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The competitive effects of exclusive dealing: Evidence from the U.S. beer industry

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Abstract

Several recent theoretical articles have modeled the effects of exclusive-dealing contracts that restrict dealers to selling a single brand, yet detailed empirical analysis of the impact of exclusivity on actual market outcomes has been lacking. I analyze a unique set of firm-level data on nearly 400 beer distributors in the United States. The impacts of economies of scale and restrictions on distributor promotional activities on the use of exclusive dealing are measured as well as the effects of exclusivity on costs, prices and output. The results support the view that exclusive dealing serves to minimize manufacturer–dealer incentive conflicts and enhances social welfare.

JEL classification: L42; L12; L66

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1. Introduction

Exclusive-dealing contracts, whereby producers prohibit their dealers from selling the products of other manufacturers, have long been the subject of controversy in the courts

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and among economists. Critics argue that such restrictions limit competition and reduce social welfare. In contrast, supporters contend that exclusive-dealing contracts promote efficiency by limiting dealer free-riding or other incentive conflicts between manufacturers and dealers.

Recently, numerous theoretical articles have formally modeled the rationale for exclusive dealing and its competitive effects. Some of the anti-competitive theories emphasize the potential for foreclosure of competing manufacturers while others contend that exclusivity can simply "dampen" competition between existing oligopolistic producers. Efficiency-based theories of exclusive dealing involve various manufacturer–dealer incentive problems including dealer free-riding on manufacturer investments, sub-optimal dealer effort, dealer–manufacturer information asymmetry, and differences in risk aversion between dealers and manufacturers. These models demonstrate that exclusive dealing can arise for a variety of reasons and that in general the net effect of exclusive dealing on social welfare is theoretically ambiguous.

Empirical analysis of exclusive-dealing contracts has been much more limited, focusing primarily on the choice between exclusive and independent agents in the insurance industry. Recent papers by Heide et al. (1998) and Slade (1998) explore the incidence of exclusive dealing and its impact on market prices outside the insurance industry. However, there are still no studies that directly measure the effect of exclusive dealing arrangements on the behavior of individual dealers and their rivals.

I analyze a unique set of firm-level data on beer distribution to gauge the effects of exclusive-dealing contracts on competition and sort out which theories are empirically relevant. The determinants of exclusivity are analyzed and the impacts of exclusive dealing on the cost, price and output of beer wholesalers are explored. The competitive impacts of exclusive dealing are investigated by measuring the effects of exclusivity on the prices and output of rival beer distributors operating in the same geographic territory. Consistent with efficiency-based theories, I find that exclusive dealing is associated with higher brewer prices, higher distributor prices and increased sales. There is no evidence that rivals of exclusive dealers are able to increase price as a result of exclusive dealing.

I begin by summarizing the theoretical literature on exclusive dealing in Section 2. The extant empirical literature is reviewed in Section 3. In Section 4, I provide some institutional background on beer distribution and exclusivity in the U.S. beer industry. Specific empirical implications of the exclusive dealing theories are presented in the context of beer distribution in Section 5. Sections 6 and 7 describe the data and present the empirical results, respectively. The final section summarizes the findings and suggests some implications for antitrust policy toward exclusive dealing.

2. Theoretical literature

The theoretical models of exclusive-dealing contracts can be divided into three general categories based on the primary rationale for exclusive dealing: incentive conflicts, market foreclosure and dampening competition. Table 1 provides a summary of the implications emanating from the various theories within each category.

