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### Estimating complementarity among vertical restraints: Evidence from manufacturing firms

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#### Abstract

This paper uses a bivariate probit model to analyze firms' decisions to impose regimes of exclusive dealing and/or exclusive territories with their distributors. We employ a panel data set of manufacturing firms (from 1990 to 2005) that contains information about such vertical restraints. Firms report whether they impose vertical restraints on their distributors (retailers or wholesalers) and the type: resale price maintenance, full line forcing, exclusive dealing, and/or exclusive territories. Our results show that the likelihood of imposing exclusive dealing and/or exclusive territories varies widely by industry and that small size greatly reduces the likelihood of imposing exclusive dealing (but not exclusive territories). The results also show the existence of complementarities between exclusive territories and exclusive dealing but not with other types of restraint.

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## 1. Introduction

Manufacturers rarely supply to final consumers; instead, most industries are vertically separated between upstream firms (e.g., the manufacturers) and downstream firms (the wholesales and retailers). In practice, vertical restraints most often arise when the upstream firm or manufacturer restricts its downstream distributor choices.<sup>1</sup>

Vertical restraints are grouped into price and non-price restraints. The former group consists of *resale price maintenance*, whereby a distributor commits to a retail price. This can take the form of a fixed price, a minimum or a maximum resale price, or even a recommended price. Non-price restraints include *exclusive territories*, where a distributor is assigned a geographic territory by the manufacturer and given monopoly rights to sell in that area; *exclusive dealing*, whereby a distributor is not allowed to carry the brands of competing manufacturers; and *full-line forcing*, which refers to a distributor's commitment to sell all the varieties of the manufacturer's products.<sup>2</sup>

The motives for imposing vertical restraints are usually grouped into two categories: efficiency motives and anticompetitive motives.<sup>3</sup> Vertical restraints can be necessary in some cases for an efficient distribution, though they also raise concerns about enhancing market power.<sup>4</sup> Attitudes of the courts and competition authorities toward vertical restraints vary significantly from one country to another and from one period to another.<sup>5</sup> Nowadays the *rule-of-reason* approach is generally applied in most regulations. This means that there is no a priori presumption and that the costs and benefits of a practice must be weighed on a case-by-case basis.<sup>6</sup>

Although there is broad theoretical literature on the determinants and effects of vertical restraints and on exclusive dealing and exclusive territories in particular there has been little empirical evaluation of vertical restraints.<sup>7</sup> Most empirical contributions are focused on particular industries that are dominated by large firms (e.g., beer, movie distribution, gasoline, auto distribution). Even so, there is no systematic plant-level evidence on the scope of vertical restraints in manufacturing industries.

Furthermore, most theoretical and empirical papers analyse the determinants or effects of vertical restraints in isolation. In practice, however, different vertical restraints might well appear in combination in the same contract. When multiple restraints are feasible, the results of a

<sup>1</sup>See article 2(1) of European Commission Regulation (EC) n° 2790/1999 of 22 December 1999.

<sup>2</sup>See Rey and Tirole (1986) and Rey and Vergé (2005) for a more exhaustive classification of vertical restraints.

<sup>3</sup>See Motta (2004, chap. 6) for a survey of the theoretical models on vertical restraints.

<sup>4</sup>See Motta (2004), Cooper et al. (2005a, 2005b), Rey and Vergé (2005), Verouden (2007) and Lafontaine and Slade (2008), for surveys of the literature on the effects of vertical integration and vertical restrictions on inter- and intrabrand competition.

<sup>5</sup>Comanor-Rey (1997) compare the evolution of the attitudes of the U.S. and E.U. competition authorities.

<sup>6</sup>This is the basis of the most recent European regulation on vertical restrictions published in the Guidelines on Vertical Restraints (2000).

<sup>7</sup>See Lafontaine and Slade (2008, 2010) for a survey of empirical papers.

theoretical model may not hold up. Different vertical restraints can often be used to achieve similar objectives, so a policy prohibiting a specific restraint might be ineffective.

This paper contributes to filling the gap in empirical literature on exclusive agreements and examines whether and to what extent manufacturing firms impose exclusive agreements. The paper also analyses firm decisions to impose exclusive dealing and/or exclusive territories on their distributors. To assess the relationship between these two types of restraints, we estimate a bivariate probit model for a panel data of Spanish manufacturing firms from 1990 to 2005.

Results show that the likelihood of exclusive dealing and/or exclusive territories varies widely by industry and that small size greatly reduces the likelihood of exclusive dealing but not of exclusive territories. Our results also demonstrate the existence of complementarities between exclusive territories and exclusive dealing but not with other vertical restraint types.

Questions regarding the complementarities between different vertical restraints are especially relevant for antitrust authorities because joint exclusive agreements could exacerbate their own possible anticompetitive effects. Competition regulations on vertical agreements usually focus on the anticompetitive effects of particular restrictions. This paper emphasizes the importance of considering more than a single restriction in the analysis of vertical restraints.

