Empirical Regularities in the Vertical Restraints of Spanish Manufacturing Firms*

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Abstract

This paper exploits a unique panel data set of Spanish manufacturing firms that contains information on vertical restraints affecting retailers and wholesalers. First, we analyze the scope of vertical restraints by identifying industry and size heterogeneities. Second, we explore the determinants of resale price maintenance by focusing on the effect of an upstream firm’s effort to increase demand. After presenting a simple theoretical framework, we use a linear probability model to analyze the empirical determinants of a manufacturing firm’s control of the resale price. We find that firms that make a greater advertising effort impose a resale price more frequently, as do larger firms and those that impose other restraints such as exclusive territories.

Keywords: vertical restraints, resale price maintenance, manufacturing sector

JEL Classification: L22, L12

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INTRODUCTION

Vertical agreements or restraints are defined by antitrust regulation as “agreements for the sale and purchase of goods or services which are entered into between companies operating at different levels of the production or distribution chain” (European Commission, Guidelines on Vertical Restraints, 2010; see note 9). In practice, vertical restraints arise most often in retail settings, with the upstream firm or manufacturer restricting its downstream retailers’ choices.

Vertical restraints are grouped into price and nonprice restraints.1 Price restraints refer mainly to resale price maintenance (RPM), which occurs when an upstream firm dictates pricing policies at subsequent stages of the distribution process.2 Such RPM can take the form of a fixed price, a minimum or a maximum resale price, or a recommended price.3 Nonprice restraints include: exclusive territories, as when a distributor is assigned a geographic territory by the manufacturer and given monopoly rights to sell in that area; exclusive dealing, as when a distributor is not allowed to carry the brands of competing manufacturers; and full-line forcing, as when a distributor must commit to selling all the varieties of a manufacturer’s products. The latter is a particular type of “tie in” sales agreement under which the distributor agrees to buy more goods from the manufacturer than it would prefer to buy.

Vertical structures involve a number of decision variables. Variables such as retail price and selling effort affect joint profits, and variables such as wholesale price affect how profits are shared between firms. Decentralizing the decision variables—so that retailers control them—can lead to market inefficiencies because it creates externalities. The best-known problems stemming from a lack of coordination are double marginalization (Spengler, 1950) and suboptimal provision of services (Telser, 1960). Vertical restraints can then be used as a means to coordinate and restore the efficiency of the vertical structure.4

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1 See Rey and Tirole (1986) and Rey and Vergé (2005) for a more exhaustive classification of vertical restraints.
2 Some authors include as price restraints (i) the franchise fee, which is a two-part tariff that combines a lump-sum fee and a per-unit price set at the marginal cost and (ii) any kind of royalties, which are usually based on the distributor’s sales levels.
3 Antitrust regulation in Europe is not the same for all these types. Although minimum prices are forbidden, maximum and recommended prices are not.
4 Surveys of literature addressing the effects of vertical integration and vertical restrictions on inter- and intra-brand competition include Dobson and Waterson (1996), Motta (2004), Cooper et al. (2005a, b), Lafontaine and Slade (2005), and Rey and Vergé (2005).
Vertical restraints can solve these inefficiencies in a number of ways. Resale price maintenance alleviates the problem of double marginalization, and exclusive dealing enables manufacturers to protect their investments against potential retailer opportunism. Exclusive territories reduce free-riding among distributors in the provision of services; this restraint promotes those services and may also promote distributor ex ante investments in specific facilities or in human capital. Finally, full-line forcing helps manufacturers introduce new or improved products to the market.

That being said, vertical restraints can also be used by manufacturers to avoid competition. To analyze anticompetitive effects, we must consider competition not only at the distribution level (intra-brand competition) but also at the manufacturing level (inter-brand competition). Vertical restraints can restrict competition in at least three ways: by diluting competition among producers (i.e., manufacturers may use certain restraints to delegate some decision-making power to their distributors and may commit to not competing aggressively among distributors); by promoting collusion among manufacturers; and by acting as “foreclosure” instruments—either by raising rival costs or by preventing the market entry of potential competitors.

The attitude of competition authorities and courts toward vertical restraints varies significantly over time and from one country to another. Most horizontal agreements among competitors violate antitrust regulation, they are forbidden per se, and viewed as illegal even in the absence of any anticompetitive intent or evidence. For vertical agreements, most regulations call for the so-called rule-of-reason approach whereby adjudicators must weigh the costs and benefits of a given practice on a case-by-case basis. This rule of reason underlies the most recent European Union regulation covering vertical

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5 For example: when a manufacturer launches a general product promotion, the dealer might encourage consumers to buy another brand; also, when a manufacturer makes an investment that reduces the retailer’s cost, other brands may benefit from that investment.
6 Rey and Stiglitz (1988, 1995) show that exclusive territories eliminate intra-brand competition between retailers and act as a pre-commitment agreement to be less “aggressive”, which incentivizes rival manufacturers to set higher prices. Rey and Vergè (2010) analyze RPM in a context where rival manufacturers distribute their products through the same competing retailers. They show that RPM indeed limits the exercise of competition at both levels and can generate industry-wide monopoly pricing.
7 Julien and Rey (2000) show that RPM increases the likelihood of collusion by eliminating the retail price variation that makes price cuts easier to detect.
8 The recent paper of Asker and Bar-Issaak (2014) discuss the effects of different vertical restraints on the exclusion of rivals. In particular they found that both the incumbent manufacturer and retailers stand to gain from RPM, and either side might initiate RPM for the purpose of exclusion.
9 Comanor and Rey (1997) compare the evolution in attitudes of the US and EU competition authorities.
restrictions. Under this regulation, decisions are based less on the type of restraint than on the market environment.