Table 1
Predicted and estimated effects of exclusive dealing on market outcomes (assuming outputs of rival manufacturers are substitutes)

Model	Manufacturer (brewer) price	Dealer (distributor) price	Output	Rival dealer (distributor) price	Manufacturer non-brand specific investment
Incentive conflicts					
Bernheim and Whinston (1998, sec. 5)	+	+	–		
Besanko and Perry (1993)	+	–	+		+
Graziano and Zaninotto (1997)	+	+	–		
Martimort (1996)		–	+		
Marvel (1982)	+		+		+
Sass and Gisser (1989)	+		+		
Foreclosure					
Bernheim and Whinston (1998, sec. 4)	+	+	–		
Besanko and Perry (1994)	+	+			
Comanor and Frech (1985)	+	+	–		
Matthewson and Winter (1987)	–	?			
Rasmussen et al. (1991)	+		–		
Dampening of competition					
Lin (1990)/O'Brien and Shaffer (1993)	+	–		+	
Slade (1998)	+	+	–	+	
Results	+	+	+	0	0

2.1. Incentive conflicts

In a number of instances, common (non-exclusive) agency produces a conflict between the incentives of manufacturers and dealers. For example, if a manufacturer makes non-brand-specific investments that benefit dealers, but cannot charge for the services directly, he will charge a wholesale price premium as compensation for the investments. A non-exclusive dealer could free ride by using the manufacturer's investment to sell the products of other suppliers. Exclusive-dealing contracts, by protecting the manufacturer's property rights, increase the level of manufacturer investments which in turn increases the wholesale price paid by dealers and the equilibrium quantity sold. Exclusive dealing will raise prices charged by dealers if the investments increase demand (Marvel, 1982) and will depress dealer prices if the investments lower dealer selling costs (Besanko and Perry, 1993).

Incentive conflicts can also arise when dealers have alternative opportunities that diminish the effort they devote to selling the goods of a given manufacturer. By eliminating the option of selling competing brands, an exclusive-dealing contract effectively lowers the opportunity cost of the dealer and thereby raises his effort level and increases sales of the product (Sass and Gisser, 1989). As a result, the optimal dealer commission rate is lower (or wholesale price higher) under exclusive dealing. To gain the dealer's cooperation, however, the manufacturer must have a large enough market share so

that the dealer's total net compensation under exclusive dealing is at least as great as under common agency.[1]

Two other sources of incentive conflicts between manufacturers and dealers are differences in information and risk aversion. In Martimort (1996), dealers know something about demand or selling costs that are not known to the manufacturer. If a manufacturer can only contract on sales of his product and not the dealer's total sales, a non-exclusive dealer can exploit his private information and earn some informational rents. However, a common (non-exclusive) dealer can choose the output of each manufacturer so as to achieve the cooperative values, thereby facilitating manufacturer collusion and reducing total output. When the products of different manufacturers are substitutes, the probability manufacturers will choose exclusive dealing is directly related to the spread of the distribution of the retailer's private information.

In Bernheim and Whinston (1998, sec. 5), incentive conflicts arise from differences in risk aversion. Risk neutral manufacturers set wholesale prices and a single risk averse retailer selects the retail price, which is unobservable (and hence uncontractable). Given the differences in risk aversion, the retailer will not select the optimal quantity from the manufacturer's perspective. Exclusive dealing arises when the gain from having the products of multiple manufacturers available through a common agent is small relative to the loss associated with manufacturer–dealer incentive conflicts. In the absence of exclusive dealing, one manufacturer can encourage sales of his product by cutting price, which reduces sales of the other manufacturer and imposes an externality. The externality is eliminated when the retailer becomes an exclusive dealer. This coordination aspect of exclusive dealing would tend to push up wholesale and retail prices and lead to a reduction in output.

Graziano and Zaninotto's (1997) model of exclusive dealing combines elements of Martimort's and Bernheim and Whinston's theories. As in Martimort's model, common agency facilitates interbrand pricing coordination at the retail level. However, if the products of rival manufacturers are substitutes, each manufacturer will compete on the wholesale price to induce a common agent to promote his product at the expense of rivals' products. Consequently there is a tradeoff between the coordination in pricing policy at the retailing stage obtained under common agency and the more aggressive pricing policy chosen by the manufacturers when they use the same agent. As in Bernheim and Whinston, manufacturers do not take into account the impact of changing their prices on the sales of their rival's product. Manufacturers set prices above marginal cost and retail prices are correspondingly greater (and output lower) with exclusive dealing than under common agency. Graziano and Zaninotto conclude that when products are substitutes, the main elements in favor of common agency are economies of scale and scope, rather than strategic elements.

