arrangement between the manufacturer and the dealer, involving only one product, if the demand curve is strictly convex (concave), the dealer's margin on unit costs will be greater (lesser) than half the manufacturer's margin.

ii. In a one-product price arrangement between the manufacturer and the dealer, the ratio between the dealer's and the manufacturer's margins is equivalent to the change in the dealer price when the manufacturer changes the wholesale price (the dealer's unit cost), or when the dealer's sale cost changes, i.e., $\frac{P^*-(w^*+s)}{w^*-m}=\frac{\partial P^*(w)}{\partial w}=\frac{\partial P^*(s)}{\partial s}$

iii. If the demand quantity-elasticity is the same for all products, and their demands are independent, (i.e., $P_i = D_i(Q_i)$), the ratio between the dealer's and manufacturer's margins is the same for all *i*.

iv. Finally, in a multi-product price arrangement between the manufacturer and the dealer, the ratio between the dealer's and manufacturer's margins for each product is determined by the quantity-elasticity of the demand curve η_i[9]. If the demand system is linear, the dealer's margins will be half of the manufacturer's margins for each product. If a proportional increase in all quantities raises the weighted impact of Q_i on the prices of all products, then the dealer's margin on the product *i* will be greater than half the manufacturer's margin.

Using data on production costs, wholesale prices, and resale costs and prices, the authors point out that more expensive models are subject to both greater discounts, on a percentage basis, as well as substantially wider margins. The authors conclude that the dealers' margins are proportional to the manufacturers' margins for the whole product line, and that we cannot reject the hypothesis that the ratio between the margins is equivalent to one half, a situation that implies demand locally linear curves.

Bresnahan and Reiss (1990) bring an empirical model of market concentration developed from an entry model based on the theory of games. The empirical model is built on inequality conditions that describe equilibrium strategies for entrant firms in simultaneous or sequential games. Such conditions are used to describe the entry into isolated monopoly markets. Based on estimations of the market size necessary to house one or two dealers, the authors conclude that monopolist dealers do not represent barriers to the entry of a second dealer. Moreover, the authors find that the entry of a second dealer does not provoke a significant decrease in the price-cost margin. The following section describes in more detail the model developed by the authors.

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[9] η_i is not the slope of the demand curve, but rather a local measure of the curvature of the dealer's demand curve, with a zero value when the demand does not have a curvature (i.e., linear demand) and constant value when the demand has the form of $P = a + bQ^c$, with *a, b* and *c* constant.

3. The Bresnahan and Reiss (1990) model for entry in monopoly markets

The model for entry in monopoly markets developed by Bresnahan and Reiss (1990) is based on the theory of games, and is adapted from the individual qualitative choice model for firms whose profits and costs are not observable. The main idea is that a potential entrant firm will only actually enter a monopoly market if it expects duopoly positive profits. Unlike individual models, the decisions taken by firms entering a market are interrelated and their profits depend on the decisions of the other competitors.

The authors assume the following demand function:

$$Q_i = D_i(Z,P)S(Y) \quad (1)$$

where $D_i(Z,P)$ is the demand of a representative consumer for the product *i*. The scalable variable *S* represents the number of representative consumers, *Z* represents the market conditions, and *P* the price of the good *i*. Note that *Z* does not include *S*, which means that the size of the market does not affect consumer preference. The size of the market, in turn, is a function of *Y*, which represents demographic variables.

On the cost side, the authors assume:

$$C_i(Q_i,W) = c_i(W)Q_i + F_i(W) \quad (2)$$

where Q_i represents the unit sales of firm *i*; $c_i(W)$, the variable costs (in which the marginal cost is constant); the vector *W*, exogenous variables that affect the costs (such as raw material prices); and $F_i(W)$, the fixed costs. Inverting the demand function, one can obtain the following profit function of the potential entrant firm *i*, which depends on its production and the production of its competitors.

$$\Pi_i = [P_i(Z,Q/S) - c_i]Q_i - F_i \quad (3)$$

For monopolies and most duopoly models, the profit, in equilibrium, increases linearly in *S*. Therefore:

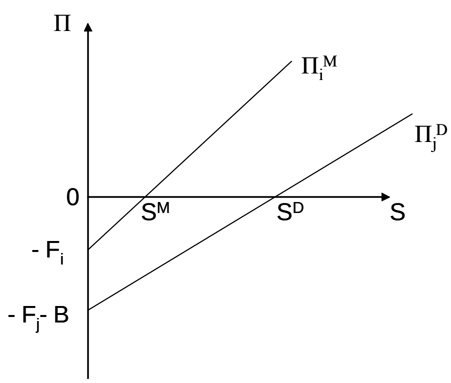
$$\Pi_i^N = \left[P_i^N(Z,W) - c_i(W)\right]D_i^N(Z,W)S(Y) - F_i(W)\text{, or}$$

$$\Pi_i^N = V_i^N(Z,W)S(Y) - F_i(W) \tag{4}$$

where *N* denotes monopoly (*N*=*M*) or duopoly (*N*=*D*).

Figure 1 compares the market structure, defined by the profit of the monopoly or duopoly, to the size of the market. The curves define, in the horizontal axis market sizes that do not support any firm (between *0* and S^M), one monopoly firm (between S^M and S^D) and two duopoly firms (to the right of S^D). In this figure, S^D is on the right of S^M because the firm *j* has higher fixed costs and lower profits per buyer than firm *i*. Such increase in the fixed cost is the equivalent to including barriers to entry *B*.