Although numerous theoretical contributions have addressed the motivation for—or the effects of—vertical restraints, empirical contributions are much scarcer. In particular, Lafontaine and Slade (2005) summarize a number of regularities that arise in the empirical literature on vertical restraints, and Cooper et al. (2005) summarize empirical studies of vertical integration and vertical restraints while paying special attention to the topic of antitrust policy. More recent empirical papers are, for example, Bonnet and Dubois (2010); Bonnet et al. (2013) or Giovannetti and Magazzini (2013).

In this paper we exploit a unique data set: a representative panel of more than 3,000 Spanish manufacturing firms gathered for the period 1990–2001. The data include detailed information on firms’ distribution systems (direct selling or distribution nets) and on their clients or customers—namely, consumers, firms, distributors ( wholesalers or retailers), or public agencies. This data set includes information, from the firms that use distributors, concerning the use of vertical restraints and the type of restraint used. The restraints are categorized into five types: franchise fee, resale price maintenance, full-line forcing, exclusive territories, and exclusive dealing.

This paper adds to the literature by identifying empirical regularities in the vertical constraints that manufacturing firms impose. Analysis of the data set reveals that larger firms impose vertical restraints more frequently than do smaller firms and that, in many cases, firms impose more than a single vertical restraint; the combination of exclusive territories and exclusive dealing is the one most frequently observed in the data. A restraint used less frequently by manufacturing firms is the franchise fee, which is employed almost entirely in the textile sector. We find significant heterogeneity in sectors with regard to the use of vertical restraints. Firms in the beverages sector frequently use all five vertical restraints. Resale price maintenance is used more frequently in sectors where it has traditionally been legal (e.g., vehicles, drugs, books), but RPM has also been observed in the industrial and agricultural equipment sector and well as in the beverages sector.

10 See the European Commission notice of 10 May 2010: Guidelines on Vertical Restraints, see also Regulation (EU) No. 330/2010, the Block Exemption Regulation (BER), which provides a safe harbor for most vertical agreements.
Much of this paper focuses on determinants of the most controversial vertical restraint: resale price maintenance. First, we propose a simple theoretical framework in the context of intra-brand competition. We evaluate an upstream firm’s benefit from limiting the resale price when it makes an effort to increase demand. This effort increases the consumers’ willingness to pay, and the distributor takes advantage of that willingness at no cost. Our theoretical model shows that the benefit from limiting the resale price is greater when the manufacturer makes an effort to increase demand.

A linear probability model is used to analyze the empirical determinants of limiting the resale price. The results from this model confirm that firms making more effort to advertise impose the resale price more frequently. In addition, that price is more likely to be dictated by firms that are larger and by firms that impose other restraints (e.g., exclusive territories).

The rest of the paper is organized as follows. Next section describes the data and presents some empirical regularities on vertical restraints in the Spanish manufacturing sector. Section 3 presents the theoretical example. Section 4 and 5 detail the empirical specification and explain the main results, and Section 6 presents our conclusions.

DATA DESCRIPTION

We use data from the ESEE (Encuesta Sobre Estrategias Empresariales), a firm-level survey of Spanish manufacturing firms sponsored by the Ministry of Industry. This survey is an unbalanced panel data from 1990 to 2000, although the variables related to vertical restraints are surveyed only every four years (in 1990, 1994, and 1998).\(^\text{11}\)

The survey collected information on each firm’s main distribution channel, either direct sales or the firm’s distribution network of intermediaries. For firms that sell products to intermediaries, the survey asked whether the manufacturer imposed any vertical restraint on the distributors and, if so, the type of restraint: franchise fee (FF), resale price limits (RPM), full-line forcing (FLF), exclusive territories (ET), and/or exclusive dealing (ED). This information about the firm’s relationship with its intermediaries makes

\(^{11}\) At the beginning of the survey period, firms with no more than 200 workers were sampled randomly by industry and size strata; 5% of these randomly sampled firms were included in the sample. All firms with more than 200 workers were asked to participate, and 60% of them responded.
the survey especially useful for our analysis. The question as posed by the questionnaire is: “State whether the company subscribed in this year commercialization agreements with wholesalers or retailers.” A firm that responds with a Yes is then asked the next question: “State whether these agreements included the following matters: 1. Payments for franchises; 2. Limits to the resale price; 3. Territorial exclusiveness stipulations; 4. Obligations to commercialize all the range of products; 5. Obligations for sole commercialization.” Firms must answer Yes or No to each option.

We have a pooled sample of 6,701 firm-year observations over three years (3,386 firms). About 28% of the sample corresponds to observations from firms more than 200 workers.