2.2. Foreclosure

An alternative explanation for the use of exclusive dealing is to restrict competition by foreclosing the market to competitors. Several models of foreclosure have been presented

[1] Brennan (1989) applies similar logic in a more formal model of constraints on outside opportunities in employment contracts.

in the literature (Comanor and Frech, 1985[2]; Matthewson and Winter, 1987; Rasmussen et al., 1991; Besanko and Perry, 1994; Bernheim and Whinston, 1998, sec. 4). The common theme is that one manufacturer possesses some initial advantage, such as being the first mover in a market, having lower production costs or possessing a unique product. The manufacturer can then induce retailers to sign exclusive-dealing contracts which either preclude future entry entirely or at least raise the distribution costs to potential entrants.[3] This generally leads to higher wholesale and retail prices and decreases in both output and social welfare.

A somewhat different outcome is obtained by Matthewson and Winter (1987). In their model, a single monopoly retailer operates in each market and two manufacturers sell substitute differentiated products. One manufacturer is assumed to have a cost advantage in production of the good and manufacturers compete on wholesale price for the right to be the exclusive supplier. Fixed franchise fees are assumed away so competition between manufacturers occurs only through the wholesale price.[4] The low-cost manufacturer, being able to offer a lower wholesale price to the retailer, captures the market. In their model exclusive dealing has two effects: it reduces the choice set for consumers but also leads to a lower wholesale price. The retail price could go up or down. If retail price falls enough to outweigh the reduction in consumer choice, consumers could end up better off.

Another significant variant is Besanko and Perry's (1994) model of partial foreclosure. In their model, two symmetric manufacturers offer differentiated brands and retailers are spatially differentiated. In the absence of exclusive dealing, consumers can obtain either brand at any retailer so retail and brand competition are separable. Under exclusive dealing, all retailers sign exclusive contracts with one manufacturer or the other, thereby excluding a given manufacturer from a particular retail outlet, but not from the market as a whole. This leads to higher retail prices and higher transport costs for consumers as neighboring retailers are no longer direct competitors (since they carry different products) and some consumers must travel longer distances to purchase their most-preferred brand. Manufacturers earn higher profits under exclusive dealing and thus prefer it to common agency. While exclusive dealing limits retail competition, it also reduces the fixed costs of retailing which induces retail entry, leaving the overall effect on social welfare ambiguous.

[2] Comanor and Frech's model is criticized by Schwartz (1987) because the equilibrium is not subgame perfect.

[3] Segal and Whinston (2000) demonstrate that if the manufacturer offering exclusive-dealing contracts cannot discriminate among retailers, both exclusionary and non-exclusionary equilibria exist. All retailers are worse off with exclusion so exclusion will only succeed if retailers cannot coordinate their actions to jointly refuse an exclusionary contract. When the monopolist can offer bribes to only some retailers, however, exclusion is possible and can be coalition-proof.

[4] The exclusion of fixed franchise fees is a key assumption of the Mathewson and Winter model. In a later paper, O'Brien and Shaffer (1997) formulate a similar model, but assume manufacturers can charge fixed fees. This allows manufacturers to extract the full value of their product without resorting to exclusive dealing arrangements and exclusive dealing contracts are either redundant or are dominated by non-foreclosure equilibria. Similarly, Bernheim and Whinston (1998, sec. 3) demonstrate that exclusive dealing contracts are superfluous if the manufacturer can induce retailers to select the joint-surplus-maximizing output through other contractual mechanisms.