Figure 1: Profit as a function of market size.



Source: Bresnahan e Reiss (1988)

While profits are not observable, the S^D and S^M break-even levels are. At S^M, the monopolist's profit is zero. That is, starting from equation (4):

$$S^M = \frac{F_i}{\left(P_i^M - c_i\right)D_i^M} \tag{5}$$

Assuming that the barriers to entry faced by a potential entrant meant firm *j*'s marginal cost increase of *b*, and fixed costs increase of *B*, the size of the market that brings zero profit to the duopolist is the following:

$$S^D = \frac{F_i + B}{\left(P_j^D - c_j\right) D_j^D} \tag{6}$$

Comparing both levels of demand, we have:

$$\frac{S^M}{S^D} = \frac{\left(P_j^D - c_j - b\right) D_j^D}{\left(P_i^M - c_i\right) D_i^M} \cdot \frac{F_i}{F_j + B}$$

The first term on the right side of the equation provides V^D/V^M, i. e., the ratio of the derivatives of the duopoly and monopoly profits in relation to the size of the market *S* (variable profits).

$$\frac{V^D}{V^M} = \frac{\partial \Pi^D / \partial S}{\partial \Pi^M / \partial S} = \frac{\left(P_j^D - c_j - b\right) D_j^D}{\left(P_i^M - c_i\right) D_i^M} \tag{7}$$

The V^D/V^M ratio decreases if post-entry competition increases *j* (i.e., if the price of the duopoly equilibrium decreases or if the production costs of firm *j* (i.e., c_j+b) increase, which can be estimated based on the qualitative information on the profits of new entrants. Estimating V^D/V^M and S^M/S^D, the ratio of the fixed costs of new entrants:

$$\frac{F^M}{F^D} = \frac{F_i}{F_j + B} \tag{8}$$

can also be estimated.

Summing up, the ratio between the break-even points can be expressed as the product of the inverse ratio of the variable profits and the direct ratio of the entry fixed costs, i.e.:

$$\frac{S^M}{S^D} = \frac{V^D}{V^M} \cdot \frac{F^M}{F^D}$$

which enables us to estimate the ratio between the fixed costs of entry using:

$$\frac{F^M}{F^D} = \frac{S^M}{S^D} \Big/ \frac{V^D}{V^M} \tag{8'}$$

The Bresnahan and Reiss (1990) analysis uses variable profits and fixed costs ratios because the empirical data do not allow us to separately identify the individual components in these ratios.

The entry model described above implicitly assumes a series of assumptions. For example, it does not consider the possibility of the existing monopolist discouraging the entry of new players by reducing the monopoly price when the market size approached S^D – which would imply a less steep slope of the monopolist's profits when S approached S^D. Overall, it omits non-linear pricing strategies and asymmetric information, among other possibilities.

Based on this model, Bresnahan and Reiss (1990) use the firms' equilibrium pay-off functions to formulate equations that describe optimal entry strategies. The entry is modeled as a binary decision that corresponds to two pure strategies: $I_i = 1$, if the firm enters, e $I_i = 0$, if it does not enter. Two potentially entrant firms face each other in a one-round game, in which each firm knows the strategies and payoffs of its respective competitors. The entry decision of firm 1 depends on the entry decision of firm 2, and vice-versa. Both act in a non-cooperative manner, in two possible situations, when decisions are simultaneous and when they are sequential. However, in this paper we will only detail the situation of simultaneous decisions.

a. Simultaneous decisions

The pair I^*_1 and I^*_2 forms Nash's pure strategy equilibrium if

$$\Pi_1\left(I_1^*, I_2^*\right) \geq \Pi_1\left(I_1, I_2^*\right), \text{ for } I_1 \in \{0,1\}, \text{ and}$$

$$\Pi_2\left(I_1^*, I_2^*\right) \geq \Pi_1\left(I_1^*, I_2\right), \text{ for } I_2 \in \{0,1\}. \qquad (9)$$

If a firm earns zero profit when opting for $I = 0$, then its optimum entry strategy will be the following:

$$I_1^* = 0 \Leftrightarrow \left(1 - I_2^*\right)\Pi_1^M + I_2^*\Pi_1^D < 0, \text{ and}$$

$$I_0^* = 0 \Leftrightarrow \left(1 - I_1^*\right)\Pi_2^M + I_1^*\Pi_2^D < 0. \qquad (10)$$

That is, a firm will decide to enter if, and only if, the profit of the monopoly or profit of the duopoly are less than zero.

Table 1 describes the other pure-strategy solutions, considering only that the duopoly profits cannot be greater than those of the monopoly.

Table 1: Results of pure strategy in a game of simultaneous decisions

$\Pi_1^M < 0$, $\Pi_2^M < 0$	No entrant
$\Pi_1^D > 0$, $\Pi_2^D > 0$	Duopoly
$\Pi_1^M > 0 > \Pi_1^D$, $\Pi_2^M > 0 > \Pi_2^D$	Monopoly of firm 1 or 2
$\Pi_1^M > 0$, $\Pi_2^D < 0$	Monopoly of firm 1
$\Pi_1^D < 0$, $\Pi_2^M > 0$	Monopoly of firm 2

Source: Bresnahan and Reiss (1990)

Following Bresnahan and Reiss (1990), the first line of the table describes a situation in which no entry takes place; the second shows one in which two firms enter. The last three lines describe monopoly situations, the last two implicitly including the condition "and not any of the previous events"; the third line shows a situation in which there is no single result of pure strategy.