[ INSERT Table 1 about Here ]

Table 1 reports the number of firm-observations for each size and the number and percentage of those that sell part or all their products directly to retailers or to intermediaries (which could be either retailers or wholesalers). Of the firms that sell primarily to retailers, those with vertical restraints range from 19% of the smaller firms to 42% of the larger firms.

[ INSERT Table 2 about Here ]

Table 2 shows the number of firms that report each type of vertical restraint. The reported values indicate that exclusive territories (resp., franchise fee) is the restriction most (resp., least) frequently used. Note also that the use of vertical restraints is increasing in company size.

[ INSERT Table 3 about Here ]

Another interesting empirical regularity is that firms often impose more than one vertical restraint, as shown in Table 3. Of the firms that employ vertical restraints, about 45% impose only one restraint and 30% impose two simultaneously. The percentage decreases as the number of restraints increases. Firms with fewer than 51 workers use multiple restraints less frequently. The most frequent combination of restraints is exclusive dealing and exclusive territories; 32% of firms with vertical restraints use these two.

Vertical restraints by industry
The second data column of Table 4 shows that there is considerable heterogeneity among sectors with respect to the channel of distribution. In the consumer goods industries (e.g., the food, textile, and furniture sectors), the proportion of firms that sell their products via intermediaries is generally quite high. At the other extreme, in the intermediate-good industries (e.g., the “other transportation materials” sector) most firms sell their products to other manufacturing firms.

[ INSERT Table 4 about Here ]

Column 3 in this table reports the percentage of firms in each sector that impose any of the five vertical restraint on their intermediaries (the percentage is obtained over the number of firms with intermediaries). Consumer industries, in particular, Beverages and Food and tobacco, are the ones in which more percentage of firms impose vertical restraints.

Another industry featuring a high percentage of vertical agreements is the Equipment and machinery industry, which typically produce intermediate goods. Such goods require a number of pre- and post-sale services (e.g., information and repair).

The Vehicles and accessories sector includes both automobiles and trucks as well as their components. Accessories and components are typically sold with fewer vertical restraints than are the vehicles themselves; it is worth noting that the manufacturers of vehicles normally employ dealers (retailers) to distribute their products. The Other transportation materials sector includes several heterogeneous products (boats, bicycles, motorbikes). In this sector, vertical restraints are found mainly in the sale of bicycles and motorbikes.

Finally, the last column in Table 4 shows the percentage of firms impose RPM (over the firms with vertical restraints). As we can see, the most frequent vertical restraint is RPM in the Printing & publishing industry, which reflect the Spanish regulations on book prices. Other sectors in which this restraint is quite frequent are Industrial & agricultural equipment or Office machinery and data process. With respect

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12 Fixed book pricing is legally regulated in Spain. Booksellers are only permitted to sell books at the prices set by the publishers, during a period of time. Maximum discounts are also regulated in special days and for public administration. The one exception is schoolbooks, which have not been subject to fixed book prices since 2007. The objective of this regulation is to promote non-price competition between booksellers in order to promote culture and reading. This regulation has been criticized by the Spanish competition authority: http://www.cnmc.es/Portals/0/Ficheros/Promocion/Informes_y_Estudios_Sectoriales/1997/1.pdf (last access 12-18-2014).
to other vertical restraints (not shown in the table), the most frequent one across all industries is exclusive territories; its usage ranges between 45% in the Printing and publishing and 88% in the Paper industry.

**Vertical restraints and sales effort**

We calculate “sales effort” as advertising expenditures divided by sales receipts in a given year. The first data column in Table 5 gives the average values of this variable while distinguishing between large and small firms.

As can be seen, sales effort is greater in large firms. The average effort ranges between 1.4% (in small firms with no price restraints) and 4.1% (in large firms that do impose price restraints). The last column of this table reports results for a test of the equality of means; it shows that the difference in effort—between firms that do and do not impose price restraints—is significant only for large firms.

**A SIMPLE EXAMPLE: SALES EFFORT AND RESALE PRICE**

The best-known instance of externalities that affect vertical chains is the “double marginalization” problem.\(^{13}\) If both a manufacturer and an associated retailer have market power then both can charge a positive markup, which results in higher prices and lower profits than in a vertically coordinated structure. This inefficiency will be greater when the upstream firm makes an effort to increase demand—for example, by an increase in advertising. That effort increases consumers’ willingness to pay, making it possible for the downstream firm to increase its price and, in turn, to increase the markup and the inefficiency of double marginalization. In this case, the upstream firm will have greater incentive to impose a resale price.

In this section we develop a simple example in the context of intra-brand competition—that is, without accounting for any interactions with other suppliers or distributors. We consider a chain of two monopolies in which the upstream firm determines its sales effort and the intermediate price as well as the final price (i.e., it dictates the resale price). We obtain the manufacturer’s profits from limiting the resale price and compare them with those in the benchmark case of a two-monopoly chain where no advertising

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\(^{13}\) Gilligan (1986) offers an empirical examination of RPM’s competitive effects.
or research and development (R&D) effort is made. We find that the gain in vertical coordination is greater when vertical externalities exist in addition to price. Therefore, when an upstream firm invests in activities such as advertising or product R&D, it has greater incentive to limit the resale price. Less gain from coordination is associated with lower markup by the downstream firm.