2.3. Dampening of competition

The third proposed rationale for exclusive dealing is to restrict interbrand competition among manufacturers by reducing the perceived elasticity of demand for their products. This approach emanates from the exclusive-territory models of Rey and Stiglitz (1988, 1995).

Lin (1990) assumes there exist two oligopolistic manufacturers producing competing brands, but no intrabrand competition in retailing (i.e. one retailer per brand in a market). If a manufacturer unilaterally lowers his wholesale price, the retailer will lower the retail price of that brand and competing dealers (selling other brands) will have a strong incentive to cut their retail prices, thereby reducing the manufacturer's gain from price cutting. In contrast, under common agency, a single monopoly retailer sells all brands. If one manufacturer lowers its wholesale price, the monopoly retailer will be less inclined to lower the prices of alternative brands since customers switching to the reduced-price brand are not switching retailers. As a result, a manufacturer's perceived demand is less elastic and equilibrium wholesale prices will be higher under exclusive dealing. The higher wholesale price under exclusive dealing tends to increase retail prices, but this is overshadowed by the increase in (interbrand) retail competition and thus retail prices are lower under exclusive dealing.[5]

Slade (1998) reinterprets the work of Rey and Stiglitz (1995) on exclusive territories to shed light on the use of exclusive dealing in the U.K. beer market. In contrast to Lin, brewers sell to multiple retailers in Slade's model. As in Lin's model, the reduction in perceived elasticity engendered by exclusive dealing leads to increases in wholesale prices. However, in Slade's model, retail prices also unambiguously rise with a corresponding reduction in the quantity sold. When franchise fees are used in conjunction with exclusive dealing, wholesale and retail prices are lower than in the absence of fees since manufacturers can extract surplus through fees rather than higher prices (though the prices are still higher than under nonexclusive dealing). Retail markups under exclusive dealing are invariant to the existence of franchise fees while manufacturers earn higher markups with franchise fees than without.

3. Empirical literature

Most of the extant empirical literature analyzes the choice between exclusive and independent agents in the insurance industry.[6] Since these studies focus on the incidence of exclusive dealing, they provide no direct tests of the competitive impacts of exclusive contracts.

[5] Lin initially argued that when fixed franchise fees are allowed, retail prices will be higher under exclusive dealing. However, O'Brien and Shaffer (1993) demonstrate that if a common agent can threaten not to carry one brand and the rejected manufacturer cannot sell to an independent retailer then the retailer can extract some of the surplus. Under these conditions, the retail price is lower under exclusive dealing.

[6] I only discuss those insurance-industry articles that contain empirical evidence relevant to the general theories of exclusive dealing. For additional empirical analyses of exclusive dealing in the insurance industry, see Posey and Tennyson (1998) and references therein.

Marvel (1982) finds that exclusive dealing is more prevalent in personal insurance lines than in business lines. He attributes the difference to greater relative efficiency of agent-level promotional effort in business lines and the greater demand for agent service among business insurance customers. Marvel also provides evidence that independent (non-exclusive) agency market shares are positively related to commission rates and negatively correlated with other acquisition expenditures, including company-level advertising. These results are consistent with his hypothesis that exclusive-dealing contracts are used to protect manufacturer's property rights in non-brand-specific promotional investments.

Sass and Gisser (1989) argue that an important determinant of exclusive-dealing contracts is the relative size of the firm and the potential market. Firms must be able to generate sufficient sales so that exclusive agents earn at least what they could earn as non-exclusive dealers for competing firms. Using the same data as Marvel, but including controls for relative firm size and population density, Sass and Gisser find that both per capita revenues and population density are positively correlated with the incidence of exclusive dealing. However, when these size controls are included, the correlation between exclusive dealing and insurer advertising is not statistically significant. Agent compensation, in the form of commission rates, is shown to be negatively correlated with the use of exclusive dealing. However, company-level advertising expenditures do not have a statistically significant impact on commission rates.