The presence of non-unique equilibria in theory of games models prevents the use of the standard qualitative choice models to model the entrants' profits. To get around this problem, the authors reinterpreted the model, to include $N = I_1 + I_2$, the number of entrants. Thus, the last three lines of the table represent a single result, $N = 1$.

b. Treatment of unobservable data

On the other hand, to get around the problem of neither earned profits nor expected profits being observable, the authors model the firms' profits as unobservable random variables, adding an error term in the equilibrium profit function (4). Specifically, the profit of the Nth entrant's profit has the following form:

$$\begin{aligned}\Pi_i^N &= V_i^N \cdot S(Y) - F_i^N \\ &= \left[\overline{V}_i^N + \eta_i^N\right] \cdot S(Y) - \overline{F}_i^N - \varepsilon_i^N \\ &= \overline{\Pi}_i^N + \xi_i^N\end{aligned} \tag{11}$$

in which variable profits are equivalent to the sum of a measurable profit component $\overline{V}(\cdot)$ and an unobservable component η. Similarly, fixed costs have a measurable component $\overline{F}$ and an error term ε.

In the econometric models the authors developed, the stochastic structure of (11) was restricted because of computational and economic conditions. For example, to prevent duopoly profits from exceeding the monopoly profits with a positive probability. The authors developed three models: (i) perfectly correlated unobservable profits; (ii) correlated errors; and (iii) monopoly and duopoly errors not perfectly dependent. In this paper we opted to detail only the first model, that in which the unobservable profits are perfectly correlated. This model presupposes that all potential entrants have the same fixed costs and unobservable variable profits, i.e.: $\varepsilon_1^M = \varepsilon_1^D = \varepsilon_2^M = \varepsilon_2^D$ and $\eta_1^M = \eta_1^D = \eta_2^M = \eta_2^D$. Although this error specification implies strong assumptions on the unobservable profit distribution, it presents two advantages. The first is that if the firms only have independent and identically distributed fixed costs, then the firms' profit parameters can be estimated using an ordered probit model. Including an error term in the variable profits, we get a heteroscedastic ordered probit model, in which the variance of unobservable profits, $\sigma_\xi^2 = 1 + \sigma_\eta^2 S^2$, increases with the size of the market.

Thus, the probabilities associated to the observation of markets with no firms, two firms, or one firm are the following:

$$P_0 = 1 - \Phi\left[\overline{\Pi}^M (Z,W,Y)/\sigma_\xi\right]$$

$$P_2 = \Phi\left[\overline{\Pi}^D (Z,W,Y)/\sigma_\xi\right]$$

$$P_1 = 1 - P_0 - P_2 \qquad (12)$$

The model is estimated from equation (4), using data obtained from isolated markets in the USA. The specifications are summarized in equations (13), (14) and (15):

$$S(Y) = TOWNPOP + \lambda(Y) \qquad (13)$$

$$V^N = \theta^M + \theta^D D + Z\theta_Z + W\theta_W, \text{ e} \qquad (14)$$

$$F^N = \gamma^M + \gamma^D D + \gamma_W W \quad (15)$$

Where *TOWNPOP* is the population of the central city, *Y* are the other demographic variables, the superscript *N* can be *M* (monopoly) or *D* (duopoly), *D* is a dummy variable for duopolies, *Z* is a demand conditioner vector, and *W* a supply conditioner vector (costs). The results obtained in the simplest model, which excludes *Y*, *Z* and *W*, are shown in Table 2.

As shown in Table 2, the ratio V^D/V^M measures the fraction by which variable profits per client decrease with the entry of a new firm. When duopolists sell the same product, V^D/V^M should be equal to (in the case of collusion) or less than (in the case of non-cooperative behavior) 0.5. Since the ratio V^D/V^M observed in Brensahan and Reiss (1990) is greater than 0.5, (in this case, V^D/V^M = 0.752), the authors conclude that product differentiation increased the duopoly margin more than competition was able to decrease it. Consequently, "entry by a Ford dealer into a monopoly GM market would not lower a monopoly GM dealer's sales and variable profits by much" (Bresnahan and Reiss, 1990, p. 552).

Table 2: Bresnahan and Reiss (1990), estimations based on the ordered probit model for the number of auto dealers.

Variables	Coefficients	Model (1)	Asymptotic standard error
V-monopoly (V^M)	θ^M	0.933	(3.39)
V-duopoly (V^D)	$\theta^M + \theta^D$	0.702	(5.02)
F-monopoly (F^M)	γ^M	0.536	(1.79)
F-duopoly (F^D)	$\gamma^M + \gamma^D$	1.277	(5.39)
Log likelihood		-123.76	
S^M		575	(188)
S^D		1820	(166)
S^M/S^D		0.316	(0.095)
V^D/V^M		0.752	(0.180)
F^M/F^D		0.419	(0.183)
Log likelihood		-123.76	

Source: Adapted from Bresnahan and Reiss (1990), tables 5 and 8.