Suppose there is an upstream firm $U$ that manufactures a product and sells it through a dealer $D$, who buys the product from $U$ and then resells it. Consumer demand is given by $q = (v + e) - p$, where $v > 0$ is a parameter, $q$ is the quantity demanded, $p$ is the price charged to consumers, and $e$ is the manufacturer’s effort. This effort, which aims to increase demand, could include advertising, marketing, and/or product innovations. The manufacturer faces a constant marginal production cost $c$, a fixed cost $F$ of imposing (should it choose to do so) a price on the retailer, and a quadratic effort cost given by $C(c, e) = cq + (\theta e^2/2) + F$; here $\theta$ is the slope of the marginal investment cost function (this functional form follows the one described by Besanko and Perry, 1993). In that case, the cost of the firm’s efforts is independent of the number of units sold. The retailer’s unit cost is given by the price $w$, which it pays to the manufacturer.

The upstream firm must decide whether or not to impose a resale price. If it does not, then the manufacturer determines $e$ and the wholesale price $w$, whereafter the retailer chooses the price $p$ at which it sells the product to consumers. However, if the manufacturer does impose a retail price then it determines both $e$ and the final price $p$ (as in a vertically integrated monopoly). In this case, the manufacturer chooses the intermediate and final prices that guarantee the retailer the same profits as in the previous scenario and thus leave that retailer indifferent between these two scenarios. Thus the manufacturer seeks to maximize: $\max U\{(1 - R)(\max_{w, e} \pi(w, e)) + R(\max_{w, e} \pi(p, e, F))\}$ where $R = 1$ when the upstream firm imposes a resale price.

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14 This benchmark case is Spengler’s (1950) model, which illustrates the double marginalization problem that occurs when a downstream monopoly chooses an excessive price without accounting for its negative effect on the upstream firm.
15 We are supposing here that both the manufacturer and retailer are monopolists; this is an extreme case, but the main conclusions are similar when they each have only some monopolistic power. Recall that this simple model applies in a context of intra-brand competition, abstracting from the case of interaction with other suppliers.
16 If we considered other types of effort—in particular, pre-sale and/or post-sale assistance—then it would probably be necessary to include variable costs of service provision because each unit sold requires a higher cost of effort.
17 For simplicity, we assume a zero cost of resale.
It is easy to compare the total profits in these two cases: the profit without vertical restraint $\pi^\text{SEP}_U$, when the manufacturer determines its effort $e$ and the wholesale (intermediate) price $w$; and the profit with vertical restraint, $\pi^\text{RPM}_U$, when the manufacturer determines its effort $e$ and the final price $p$. If there is double marginalization, then the manufacturer’s profit is higher in the second case. Deciding to impose a resale price depends on the profit increase from (less the cost of) doing so. The profit increase can be written as

$$\pi^\text{RPM}_U - \pi^\text{SEP}_U = \left( \frac{\theta (v - c)^2}{2 \theta - 1} - \left( \frac{\theta(v - c)}{4 \theta - 1} \right)^2 - F \right) - \frac{\theta(v - c)^2}{2(4 \theta - 1)}$$

and a firm will likely impose a resale price whenever this difference in profits is positive.

Hence the manufacturer will find it profitable to fix the resale price when the fixed cost of doing so, $F$, is low enough, that is:

$$F \leq \frac{2\theta^3(v-c)^2}{(2\theta-1)(4\theta-1)^2}$$

This fraction is decreasing in $\theta$ and increasing in $(v - c)$. So as the manufacturer’s effort becomes more costly, both the optimal effort and the incentives to impose the restriction are reduced. A higher fixed cost $F$ also reduces the incentive to impose price restraints.

This outcome leads us to an interesting empirical prediction: limiting the resale price is more likely when distributors have market power\(^{18}\) and double marginalization can be avoided, but this likelihood will be greater when other types of vertical externalities (i.e., besides price) occur. In particular, firms that make an effort to increase demand will have more incentive to limit the resale price. In the next section, we test for whether there are any correlations among the demand effort (advertising), the market power of the distributors, and restraints on the resale price.

**EMPIRICAL MODEL**

According to our theoretical framework, a manufacturer (denoted by $i$) will impose a price to the retailer

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\(^{18}\) This result can be extended to the case of a downstream Cournot oligopoly. In this case, it is easy to show that the profit increase due to vertical integration is *decreasing* in the number of distributors.
whenever the gross profit increment from doing so is positive: \( \pi_i^{\text{RPM}} - \pi_i^{\text{SEP}} > 0 \).

The decision to innovate can be summarized by the following discrete-choice expression:

\[
R_{it} = \begin{cases} 
1 & \text{if } R_{it}^* = \pi_{it}^{\text{rpm}} - \pi_{it}^{\text{sep}} > 0 \\
0 & \text{otherwise}
\end{cases}
\]

The dependent variable takes the value 1 if the manufacturer dictates the resale price to its distributors (i.e., its wholesaler or retailer intermediaries) and takes the value 0 otherwise.