Kim et al. (1996) find limited support for Marvel's free-riding hypothesis; advertising-to-premium ratios are higher for non-group (single-firm) exclusive agency insurers than for non-group firms marketing through independent agents. However, no statistically significant difference in advertising expenditures was found for insurance groups. Further, in contrast to Marvel, they find small companies with higher proportions of personal to commercial direct writings are less likely to utilize exclusive agents.

Consistent with Sass and Gisser's minimum-scale hypothesis, Kim, Mayers and Smith find that geographic concentration (premium dollars per capita) is positively correlated with the use of exclusive agents. However, total firm size (measured by direct premiums written) is not significantly correlated with the use of exclusive dealing. Regan and Tennyson (1996) find that exclusive agency market shares are positively correlated with both measurers of firm size and population density, providing further support for the Sass–Gisser hypothesis.

Only two studies empirically investigate the contemporary use of exclusive-dealing contracts outside the insurance industry. Heide et al. (1998) analyze subjective survey data on the incidence of exclusive dealing and Slade (1998) studies the price effects of exclusive dealing in the context of vertical disintegration.

Heide, Dutta and Bergen survey managers of 147 firms in the industrial machinery and electric equipment industries to determine the motivation for exclusive-dealing contracts. Consistent with Marvel's hypothesis, they find a positive correlation between exclusive dealing and managers' perceptions of the potential for competitor free riding on services provided to distributors. They also find that where managers perceive the costs of enforcing exclusivity are high or consumer's preferences for multi-line distributors are relatively strong, exclusive contracts are less likely to be used. In contrast, there is no significant correlation between firm size or perceived likelihood of market entry and the use of exclusive dealing.

Slade (1998) uses the "dampening of competition" model to analyze the impact of vertical disintegration on prices and profits in the U.K. beer industry. While the focus of her analysis is on the effects of a forced divestiture of pubs by brewers, she also notes that pubs not owned by brewers and without any exclusivity restrictions ("free pubs without loan ties") received lower average wholesale prices and charged lower retail prices on average than pubs leased from brewers with exclusivity provisions ("tenated houses") or independently owned pubs that receive below-market loans from brewers and are subject to exclusivity provisions ("free houses with loan ties"). While these findings are consistent with her dampening-of-competition model, they are also consistent with other explanations for exclusive dealing, including models of foreclosure and incentive conflicts.

4. Exclusive dealing in the U.S. beer industry

Unlike previous empirical studies, which focus almost entirely on the insurance industry, I analyze the causes and consequences of exclusive dealing among U.S. beer distributors. The beer industry has some distinct advantages over insurance markets as a laboratory for testing theories of exclusive dealing. First, since they deal in physical commodities, the issues facing brewers and beer distributors are more similar to those of other manufacturers than are the problems faced by insurers and their agents. For example, the identity of consumers (and their likelihood of incurring losses) is important to insurers but not to most manufacturers. Similarly, issues of maintaining product quality and insuring adequate retail inventories are relevant to beer distribution and the sale of other manufactured goods, but not insurance. Second, since there is a physical commodity that changes title, a wholesale price is observed rather than simply an agent's commission rate. Third, there is greater intra-company variation in the use of exclusive dealing among brewers than insurers, thereby allowing one to control for confounding factors related to the identity of the company or product. For a given product, an insurer typically uses either exclusive or independent agents but not both, while all of the major U.S. brewers employ a mix of exclusive and non-exclusive distributors for their product.