In turn, the relation F^M/F^D suggests that the duopoly's fixed costs are relatively larger than those of the monopoly. For a simpler specification, the results of which are shown in Table 2, the duopoly's fixed costs are more than two times larger than those of the monopoly. In the other specifications, the proportion ranged between 1 and 1.5 times, approximately. The authors conclude that although the estimates suggest the duopoly's fixed costs are larger than those of the

monopoly, these costs cannot be attributed to entry barriers. The estimations obtained from the sequential entry model suggested that, unlike the entry order, the fixed costs could vary, say, according to the brand.

4. Barriers to entry in monopoly markets: automobile distribution in Brazil

This section analyzes the existence of barriers to entry into monopoly markets in the Brazilian auto distribution industry. To do so, we organized a database containing the location of all automobile and light commercial vehicles in Brazil in 2004, according to manufacturer and city[10]. This information has been crossed with the municipal characteristics, obtained from 2000 Census micro-data and aggregated into micro-regions, which, considering consumer mobility and production factors, are believed to provide a suitable analysis unit.

The 2000 Census data were considered proxies for the characteristics of the micro-regions existing in 2004. No information on dealer location was found for 2000, and the available data on micro-regions for 2004 were not as detailed as those based on the 2000 Census micro-data.

This analysis is subdivided into three sub-sections. The first analyzes the dealer location determinants in the micro-regions. The second analyzes the dealer number determinants in each micro-regions. The third uses the variables found in the previous sections to investigate the signs of the existence of barriers to entry into the auto distribution industry in Brazil, based on the Bresnahan and Reiss (1990) model.

4.1 Analysis of dealer location determinants in a micro-region.

To analyze the dealer location determinant factors, we built a binary choice model of the following type:

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[10] Data was kindly provided by Fenabrave, the National Automobile Distributor Federation. In the case of Ford, the auto and light commercial vehicle dealers also include truck dealers. Fenabrave updates this information every week. The file that generated this database is from 14 October 2004.

$$P(y=1 \mid x) = G(\beta_0 + x\beta) \qquad \text{(A)}$$

in which the variable *y* assumes the value of zero if no dealers exist in a micro-region, or the value of one, if there is at least one dealer. The independent variable vector ***x*** gathers demographic data, which condition the demand for automobiles and information on the cost of dealer installation in a micro-region.

Alternatively, the model can be read to implicitly assume the latent (unobservable) variable economic profit (y^*):

$$y^* = \beta_0 + x\beta + \varepsilon \ , \ \ y = 1[y^* > 0]$$

The probability of an answer to *y* is:

$$P(y=1 \mid x) = P(y^* = 0 \mid x) = P[e > -(\beta_0 + x\beta \mid x)] = 1 - G[-(\beta_0 + x\beta)] = G(\beta_0 + x\beta) \qquad \text{(B)}$$

which is the same of the model (A). In the logit model, *G* is a logistic function, while in the probit model, *G* is an accumulated standard normal distribution function. Details on the binary choice models are found in Wooldridge (2002), Griffiths et al. (1993) and Cramer (2001).

After preliminary analyses, the best results were obtained with the variables shown in Table 3 below, in which the first two are demographic variables, relative to market size; the next two are supply shifters; and the last three are demand shifters. The main statistics describing these variables are shown in Table 4.

Table 3: Variables used in binary choice models

Variables	Meaning
lnpop_1	Natural log of the urban population of the micro-region's largest city.
lnpop_2	Natural log of the remaining population in the micro-region (i.e., rural population plus urban population of the other cities.
adens	Inhabitants per square kilometer.
custof_rel	Average wage of workers in administrative positions employed in auto retail, divided according to per capital income in each micro-region, in R$. (*)
lny_dom	Natural log of average income per household, in R$.
Theil	Theil's L inequality index, computed for each micro-region.
Age	Average age in each micro-region.

Note: (*) In the micro-regions with no workers employed in administrative positions in the auto retail, we used the average salary of the other workers employed in retail in that industry.

Table 4: Statistics describing independent variables used in binary choice models

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
lnpop_1	558	10.749	1.227	7.626	16.100
lnpop_2	558	14.108	1.055	9.263	18.645
adens	558	886.052	3447.441	2.308	5.773.77
custof_rel	558	5.515	5.960	0.458	55.681
Theil	558	0.537	0.077	0.334	0.852
lny_dom	558	6.572	0.454	5.647	7.735
Age	558	27.620	2.709	19.768	33.800

Source: Based on Census data (IBGE, 2000).

The results of the logit and probit models are shown in Table 5. In this Table we see that the demographic variables and those representing demand conditioners have positive signs, while those representing supply conditioners (costs) have negative signs. Specifically in regard to the *adens* (population density) variable, we believe that it is a proxy for the costs of property where the dealer is located.