The rest of the paper is organized as follows. Section 2 describes the data and presents some empirical regularities on vertical restraints in manufacturing firms. Section 3 details the empirical specification and explains the main results. Section 4 presents the conclusions.

## 2. Data

The data set used in this paper is a firm-level survey representative of the Spanish manufacturing sector, sponsored by the Ministry of Industry, the *Survey on Firm Strategies (Encuesta Sobre Estrategias Empresariales)*. The panel data extends from 1990 to 2006, although the variables related to vertical restraints are surveyed only every fourth year (1990, 1994, 1998, 2002 and 2006). The survey also contains information on the distribution channels used by the firms. Firms report their percentage of sales via three main distribution channels: direct sale, own distribution network, and/or intermediaries. For firms that sell their products to intermediaries, the survey indicates whether the manufacturer imposes any type of vertical restraint on the distributors and, if so, includes information on which type.

Table 1 reports the number of firms in the sample each period. The data base contains information on 5,786 observations of firms with 200 or fewer workers and 2,618 with more than 200 workers. The panel data is incomplete, so we do not have the same number of firms each period.

**Table 1. Number of firms per year in the sample**

Year	200 or fewer workers	More than 200 workers
1990	1385	638
1994	1148	535
1998	1211	498
2002	1143	512
2006	899	435
Total	5786	2618

As mentioned previously, firms report the percentage of sales made through each distribution channel. In some cases, all their production is sold directly to final consumers (in the case of final goods) or to other firms (mainly in the case of intermediate goods) or via their own distribution channel. In other cases, firms sell (all or part of) their production via intermediaries (retailers or wholesalers). Note also that firms frequently use more than one channel to distribute their products. We consider the *main distribution channel* as the one providing the highest proportion of sales.

**Table 2. Firms' main distribution channel**

	200 or fewer workers		More than 200 workers	
	N°	%	N°	%
Retailer/ wholesaler	2245	28.8	1158	44.2
Direct selling	3040	52.2	1186	45.3
Own network	354	6.1	236	9.0
Mixed	147	2.5	38	1.5
Total	5786	100	2618	100

Table 2 shows that almost half of the firms use direct selling as the main distribution system. These firms typically produce intermediate goods, and their clients are other firms. About 40% of firms sell most of their products to intermediaries. A very small percentage of firms use their own distribution network as the main channel of distribution. Table 3 indicates the number of firms that have at least one intermediary and the proportion of them that impose vertical restraints.

**Table 3. Firms with intermediaries and vertical restraints**

	200 or fewer workers		More than 200 workers	
	Nº	%	Nº	%
Without intermediaries	2376	41.1	882	33.7
With intermediaries	3410	58.9	1736	66.3
With vertical restraints	970	28.5	836	48.2
Without vertical restraints	2440	71.5	900	51.8
Total	5786		2618	

The tabulated data show that vertical restraints increase with size. Large firms impose vertical restraints more frequently on their intermediaries (wholesalers or retailers) than do small and medium ones: 48% for large firms and 28% for small and medium firms.

**Table 4. Summary of firms with exclusive agreements**

	200 or fewer workers		More than 200 workers	
	Nº	%	Nº	%
Only exclusive dealing	102	10.5	102	12.2
Only exclusive territories	297	30.6	230	27.5
Both exclusive restraints	224	23.1	230	27.5
Other types of vertical restraints	247	35.8	274	32.8
Total	970	100	836	100

Finally, Table 4 summarizes the number of manufacturing firms that sign exclusive agreements with their intermediaries, conditioning on firms that impose vertical restraints. Exclusive territories is the most frequent restriction used by Spanish manufacturing firms, but a significant number of them impose both types of exclusive agreements. One third of firms impose other types of vertical restraints, mainly full-line forcing and resale price maintenance.

### 3. Empirical specification and results

The decision to impose a vertical restraint is typically a discrete choice. A standard bivariate probit model is estimated where the imposition of exclusive dealing and exclusive territories are treated as two separate binary decisions. The equations can be written as follows:

$$I(ED_{it}) = \alpha_0 + \sum_{k=1}^3 \alpha_k I(ER_{it-1}^k) + \alpha_v v_{it-1} + x_{it} \alpha + \varepsilon_{it}$$

$$I(ET_{it}) = \beta_0 + \sum_{k=1}^3 \beta_k I(ER_{it-1}^k) + \beta_v v_{it-1} + x_{it} \beta + \varepsilon_{it}$$

Here  $I(ED_{it})$  and  $I(ET_{it})$  are indicator variables for firms that impose exclusive dealing agreements and exclusive territories, respectively. This specification does not include any source of intertemporal correlation; however, it does allow the contemporaneous correlation between the two choices,  $Corr(\varepsilon_{it}, \varepsilon_{it})$ , to be non zero. The explanatory variables are three lagged dummy variables  $I(EA_{it-1}^k)$ , where  $k \in \{1, 2, 3\}$ , that take the value 1 for firms that impose (respectively) exclusive dealing, exclusive territory or both restraints. A lagged dummy variable ( $v$ ) takes the value 1 if firm  $i$  imposed another (non-exclusive) vertical restraint. This specification let us to explore the complementarities between them. Finally, the vector of control variables includes 6 size dummies, year dummies and industry dummies and other firm characteristics whether the firm reports advertising and R&D expenditures and whether it is an exporter firm.