Since we do not actually observe profit \( \pi_{Uit}^{\text{SEP}} \) and profit \( \pi_{Uit}^{\text{RPM}} \), we approximate the difference between them via a reduced-form expression incorporating exogenous firm and market characteristics that are observable in period \( t \). Thus, \( R_{it}^* = \pi_{it}^{\text{rpm}} - \pi_{it}^{\text{sep}} = X_{it}\beta + ye_{it} + \epsilon_{it} \) where the vector \( X \) represents a set of firm and market characteristics. The variable \( e_{it} \) represents the effort made by manufacturer \( i \) to increase demand.

To conduct the empirical exercise, from the database of Spanish manufacturing firms we select a subsample of firms that acknowledge having sold some of their products via intermediaries. This subset contains a total of 1,893 observations.\(^{19}\)

As stated previously, the variable used to capture a firm’s sales effort is advertising expenditures divided by sales. For our sample we have information concerning how much the firms spend on advertising, which can serve as a direct measure of demand effort.\(^{20}\) In the theoretical framework we employ, \( e \) is an endogenous variable. Because sales effort and demand effort are likely determined simultaneously, we can reasonably assume that they are correlated.

The survey gathers no information about distributors, so we are unable to measure their market power directly. Hence we use information about vertical restraints that are indicative of (or conducive to) market power—in particular, the restraints of exclusive territories and exclusive dealing. Under exclusive territories, retailers are protected from intra-brand competition in a given area; in this case we expect a clear positive effect on the probability of limiting the resale price. Under exclusive dealing, retailers are

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\(^{19}\) We included the observations of those firms that provided information about all variables. A total of 106 observations were discarded because they did not report the data needed for some variables used in the estimation; we also discarded observations of the first period in order to build the lags. Finally, we did not consider any firms in the “other transport materials” sector because none of them admit to participating in resale price maintenance.

\(^{20}\) We use the logarithm of this variable.
protected from inter-brand competition because they are not allowed to sell competing brands. We include three dummy variables: two of them are set to 1 (resp., to 0) according as whether the firm does (resp., does not) acknowledge imposing only one of exclusive dealing or exclusive territories; the third dummy is set to 1 only for firms that impose both of these restraints.

To measure the fixed cost of imposing a vertical restraint, we use several indicator variables. The first one is the manufacturing firm’s size, since we assume that larger firms are better able to enforce vertical agreements. Thus we include a dummy variable for firms with more than 200 workers.

The second indicator relates to the industry in which the focal firm operates. If other firms in that industry use a particular restraint, then we can safely assume that this restraint is generally accepted. In such cases, the cost to the firm of limiting the resale price will be lower because, the more accepted the restraint, the easier it will be to impose. We include a variable indicating the percentage of firms in the same industry that acknowledged (in the survey) limiting the resale price. We also include industry dummies to account for any industry-specific regulations on vertical restraints.

Finally, we include a variable that indicates how many distributors are used by the focal firm. This variable is set to 1 only if the firm has more than 50 distributors and serves a national (or international) market.

We wish to control for the firm’s main client in the sense of what type of intermediary that client is. Hence we include a dummy variable set equal to 1 (resp., to 0) if most of the firm’s production is sold via retailers (resp., via wholesalers).

RESULTS

We use two-stage least squares (2SLS) to estimate the above linear probability model.21 Table 6 reports the estimated coefficients of the explanatory variables. The columns marked [1] consider the

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21 According to Wooldridge (2001), the 2SLS procedure provides a good estimate of the average effect in a latent variable model where one of the explanatory variables is correlated with the error term. Another important advantage of this procedure is that the estimated coefficients are directly interpretable.
firm’s advertising effort as an exogenous variable, while those marked [2] and [3] consider that effort to be endogenous.\(^{22}\)

We perform two tests of the exogeneity that tolerate both heteroskedastic and autocorrelated errors. Both the Wooldridge’s score test and a regression-based test of exogeneity yield the same conclusion, they reject the null hypothesis that \(e\) is exogenous at significance levels (\(p = 0.064\)). So, our preferred estimation treats \(e\) as endogenous. Notice that if \(e\) is exogenous, the 2SLS estimates are still consistent. In order to instrument firm effort, we use the value of lagged advertising effort and a dummy variable for whether the firm had introduced a product innovation in the previous period. We test whether both instruments are statistically relevant and exogenous.

On the one hand, we test the relevance of the instruments looking at the correlation with the endogenous variable. The \(F\) test and partial \(R^2\), reported in the Table 6 and performed in the first stage, show the joint significance of both instruments and the correlation between our endogenous variable and the additional instruments, respectively. The value of the adjusted \(R^2\) is obtained from fitting the first-stage regression by OLS. The higher values of both the adjusted and the partial \(R^2\), indicate stronger instruments. On the other hand, we test for instrument exogeneity. As our model is overidentified, it is possible to test of whether the instruments are uncorrelated with the error term.\(^{23}\) The Wooldridge’s score test of overidentifying restrictions, Chi2(1), reported in Table 6, shows that we cannot reject the null hypothesis that our instruments are valid.

[INSERT Table 6 about here]

Advertising effort has a positive and significant effect on the chances that a firm will limit the resale price. As shown in the columns marked [2] and [3], the likelihood of imposing resale price increases by almost 3 percentage points in response to a 1% increase in advertising. This effect is economically significant because nearly 6% of the firms in our sample impose price restraints. Note that, when advertising effort is considered to be exogenous (i.e., in the columns marked [1]), the coefficient is 1 percentage point lower.