Table 5: Results of binary choice models

Variables	Probit				Logit	
	Coeff.	Standard deviation	dF/dx	Standard deviation	Coeff.	Standard deviation
lnpop_1	1.292(***)	0.235	0.358(***)	0,063	2.272(***)	0.427
lnpop_2	0.883(***)	0.235	0.244(***)	0,066	1.588(***)	0.419
custof_rel	-0.014	0.014	-0.0038	0,004	-0.0231	0.024
adens	-0.0002(***)	0.00007	-0.00006(***)	0,00002	-0.0004(**)	0.0001
lny_dom	1.713(***)	0.339	0.474(***)	0,091	2.994(***)	0.606
Theil	3.618(**)	1.453	1.002(**)	0,424	6.624(**)	2.613
Age	0.298(***)	0.047	0.083(***)	0,0142	0.543(***)	0.089
Constante	-46.663(***)	4.570			-83.077(***)	8.800
Log Likelihood	-119.732				-120.524	
Pseudo R^2	0.683				0.680	
N	558				558	

Note: (**) significant at 5%, (***) significant at 1%.

All the variables are significant at 1%, except variables associated to income distribution (at 5%) and to labor (which is significant only at 35%). We also see no major differences between the logit and probit models, regarding the significance of the variables.

The probit model also enables us to compute the marginal effects of the variables on the probability of a dealer occurring in a micro-region. The marginal effects are listed in column *dF/dx*; for example, the column shows that a 1% rise in the share of female population in a micro-

region increases the probability of a dealer existing in the micro-region in approximately 5%. Table 6 shows that correct percentages for both models exceed 90%, and that forecast errors are balanced.

Table 6: Correct percentages of the dealer location models

Probit		Location forecast		Total
		0	1	
Actual Location	0	200	26	226
	1	28	304	332
Total		228	330	558
Correct percentage				90,3%

Logit		Location forecast		Total
		0	1	
Actual Location	0	200	25	225
	1	28	305	333
Total		228	330	558
Correct percentage				90,5%

Source: own elaboration

4.2 Analysis of dealer number determinants in a micro-region.

To analyze the determinants of the number of dealers in a micro-region, we compared the results of two models. The first was a multiple linear regression model (in which the coefficients are computed using the ordinary least squares (OLS) method) and the second with a sample selection correction (Heckit model).

The multiple linear regression model used as regressors a subset of variables identified in the previous section:

$$\ln q = \beta_0 + \beta_1 \ln pop\_1 + \beta_2 \ln pop\_2 + \beta_6 \ln y\_dom + \beta_8 age \qquad \text{(C)}$$

The sample selection correction model used all variables identified in the previous section as variables, and only the variables used in the multiple linear regression model as regressors. The variables "*lnpop_3*", "*custof_rel*", "*adens*" and "*Theil*" were not significant enough to be included as regressors.

$$\begin{aligned} &\ln q = \beta_0 + \beta_1 \ln pop\_1 + \beta_2 \ln pop\_2 + \beta_6 \ln y\_dom + \beta_8 age \\ &s = 1\left[\gamma_0 + \gamma_1 \ln pop\_1 + \gamma_2 \ln pop\_2 + \gamma_3 custof\_rel + \gamma_4 adens + \gamma_5 \ln y\_dom + \gamma_6 Theil + \gamma_7 age\right] \end{aligned} \qquad \text{(D)}$$

The compared results are shown in Table 7:

Table 7: Results of the dealer number determinants per micro-region models

lnq	OLS		HECKIT	
	Coefficient	Standard error	Coefficient	Standard error
lnpop_1	0.256	0.063	0.231	0,063
lnpop_2	0.513	0.068	0.513	0,067
lny_dom	0.626	0.098	0.580	0,100
age	0.070	0.013	0.063	0,013
_cons	-15.166	0.754	-14.334	0,877
sigma			0.475	0,019
Observações	330		558 (330 selec.)	
F	261.610			
R2	0.763			
Log likelihood			-338.160	

Note: All coefficients are significant at 1%.

All coefficients are significant at 1%. Particularly important is the significance of the value of the sigma coefficient, a sign of a problem in sample selection. The coefficients of the variables "*lnpop_1*" and "*age*" are those whose correction is proportionally higher.

4.3 Analysis of the importance of barriers to the entry of new dealers.

This third exercise investigates if the existence of a dealer in a micro-region represents a barrier to the entry of a new dealer in this micro-region.

To analyze this matter, we extracted from the original database a subset of "non-shared" micro-regions, i.e., those which did not house more than one dealer of a given brand. This procedure produced a subset of 410 micro-regions, of which 228 (56% of the total) did not have any dealers, 52 (13%) had only one dealer, and up to three micro-regions (1%) had eight dealers of different brands, as shown in Table 8.

The objective was to identify and segregate a subgroup of dealers that enjoyed market power in their operating regions, at least regarding intrabrand competition. We later limited the number of dealers in a micro-region to no more than two, which resulted in a subset containing 313 micro-regions.

Table 8: Frequency of dealers in micro-regions, excluding shared micro-regions

Number of dealers	Absolute frequency (micro-regions)	Relative frequency (micro-regions)
0	228	56%
1	52	13%
2	33	8%
3	38	9%
4	34	8%
5	14	3%
6	7	2%
7	1	0,2%
8	3	1%
Total	410	100%

Source: Based on Fenabrave data.

The models built to measure the importance of barriers to the entry of new dealers is based on Bresnahan and Reiss (1990), the details of which were shown in the previous section. We used a reduced ordered probit model, in which the unobserved economic profit variable (y^*) is specified according to the equation below:

$$y^* = \beta_1 pop1 + \beta_2 y\_cap + \beta_3 Theil + \beta_4 adens \quad \text{(E)}$$

The dependent variables are defined and characterized according to the table in Table 9. We decided to use the variables in level, no in logarithm (except for the Theil index), to enable us to directly estimate the break-even points.