In order to interpret the use of exclusive dealing in beer distribution, it is useful to understand the institutional and structural context of the market. Beer is marketed primarily through a three-tier system in the United States; it is sold by brewers to independent distributors who in turn sell to retailers. Brewers set constant per-unit prices for beer and do not charge distributors explicit franchise fees. Distributors in turn independently set simple linear wholesale prices to retailers. In addition to producing the physical product, brewers engage in advertising and other forms of product promotion and provide training to their distributors.[7] Distributors warehouse the product, deliver to

[7] Brewers engage in both independent national and regional advertising and in local cooperative advertising and local promotional events with their distributors. The training that brewers provide can be both general (personal sales skills, shelf-management techniques, warehouse design) and brand specific (information about particular promotions, product attributes).

retailers, engage in local advertising and point-of-sale promotions, sponsor community events, and monitor the freshness of beer on store shelves. Distributors are also often responsible for stocking beer on store shelves and maintaining an attractive display of the product.

Exclusive dealing arrangements between brewers and distributors have existed for many years.[8] While the use of exclusive dealing varies among brewers, the three largest U.S. brewers (Anheuser–Busch, Miller and Coors) all have some distributors that exclusively market their products. Although exclusive dealing could potentially limit the distribution channels for regional beers and microbrews, it does not seem to foreclose any of the largest domestic brewers at the wholesale level.[9] A–B, Miller and Coors products appear to be universally available in the United States. Contrary to the assumptions underlying many of the theoretical models, the absence of exclusive dealing rarely leads to pure common agency in the beer industry. All major brewers assign exclusive territories to their distributors so there is little or no intrabrand competition among distributors in a market.[10] Although it is not unusual for a single distributor to carry the products of two or more major domestic brewers, it is rare that all of the top-three brewers use the same distributor. It is even more infrequent that a distributor possesses a pure monopoly in a market and acts as a common agent for all brewers.[11]

5. Empirical implications and application to the U.S. beer industry

The testable implications that flow from the theoretical literature fall into two categories: when exclusive dealing will occur and the impact of exclusive dealing on equilibrium market outcomes.

5.1. Incidence of exclusive dealing

The foreclosure theories are predicated on the assumption that economies of scale or capacity constraints limit entry into the retail market. As Rasmussen et al. (1991)

[8] See, for example, *Campbell Distributing Co. v. Jos. Schlitz Brewing Co.,* 208 F. Supp. 523 (1962), where the plaintiff alleges Schlitz attempted to impose exclusivity in the 1950s. Exclusive dealing may also occur in on-premise retail outlets. See, for example, *Adolph Coors Co. v. FTC*, 497 F. 2d. 1178 (1974).

[9] On January 1, 1997 (after my period of analysis) A–B began an "Exclusivity Incentive Program" designed to encourage more of its distributors to only carry Anheuser–Busch products. The program, dubbed "100% Share of Mind", included cash payments of 2 cents per case, extended days of credit on beer purchases and a $1500 per truck painting allowance. Distributors choosing to go exclusive were also allegedly given priority when assigning new distribution territories. A–B also modified their contracts with all distributors in August 1997 to require that distributors devote their "primary efforts" to promote, sell and service A–B products in their territories. A number of small regional brewers claimed that their beers were dropped by Anheuser–Busch distributors as a result of the program and this created difficulties in finding distributors for their products. See Wilke and Ortega (1997, 1998) and *In re Beer Distribution Antitrust Litigation,* 188 F.R.D. 557, 1999 U.S. Dist. LEXIS 18431 (1999).

[10] The one exception is the state of Indiana, where until recently the use of exclusive territories was banned. For a detailed discussion of exclusive territories in the U.S. beer industry, see Sass and Saurman (1993).

[11] In the data sample, the highest local market share of any distributor is 85%.

demonstrate, if there are no economies of scale then foreclosing access to the downstream market through exclusive contracts is impossible. As economies of scale rise relative to the size of the market it becomes easier to exclude potential entrants since the number of dealers that must agree to exclusivity in order to leave a residual demand less than the minimum efficient scale is reduced. Thus if foreclosure is the motivation for exclusive dealing, the use of exclusive-dealing contracts in beer distribution should be negatively correlated with market size. However, the participation constraint for dealers implies that exclusive dealing will be more prevalent in larger markets. Distributors will only accept an exclusive-dealing contract if they earn at least as much as they would selling the products of other firms. Small markets or brewers with a small market share would not be able to generate sufficient business to support an exclusive dealer.