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\(^{22}\) Note that [3] differs from [2] as it includes industry dummies in the model.

\(^{23}\) As we are using the 2SLS estimator with robust VCE, the Wooldridge’s robust score test of overidentifying restrictions is performed. A significant test statistic could represent either an invalid instruments or an incorrectly specified equation.
The effects of the other vertical restraints are clear. When a retailer has local monopolies (the exclusive territories restraint), the likelihood that the manufacturer will limit the resale price increases by more than 9 percentage points. In contrast, the exclusive dealing restraint does not play a significant role (if it is imposed alone)—a result that suggests some degree of complementarity between these two restraints. One possible explanation is that the manufacturer limits the resale price in order to preclude any retailer monopoly power resulting from geographical exclusivity.

It is interesting the effect of the other two vertical restraints. The effect of exclusive dealing only is not significant, while the effect of imposing exclusive territories only is positive and significant. Hence exclusive dealing and resale price maintenance can be viewed as substitutes for firms that also use exclusive territories. Firms that impose both exclusive territories and exclusive dealing are less likely to engage in RPM than are firms that impose only exclusive territories (although we cannot reject the null hypothesis that both coefficients are equal). Another possible explanation is that it is prohibitively expensive for a firm to impose more than two vertical restraints.

Firm size is also an important determinant. Those with more than 200 workers are more likely to limit resale prices. Also, the probability of RPM is higher (resp., lower) when the firm’s main client is a retailer (resp., a wholesaler). Our variable for the number of distributors and market size has a negative effect: a firm with more than 50 retailers is less likely to impose vertical restraints.

Our last result is that the industry in which the firm operates plays a small but significant role. The probability of dictating the resale price is higher when more firms in the same industry do likewise (see columns [2]). However, this effect is moderated by the inclusion of industry dummies (columns [3]).

SUMMARY AND CONCLUSIONS

Vertical restraints enable coordination between producers and distributors that can lead to increased firm profits. Under certain circumstances, such efficiency gains could be passed on to consumers.

Although there are numerous theoretical contributions that deal with the motivation for and/or the effects of vertical restraints, few empirical studies have been conducted. As a result, little is known about
the scope of such agreements in manufacturing firms. This paper exploits a unique data set of manufacturing firms that contains information about the vertical restraints they impose. Firms that have at least one distributor (either a retailer or a wholesaler) report whether they employ vertical restraints and, if so, identify which of five types are employed: franchise fee, resale price maintenance, full-line forcing, exclusive dealing, and/or exclusive territories.

The empirical regularities derived from the data set show that large firms impose vertical restraints more frequently and that many firms impose more than one such restraint. Exclusive territories and exclusive dealing is the combination most frequently observed, and a franchise fee is the restraint used least. There is considerable heterogeneity in the use of vertical restraints among various industries, and the beverages sector is notable for using all five vertical restraints. Resale price maintenance is frequently used in sectors for which it is legal (e.g., vehicles, drugs, books); RPM is also used in sectors whose products require pre- and post-sales service (e.g., industrial and agricultural equipment). We find a correlation in the data between RPM and a greater advertising effort.

This paper extends Spengler’s (1950) classical model of two vertically related monopolists by examining the case of an upstream firm that makes an effort to increase demand. This effort increases consumers’ willingness to pay, which means that retailers can costlessly increase the extent of their own markup. This dynamic incurs both inefficiency from double marginalization and greater incentives to limit the resale price. Empirical analysis based on a linear probability model confirms the following hypothesis: Firms that make an effort to increase demand via advertising are the most likely to impose price restraints on retailers. Moreover, this likelihood increases for manufacturing firms that additionally impose other vertical restraints such as exclusive territories. The size of a firm—and the industry in which it operates—also significantly increase the probability of fixing resale price.
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Table 1. Observations, sales destination, and use of vertical restraints by firm size

<table>
<thead>
<tr>
<th>Size of firm</th>
<th>Observations</th>
<th>Selling to intermediaries</th>
<th>Selling to retailers</th>
<th>Vertical restraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 20 workers</td>
<td>1995</td>
<td>1158 (58%)</td>
<td>849 (43%)</td>
<td>159 (19%)</td>
</tr>
<tr>
<td>21–50 workers</td>
<td>1579</td>
<td>950 (60%)</td>
<td>663 (42%)</td>
<td>163 (25%)</td>
</tr>
<tr>
<td>51–100 workers</td>
<td>516</td>
<td>304 (59%)</td>
<td>196 (38%)</td>
<td>83 (42%)</td>
</tr>
<tr>
<td>101–200 workers</td>
<td>575</td>
<td>368 (64%)</td>
<td>221 (38%)</td>
<td>83 (38%)</td>
</tr>
<tr>
<td>201–500 workers</td>
<td>1356</td>
<td>892 (66%)</td>
<td>568 (42%)</td>
<td>247 (43%)</td>
</tr>
<tr>
<td>&gt; 500 workers</td>
<td>680</td>
<td>471 (69%)</td>
<td>296 (44%)</td>
<td>123 (42%)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>6701</td>
<td>4149 (62%)</td>
<td>2973 (42%)</td>
<td>1269 (31%)</td>
</tr>
</tbody>
</table>