Table 9: Variables used in ordered Probit model

Number of dealers	Observations	Variables	Mean	Standard deviation	Minimum	Maximum
0 to 2	313	pop1	39,639.39	26,620.51	2,051	262,538
		y_cap	146.09	79.95	46.25	601.37
		I1	0.52	0.08	0.33	0.85
		adens	264.94	489.21	2.31	6,574.88
0	228	pop1	34,801.23	21,615.08	2,051	152,977
		y_cap	125.67	70.64	46.25	601.37
		I1	0.51	0.08	0.33	0.79
		adens	234.23	332.31	2.31	2.318.85
1	52	pop1	47,371.21	27,768.71	12,665	133,738
		y_cap	208.71	74.68	81.57	404.37
		I1	0.56	0.08	0.45	0.85
		adens	425.81	957.38	6.92	6.574.88
2	36	pop1	60,883.23	40,457.36	18,413	262,538
		y_cap	188.57	82.69	80.55	368.46
		I1	0.54	0.06	0.45	0.70
		adens	223.62	196.87	14.13	857.99

Source: Based on Census data (IBGE, 2000)

We used five specifications, from a simpler one, in which the y^* depends only on *pop1*, to a more comprehensive, in which all four explanatory variables comprise the model. We also tested specifications using other variables, such as average age, household income, and income of the staff employed in administrative positions at dealers.

The advantage of using the ordered probit model is that it automatically imposes an implicit presupposition in the theoretical model, namely that S^M is greater than S^D (i.e., the size of the market for monopoly is smaller than the size of the market for duopoly). Considering a synthetic model, the coefficients α_1 and α_2 of the ordered probit model define the probabilities:

$$\begin{aligned}
P(y=0|x) &= P(y^* \leq \alpha_1|x) = P(x\beta + e \leq \alpha_1|x) = \Phi(\alpha_1 - x\beta) \\
P(y=1|x) &= P(y^* \leq \alpha_2|x) = P(\alpha_1 \leq x\beta + e \leq \alpha_2|x) = \Phi(\alpha_2 - x\beta) - \Phi(\alpha_1 - x\beta) \\
P(y=2|x) &= P(y^* \leq \alpha_3|x) = P(\alpha_2 \leq x\beta + e \leq \alpha_3|x) = 1 - \Phi(\alpha_3 - x\beta)
\end{aligned} \tag{F}$$

where $y = 1$ represents a monopoly, $y = 2$ a duopoly, and Φ is the normal distribution.

The model's coefficient estimations are shown in Table 10. All coefficients are significant at 10%, 5% or 1%, except for the coefficient of the variable "Theil" (but which was nonetheless maintained to consider the income distribution effect); moreover, all variables represent the expected signal.

Table 10: Results of the ordered probit models for determining barriers to the entry of new dealers

	(1)	(2)	(3)	(4)	(5)
pop1	0.0000155 (***)	0.0000193(***)	0.0000196(***)	0.0000228(***)	0.0000225(***)
	(2.95e-06)	(3.17e-06)	(3.20e-06)	(3.63e-06)	(3.66e-06)
y_cap		0.007032(***)	0.0065633(***)	0.0073345(***)	0.0070018(***)
		(0.0009614)	(0.0010124)	0.0009838	(0.001052)
Theil			1.621457		1.004655
			(1.044764)		(1.110083)
adens				-0.0003143(**)	-0.002671(*)
				0.0001498	(0.0001586)
α_1	1.257842	2.546358	3.354958	2.657618	3.142829
	(0.1482535)	(0.2488701)	(0.5835764)	(0.2605346)	(0.599537)
α_2	1.960928	3.363532	4.174723	3.484323	3.969582
	(0.1684994)	(0.2751392)	(0.5964521)	(0.2866102)	(0.6112228)
Log likelihood	-224.4045	-194.25998	-195.28166	-194.25998	-193.85019
Pseudo R^2	0.0643	0.1900	0.1857	0.1900	0.1917
Observações	313	313	313	313	313

Note: (*): Significant at 10%. (**) Significant at 5%. (***) Significant at 1%. The numbers in parenthesis are standard deviations.

The ratio between the coefficients α_1 and α_2 and the coefficient of the variable *pop1* define the scales S^M and S^D, i.e., the size of the urban population of the largest city in a micro-region housing zero, one or two dealers. In the models, according to Table 11, these values are approximately 81,000 and 126,000 (in the simplest model) and 140,000 and 175,000 people (in the most comprehensive model), which are relatively larger than the magnitudes actually seen. According to the database, the average urban population of the largest city in the micro-regions housing only one dealer is approximately 47,000, while in cities housing two dealers it is 60,000. Yet, if we take the comprehensive model, the proportions remain the same, i.e., $S^M/S^D = \hat{S}^M / \hat{S}^D \approx 0.8$.

Table 11: Limit points for the ordered probit models

	(1)	(2)	(3)	(4)	(5)
Monopoly (S^M)	81,009	131,859	116,436	171,140	139,810
	(8,846)	(15,645)	(13,136)	(32,474)	(30,939)
Duopoly (S^D)	126,289	174,176	152,655	212,957	176,589
	(16,520)	(21,446)	(17,903)	(36,323)	(34,404)
(S^M/S^D)	0.64	0.76	0.76	0.80	0.79
	(0.04)	(0.03)	(0.03)	(0.03)	(0.04)

Source: Based on Census (IBGE, 2000) and Fenabrave data.
The numbers in parenthesis are standard deviations.