Marvel's and Besanko and Perry's models imply the use of exclusive dealing will be positively correlated with brewer provision of non-brand specific investments such as advertising. Greater levels of brewer advertising increase the potential loss from distributors switching their retail customers to different beers, thereby enhancing the desire for exclusivity by brewers. Similarly, exogenous constraints on distributor-level promotion, such as state laws banning outdoor advertising of malt beverages, should enhance the value of national advertising by brewers and increase brewer's incentives to obtain exclusivity.

Martimort's information-asymmetry argument implies the greater the informational advantage of distributors, the greater the gain to brewers from imposing exclusive dealing. In Martimort's model, manufacturers decide ex-ante whether to offer exclusive or non-exclusive contracts to dealers. Thus the probability of exclusive dealing increases with the informational advantage of dealers. However, in the beer industry the ability of brewers to support exclusive dealers and the information asymmetry between brewers and distributors may fluctuate over time. As the population of a market grows or the market share of a brewer expands, the feasibility of exclusive dealing is enhanced. Thus, over time a brewer may want to convert distributors from common agents to exclusive agents. Since exclusive dealing lowers dealer informational rents, the likelihood that dealers would voluntarily accept exclusivity ex-post diminishes with their informational advantage. The longer a distributorship is operated by an individual or family, the more specific market knowledge they will acquire and the greater will be their informational advantage over brewers. Thus in a dynamic setting, we should observe an inverse correlation between dealer tenure and exclusive dealing.

5.2. Firm behavior

The theories of exclusive dealing are nearly unanimous in predicting that exclusive dealing is associated with higher manufacturer (i.e. brewer) prices. The incentive-conflict models all imply that exclusive dealing will lead to higher brewer prices. For example, in Marvel's and Besanko and Perry's free-riding models, exclusivity leads to increased brewer promotional investment which is paid for by distributors in the form of higher prices. In the Sass and Gisser model of agent effort, exclusivity increases distributor promotional or service effort. If the marginal effect of increased

compensation on distributor effort is lower at higher effort levels then the optimal price charged by brewers to distributors will be higher under exclusive dealing. Graziano and Zaninotto predict that exclusive-dealing contracts will result in higher prices due to decreased competition among manufacturers vying to have distributors promote one product over the other. The "dampening of competition" models infer that exclusivity raises the manufacturer's price because of a reduction in the perceived elasticity of demand. Most of the foreclosure models also infer that exclusivity leads to higher manufacturer prices as competitors are excluded from the market. The exception is Mathewson and Winter's model where manufacturers compete for exclusive access to a retailer by lowering the wholesale price.

There is greater diversity in the models' predictions of the relationship between exclusivity and dealer (distributor) prices. The incentive-conflict models of Bernheim and Whinston (Section 5) and Graziano and Zaninotto predict that exclusive dealing leads to higher manufacturer (brewer) prices which in turn produces higher downstream (distributor) prices. However, in Besanko and Perry (1993), exclusivity enhances manufacturer (brewer) investments that lower downstream (distributor) selling costs and therefore reduce downstream (distributor) prices. Martimort's model predicts that exclusive dealing is associated with lower distributor prices since the coordination that occurs through a single common agent is lost and interbrand competition among distributors drives prices down. With the exception of Matthewson and Winter, the foreclosure models all predict that exclusive dealing leads to higher downstream prices. In Bernheim and Whinston (Section 4), entry is precluded which enhances the remaining firm's market power and leads to higher prices. In Commanor and Frech's foreclosure model, exclusive dealing by an incumbent forces entrants to use an alternate, higher cost, distribution channel which results in higher prices to consumers. In Besanko and Perry (1994), the changing nature of competition under exclusive dealing leads to higher retail prices for consumers as neighboring retailers are no longer direct competitors (since they carry different products).