Year dummies take into account temporal shocks that are common to all firms, especially the changes in vertical restraint regulations after 2000. The industry dummies (20 included) capture industry heterogeneity in the use of vertical agreements.<sup>8</sup>

The results of the bivariate specification are reported in Table 5. The first and second columns present the estimated coefficients (and robust standard errors in parentheses) for the decision to exclusive territories and exclusive dealing, respectively. Firms with territorial agreements in the previous period, either alone or in combination with exclusive dealing agreements, are more likely to impose territorial restraints in the current period. The impact of imposing exclusive dealing is also positive and significant, but the magnitude is lower. In the case of exclusive dealing, the effect of both restraints is positive and significant, although the magnitude of the territorial restraint is lower.

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<sup>8</sup> The industries that impose both restraints more frequently are Beverage, Vehicles and accessories and Industrial and agricultural machinery.

Table 5: Results of estimating the bivariate probit model

	Exclusive territories		Exclusive dealing	
	Coefficient	S.E.	Coefficient	S:E
<i>Intercept</i>	-2.047	(0.20)	-2.178	(0.21)
<i>Only exclusive territories dummy (lagged)</i>	1.583	(0.09)	0.418	(0.11)
<i>Only exclusive dealing dummy (lagged)</i>	0.558	(0.14)	1.391	(0.12)
<i>Both exclusive restraints dummy (lagged)</i>	1.661	(0.11)	1.513	(0.11)
<i>Other type of restraints (lagged)</i>	-0.061	(0.09)	0.091	(0.09)
<i>R&amp;D dummy</i>	0.241	(0.08)	0.041	(0.08)
<i>Advertising dummy</i>	0.347	(0.09)	0.250	(0.10)
<i>Exporter dummy</i>	0.210	(0.08)	-0.012	(0.09)
<i>Size dummies (n° of workers)</i>				
<i>From 21 to 50</i>	0.130	(0.10)	0.079	(0.11)
<i>From 51 to 100</i>	0.317	(0.13)	0.269	(0.15)
<i>From 101 to 200</i>	0.243	(0.12)	0.280	(0.14)
<i>From 201 to 500</i>	0.209	(0.12)	0.430	(0.13)
<i>More than 500</i>	-0.077	(0.13)	0.358	(0.15)
<i>1998</i>	0.107	(0.09)	0.006	(0.10)
<i>2002</i>	-0.038	(0.10)	-0.061	(0.11)
<i>2006</i>	-0.168	(0.08)	-0.108	(0.09)
<i>Industry dummies (20)</i>	Included		Included	
<i>Corr(<math>\varepsilon_{it}</math>, <math>\varepsilon_{it}</math>)</i>	0.722	(0.03)		
Log L.	-1778.4			
N° observations	3110			

It is interesting to observe that no other type of vertical restraint has a significant effect on either exclusive territories or exclusive dealing. These results suggest that there exist complementarities between both of these types of vertical restraints. On the other hand, the coefficients of the rest of the variables indicate that firms with R&D and exporter firms are more likely to engage in the restraint of territories but not of exclusive dealing. Firms with positive expenditures in advertising are more likely to engage in one of these two restraints.

The role of firm size is nonlinear in the case of exclusive territories, as the estimated

coefficients of the size dummies show. The medium-size firms (from 51 to 100 workers) are the ones that more frequently impose this restraint. In contrast, the largest firms (more than 100 workers) are the ones that impose exclusive dealing more frequently. This result could indicate that small firms have less negotiation power induce to a distributor not to carry the brands of competing manufacturers.

The estimated parameters of the year dummies show that there are no significant changes in the adoption of both restraints. Only the exclusive territories restriction is used less in 2006 than in previous periods. The estimated value of  $Corr(\varepsilon_{it}, \varepsilon_{it})$  is a positive 0.72 and is statistically significant. Shocks that lead a firm to impose one exclusive vertical restraint tend to lead it to impose the other as well.

#### 4. Concluding remarks

This paper examines the manufacturing firm's decisions to impose vertical restraints on their distributors. A standard bivariate probit model is estimated in which exclusive dealing and exclusive territories are treated as two separate binary decisions while considering contemporaneous correlation between the two choices. The results obtained suggest the existence of complementarities between both types of exclusive vertical restraints but not with other type of restraints. This finding underscores the importance of taking into account the effect of multiple restrictions on competition.

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