In addition to the values S^M and S^D, it is necessary to estimate proxies for the variable profits V^D and V^M, the derivative of unobservable profit in relation to the demographic variable. We know that in the probit model the marginal change of the latent variable in relation to changes in continuous independent variables is obtained from:

$$\frac{\partial p(x)}{\partial x_j} = g(x\beta)\beta_j \text{, where } g(z) = \frac{dG}{dz}(z) \text{ is the normal distribution.} \tag{G}$$

In the ordered probit model, in turn, the marginal effect of the continuous independent variables is given by:

$$\begin{aligned} \frac{\partial p_0(x)}{\partial x_k} &= -\beta_k \phi(\alpha_1 - x\beta) \\ \frac{\partial p_J(x)}{\partial x_k} &= \beta_k \phi(\alpha_J - x\beta) \qquad \text{, for } 0 < j < J \\ \frac{\partial p_j(x)}{\partial x_k} &= \beta_k \left[\phi(\alpha_{j-1} - x\beta) - \phi(\alpha_j - x\beta)\right] \end{aligned} \tag{H}$$

We computed the marginal effects V^M and V^D for the mean of values **x**, according to the mean values of the variables shown in Table 9[11]. The results of the marginal effects for monopoly and duopoly in the five specifications are shown in Table 12. There we see that the relation between the marginal effects in specification (4) is 0.14. In the simplest model, this relation is 1.52, while in the most comprehensive model it is 0.28.

Table 12: The marginal effect of the size of the market on the probability of entry

	(1)	(2)	(3)	(4)	(5)
Monopoly (V^M)	2.53e-06	2.56e-06	3.61e-06	4.23e-06	4.16e-06
	(1.95e-07)	(2.48e-07)	(2.58e-07)	(3.45e-07)	(3.45e-07)
Duopoly (V^D)	2.51e-06	2.24e-06	2.21e-06	2.57e-06	2.49e-06
	(2.99e-07)	(4.54e-07)	(4.62e-07)	(6.53e-07)	(6.31e-07)
(V^D/V^M)	0.99	0.63	0.61	0.61	0.60
	(0.30)	(0.21)	(0.20)	(0.22)	(0.215)

Note: the numbers in parenthesis are standard errors.

[11] We used the mean of 313 observations, containing 0, 1 or 2 dealers (i.e., the first line of the table in Table 9).

The theoretical model assumes, following equations (6) to (8), that the variable profit, both in a monopoly as well as in a duopoly, increases linearly with the variable representing the size of the market. In the empirical models developed in this paper, the size of the market corresponds to the variable "urban population in the largest city of the micro-region" (*pop1*). The marginal effects referring to the variable *pop1* in monopoly and duopoly correspond, respectively, to the variables V^M and V^D in the theoretical model.

The ratio between these marginal effects (V^D/V^M) in models (1) to (5) is above 0.5, suggesting, not unlike in Bresnahan and Reiss (1990), that in the Brazilian case the increase of the margin resulting from product differentiation more than offset the decrease in the monopoly margin resulting from competition.

Following equation (8'), if we divide limit points ratio (S^M/S^D) by the marginal effects ratio (V^D/V^M), we obtain the fixed costs ratio (F^M/F^D). The estimations are in Table 13. In the simpler model, this ratio equals 0.65, showing that the costs of installing a second dealer would be approximately 54% higher than for the first dealer. Just as in Bresnahan and Reiss (1990), we cannot attribute this increase in costs directly to the entry barriers. It would be necessary to investigate, say, if no differences in cost associated to dealer and manufacturer brands exist.

Table 13: Ratio between fixed costs of entry in a monopoly and in a duopoly

	(1)	(2)	(3)	(4)	(5)
(F^M/F^D)	0.65	1.20	1.31	1.26	1.32
	(0.20)	(0.40)	(0.44)	(0.44)	(0.47)

Note: the numbers in parenthesis are standard errors.

Yet the ratio F^M/F^D in all other models is above one, suggesting that in the Brazilian case the costs of entry for a second dealer are smaller than those for the first dealer, contrary to the findings of Bresnahan and Reiss (1990). For example, using data and specification of the comprehensive model (model (5)), the costs of installing a second dealer are approximately 0.76 times of those necessary to install the first. Comparing with the results of Bresnahan and Reiss (1990), in four of the authors' eight specifications, the costs of entry for the second dealer are from 40% to 50% higher than those for the first one.

5. Summary, conclusion and implications

This paper investigates if the existence of a dealer in a micro-region represents a barrier to the entry of a new dealer into this micro-region. To do so, we organized a database gathering information on the location of dealers according to micro-regions, based on Fenabrave data and IBGE's 2000 Census data.

In a first phase, we identified eight variables that condition the existence and the number of dealers in a micro-region: the natural logarithm of the urban population of the largest city in a micro-region; the natural logarithm of the remaining population of a micro-region; the natural logarithm of the share of women in that population; population density (inhabitants per square kilometer); income distribution (as measured by the Theil-L); the natural logarithm of household income; wages paid to workers in administrative positions at auto dealers; and average age in each micro-region.