Table 2. Types of vertical restraints by firm size

<table>
<thead>
<tr>
<th>Size of firm</th>
<th>FF*</th>
<th>RPM*</th>
<th>Full line forcing</th>
<th>Exclusive Territories</th>
<th>Exclusive Dealing</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 20 workers</td>
<td>9 (1%)</td>
<td>56 (7%)</td>
<td>49 (6%)</td>
<td>93 (11%)</td>
<td>53 (6%)</td>
</tr>
<tr>
<td>21–50 workers</td>
<td>9 (1%)</td>
<td>47 (7%)</td>
<td>51 (8%)</td>
<td>108 (16%)</td>
<td>72 (11%)</td>
</tr>
<tr>
<td>51–100 workers</td>
<td>5 (3%)</td>
<td>17 (19%)</td>
<td>38 (19%)</td>
<td>59 (30%)</td>
<td>44 (22%)</td>
</tr>
<tr>
<td>101–200 workers</td>
<td>8 (5%)</td>
<td>29 (13%)</td>
<td>34 (15%)</td>
<td>50 (23%)</td>
<td>32 (14%)</td>
</tr>
<tr>
<td>201–500 workers</td>
<td>15 (3%)</td>
<td>91 (16%)</td>
<td>108 (19%)</td>
<td>173 (30%)</td>
<td>115 (20%)</td>
</tr>
<tr>
<td>&gt; 500 workers</td>
<td>22 (7%)</td>
<td>47 (16%)</td>
<td>47 (16%)</td>
<td>71 (24%)</td>
<td>54 (18%)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>68 (2%)</td>
<td>287 (10%)</td>
<td>327 (12%)</td>
<td>554 (20%)</td>
<td>370 (13%)</td>
</tr>
</tbody>
</table>

*FF: Franchise Fee; RPM: Resale Price Maintenance

Table 3. Use of multiple vertical restraints by firm size

<table>
<thead>
<tr>
<th>Size of firm</th>
<th>1 restraint</th>
<th>2 restraints</th>
<th>3 restraints</th>
<th>4 restraints</th>
<th>5 restraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 20 workers</td>
<td>93 (58%)</td>
<td>39 (25%)</td>
<td>19 (12%)</td>
<td>8 (5%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>21–50 workers</td>
<td>76 (47%)</td>
<td>58 (36%)</td>
<td>22 (13%)</td>
<td>6 (4%)</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>51–100 workers</td>
<td>34 (41%)</td>
<td>25 (30%)</td>
<td>17 (21%)</td>
<td>7 (8%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>101–200 workers</td>
<td>37 (45%)</td>
<td>24 (29%)</td>
<td>20 (24%)</td>
<td>2 (2%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>201–500 workers</td>
<td>93 (38%)</td>
<td>77 (31%)</td>
<td>53 (21%)</td>
<td>24 (10%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>&gt; 500 workers</td>
<td>55 (45%)</td>
<td>32 (26%)</td>
<td>26 (21%)</td>
<td>6 (5%)</td>
<td>4 (3%)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>388 (45%)</td>
<td>255 (30%)</td>
<td>157 (00%)</td>
<td>53 (00%)</td>
<td>5 (0%)</td>
</tr>
</tbody>
</table>
Table 4. Observations, sales destination, vertical restraints, and RPM by sector

<table>
<thead>
<tr>
<th>Sector</th>
<th>Observations</th>
<th>Use of intermediaries</th>
<th>Vertical restraints(^1)</th>
<th>Resale price maintenance(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat-related products</td>
<td>192</td>
<td>181 (94%)</td>
<td>55 (30%)</td>
<td>16 (29%)</td>
</tr>
<tr>
<td>Food and tobacco</td>
<td>654</td>
<td>553 (85%)</td>
<td>212 (38%)</td>
<td>80 (38%)</td>
</tr>
<tr>
<td>Beverages</td>
<td>133</td>
<td>126 (95%)</td>
<td>74 (59%)</td>
<td>27 (36%)</td>
</tr>
<tr>
<td>Textile and clothing</td>
<td>75</td>
<td>502 (67%)</td>
<td>77 (15%)</td>
<td>15 (19%)</td>
</tr>
<tr>
<td>Leather, fur, and footwear</td>
<td>240</td>
<td>193 (80%)</td>
<td>36 (19%)</td>
<td>6 (17%)</td>
</tr>
<tr>
<td>Timber</td>
<td>184</td>
<td>108 (59%)</td>
<td>24 (22%)</td>
<td>4 (17%)</td>
</tr>
<tr>
<td>Paper</td>
<td>187</td>
<td>76 (41%)</td>
<td>17 (22%)</td>
<td>7 (41%)</td>
</tr>
<tr>
<td>Printing &amp; publishing</td>
<td>345</td>
<td>160 (46%)</td>
<td>42 (26%)</td>
<td>31 (74%)</td>
</tr>
<tr>
<td>Chemicals</td>
<td>448</td>
<td>347 (78%)</td>
<td>112 (32%)</td>
<td>38 (34%)</td>
</tr>
<tr>
<td>Plastic &amp; rubber products</td>
<td>343</td>
<td>175 (51%)</td>
<td>42 (24%)</td>
<td>15 (36%)</td>
</tr>
<tr>
<td>Nonmetal mineral products</td>
<td>449</td>
<td>326 (73%)</td>
<td>87 (27%)</td>
<td>21 (24%)</td>
</tr>
<tr>
<td>Basic metal products</td>
<td>194</td>
<td>129 (67%)</td>
<td>29 (22%)</td>
<td>4 (14%)</td>
</tr>
<tr>
<td>Manufactured metal products</td>
<td>623</td>
<td>238 (38%)</td>
<td>69 (29%)</td>
<td>9 (13%)</td>
</tr>
<tr>
<td>Industrial &amp; agricultural equipment</td>
<td>465</td>
<td>203 (44%)</td>
<td>100 (49%)</td>
<td>40 (40%)</td>
</tr>
<tr>
<td>Office mach., data proc., &amp; similar</td>
<td>114</td>
<td>81 (71%)</td>
<td>28 (35%)</td>
<td>12 (43%)</td>
</tr>
<tr>
<td>Electric material &amp; accesories</td>
<td>418</td>
<td>212 (51%)</td>
<td>74 (35%)</td>
<td>19 (26%)</td>
</tr>
<tr>
<td>Vehicles &amp; accessories</td>
<td>303</td>
<td>115 (38%)</td>
<td>49 (43%)</td>
<td>19 (39%)</td>
</tr>
<tr>
<td>Other transportation materials</td>
<td>146</td>
<td>30 (21%)</td>
<td>15 (50%)</td>
<td>7 (47%)</td>
</tr>
<tr>
<td>Furniture</td>
<td>351</td>
<td>258 (74%)</td>
<td>94 (36%)</td>
<td>19 (20%)</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>159</td>
<td>136 (86%)</td>
<td>33 (24%)</td>
<td>7 (21%)</td>
</tr>
</tbody>
</table>

\(^1\)Firms with RPM over the number of firms with restraints (in percentage).
\(^2\)Firms with vertical restraints over the number of firms with intermediaries (in percentage).

Table 5. Sales effort and price restraints (PRs) by firm size

<table>
<thead>
<tr>
<th>Firm size</th>
<th>With PRs</th>
<th>Without PRs</th>
<th>Means Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 200</td>
<td>1.7</td>
<td>1.4</td>
<td>−1.0</td>
</tr>
<tr>
<td>&gt; 200</td>
<td>4.1</td>
<td>2.9</td>
<td>−2.8</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2.2</td>
<td>3.4</td>
<td>−3.7</td>
</tr>
</tbody>
</table>
Table 6. Determinants of resale price maintenance

<table>
<thead>
<tr>
<th></th>
<th>[1]</th>
<th>[2]</th>
<th>[3]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef.</td>
<td>t-ratio</td>
<td>Coef.</td>
</tr>
<tr>
<td>Advertising effort</td>
<td>1.88</td>
<td>3.3</td>
<td>—</td>
</tr>
<tr>
<td>$e_t = z_t \gamma + v_t$</td>
<td>—</td>
<td>—</td>
<td>2.63</td>
</tr>
<tr>
<td>(Exclusive territories only)$_{-1}$</td>
<td>9.77</td>
<td>3.3</td>
<td>9.73</td>
</tr>
<tr>
<td>(Exclusive dealing only)$_{-1}$</td>
<td>-0.27</td>
<td>-0.1</td>
<td>-0.47</td>
</tr>
<tr>
<td>Both restraints</td>
<td>5.34</td>
<td>1.8</td>
<td>5.19</td>
</tr>
<tr>
<td>Large firms (&gt;200 workers)</td>
<td>4.47</td>
<td>3.1</td>
<td>4.55</td>
</tr>
<tr>
<td>% of firms with RPM (same industry)</td>
<td>0.70</td>
<td>2.0</td>
<td>0.77</td>
</tr>
<tr>
<td>Retailer main client</td>
<td>3.41</td>
<td>2.3</td>
<td>2.99</td>
</tr>
<tr>
<td>&gt;50 distributors and wide market</td>
<td>-2.53</td>
<td>-1.8</td>
<td>-3.21</td>
</tr>
<tr>
<td>Constant</td>
<td>0.93</td>
<td>0.5</td>
<td>0.85</td>
</tr>
<tr>
<td>Industry dummies</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
<td>1893</td>
<td>1893</td>
<td>1893</td>
</tr>
<tr>
<td>$R^2$</td>
<td>6%</td>
<td>5%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Test of exogeneity:
- Score Test: Chi2(1) 3.43 (p = 0.064)
- Regression-based test: F(1,1877) 3.44 (p = 0.064)

Test relevance of instruments (First stage):
- F(2,1877) 802.71 (p= 0.00)
- Partial R$^2$ 53%
- Adjusted R$^2$ 61%

Test of overidentification: Chi2(1) 1.40 (p = 0.24)

Estimation method
- LS
- 2SLS
- 2SLS

Notes: Reported values are from the least-squares (column [1]) and two-stage least-squares (columns [2] and [3]) estimation of a linear probability model. The dependent variable is $R$, where $R = 1$ if the firm dictates the price charged by intermediaries. Advertising effort is exogenous in columns [1] but is endogenous in columns [2] and [3].