In a second phase, we adapted the Bresnahan and Reiss (1990) model to the Brazilian auto-distribution industry. Estimates suggest that the increase of the profit margin resulting from product differentiation more than offsets the decrease in the monopoly margin resulting from competition, and that the fixed costs of installing a second dealer in monopoly micro-regions are lower than the fixed costs necessary to install the first dealer, which suggests the inexistence of barriers to the entry of new dealers in monopolized markets.

The possible confirmation of the inexistence of barriers to the entry of new dealers in monopoly markets would strengthen the conclusion that the clause of exclusivity in auto-retail contracts – according to which auto dealers cannot sell new vehicles of other brands – apparently does not impose major restrictions on the expansion of the country's dealer network[12].

Yet one last caveat is that the econometric results arrived at in this paper reflect a particular point in time, when we still see the impact of the entry of new automobile manufacturers into the dynamics of this industry. For example, the possible adoption of

[12] In this aspect, please see Dobson and Waterson, 1996.

aggressive distribution policies by these new manufacturers, as the installation of dealers following criteria other than short-term economic profit, can be affecting the estimated results.

6. Bibliographical references

Andrade, Thompson A. e Roberto Teixeira Alves (2003): "Distribuidoras de veículos vs. montadoras: condutas anticompetitivas e relações verticais". In César Mattos: *A Revolução Antitruste no Brasil*. São Paulo, Editora Singular.

ANFAVEA (Brazilian Automotive Industry Association, 2005): *Brazilian Automotive Industry Yearbook*. São Paulo, Brazil.

Arbix, Glauco e João Paulo Cândida Veiga (2003): *A distribuição de veículos sob fogo cruzado:* em busca de um novo equilíbrio de poder no setor automotivo. Website: http://www.fenabrave.org.br/noticias/pdf/glauco_arbix_montadoras.pdf. Last access: December 21st, 2004

Bresnahan, T. F. and Peter C. Reiss (1985): "Dealer and Manufacturer Margins", *RAND Journal of Economics*, Vol. 16, Issue 2 (Summer, 1985), pp. 253-268.

Bresnahan, T. F. and Peter C. Reiss (1990): "Entry in Monopoly Markets". *The Review of Economic Studies*. Vol. 57, no. 4 (Oct.), 531-553.

Cooper, Mark (2001): *A Roadblock on the information superhighway: anticompetitive restrictions on automotive markets*. Consumer Federation of America. Website: http://www.consumerfed.org/internetautosales.pdf . Last access: May 05th, 2005.

Cooper, Mark (2002): *Bringing New Auto Sales and Service into the 21st Century*: eliminating exclusive territories and restraints on trade will free consumers and competition. EUA, Consumer Federation of America. Website: http://www.consumerfed.org/autointernet.pdf. Last access: January 05th, 2005.

Cramer, J. S. (2001): *An Introduction to the Logit Model for Economists*. 2nd Edition. London, Tomberlake Consultants Ltd.

Dobson, P. W. e M. Waterson (1996): *Vertical Restraints and Competition Policy*. London, Office of Fair Trading. (Research Paper #12).

Goldbaum, Sérgio (2005): Restrições Verticais no Setor Automotivo: Barreiras à entrada de Novos Concessionários. SP, FGV-SP. (Tese de doutoramento).

Griffiths, W. E., R. Carter Hill and George G. Judge (1993): *Learning and Practicing Econometrics*. NY, John Wiley & Sons, Inc.

Helmers, H. O., C. N. Davisson e H. F. Taggart (1974). *Two studies in Automobile Franchising*. Ann Arbor, Michigan: Division of Research, Graduate School of Business Administration, The University of Michigan.

Instituto Brasileiro de Geografia e Estatísticas (IBGE) (2000): *Microdados do Censo*.

Mattos, César: *A Revolução Antitruste no Brasil:* A Teoria Econômica Aplicada a Casos Concretos. São Paulo, Editora Singular, 2003.

McKinsey & Company and The Economist Intelligence Unit (2000): *Automotive Retailing in the New Millenium*.

Merger and Competition Commission (MCC) (1992a): "Summary of the report on the supply of new motor cars within the UK". Website: http://www.competition-commission.org.uk/rep_pub /reports/1992/313newmotorv1.htm#summary . Last access: December, 17th, 2004.

Pashigian, B. P. (1961): *The distribution of automobiles: an economic analysis of the franchise system*. Englewood Cliffs, NJ : Prentice Hall (Ford Foundation Doctoral Dissertation Series).

Pricewaterhouse & Coopers (1999): *Measuring the Automotive Retail Revolution*. Website: www.pwcglobal.com/Extweb/pwcpublications.nsf/docid/BD6A2CA16C65654F80256C77003CF30E Last access: January 05th, 2005.

Rogers, R. P. (1986): *The effect of State Entry Regulation on retail Automobile Markets*. Bureau of Economic Staff Report, U. S. Federal Trade Commission.

Smith II, Richard (1982): "Franchise Regulation: An Economic Analysis of State Restrictions on Automobile Distribution". *Journal of Law and Economics*, vol. XXV (April 1982), pp. 125-157.

Wooldridge, J. M. (2002): *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA, MIT Press.