The models of exclusive dealing also diverge in their implications for equilibrium output. The foreclosure models claim that exclusive dealing limits entry and enhances the market power of incumbent firms. Therefore they generally predict that exclusive dealing reduces firm output. The incentive-conflict models of Bernheim and Whinston (Section 5) and Graziano and Zaninotto (1997) also predict that exclusive dealing lowers output. In contrast, the free-riding models of Marvel (1982) and Besanko and Perry (1993) argue that exclusive dealing promotes manufacturer investments that enhance demand or reduce dealer costs and hence increase equilibrium output. In the Sass and Gisser model, switching from common agency to exclusive dealing increases dealer effort which boosts sales of the remaining brand. The "dampening-of-competition" model of Slade predicts that exclusive dealing limits interbrand competition at the manufacturing (brewer) level, leading to a reduction in output.

The dampening-of-competition models also have implications for the behavior of rival firms. By reducing the perceived elasticity of demand, exclusive dealing should lead rival firms to charge higher prices and sell less output. In contrast, the incentive-conflict models have no explicit predictions for the impact of exclusive dealing on the behavior of rivals.

6. Data and methodology

The primary source of data for the analysis of exclusive dealing in the beer industry is the *1996/97 Distributor Productivity-Brand Equity Survey* conducted by Industry Insights for the National Beer Wholesalers Association (NBWA). The survey asked detailed questions about sales, costs, promotional activities, ownership and sales territories of individual beer wholesalers for the year 1996. The survey was mailed in July, 1997 to all licensed US beer wholesalers with a nontrivial quantity of beer sales. A total of 1823 NBWA members and 560 nonmembers were sent surveys. After a number of reminders, 391 responses to the survey were received by mid-October 1997, yielding a response rate of 21%. After the initial responses were received, data were checked for consistency and follow-up contacts were made to correct errors and clarify questionable responses.

The responding firms are larger on average than the industry as a whole, with average annual sales of $26.4 million and average employment of 67 workers compared to the national per-firm averages of $11.6 million in sales and 32 employees.[12] However, there is considerable variation within the surveyed sample, annual sales range from $0.5 million to $260 million and employment ranges from 2 workers to 583. The incidence of exclusive dealing among the sampled A–B distributors closely resembles that in the population of all A–B distributors. Among the A–B distributors in the sample, 39% sell A–B products exclusively while 41% of all distributors carrying A–B products were exclusive at the end of 1996.[13] The distribution of sampled distributors is also roughly equivalent to the distribution of national sales by brand. For example, A–B distributors account for 44% of the sampled distributors while A–B enjoyed a 45.4% national market share in 1996.

Ancillary data on supply and demand factors, including the demographic makeup of sales territories, shipping distances, tax rates, brewer advertising and state-level market shares were obtained from variety of sources and matched to the NBWA survey data. Detailed descriptions of the variables used in the analysis and the data sources are provided in Appendix A.

7. Results

7.1. The incidence of exclusive dealing

The incidence of exclusive dealing in the beer industry will depend on the expected benefits to brewers from having an exclusive distributor and the potential cost to distributors from forsaking sales of competing brands. As discussed above, the potential benefits of exclusive dealing as an exclusionary device as well as the willingness of distributors to become exclusive depends on market size. I measure potential sales by

[12] National figures are based on data from the 1997 Economic Census.

[13] See Wilke and Ortega (1998). Unfortunately, no comparable figures on the incidence of exclusive dealing among the population of non-A–B distributors are available.

Table 2
Incidence of exclusive dealing by primary supplier

Primary supplier	Number of distributors in sample	Number exclusive	Percent exclusive
Anheuser–Busch	168	65	38.7
Miller	116	2	1.7
Coors	59	1	1.7
Stroh/Heileman	31	1	3.2
Pabst	7	0	0.0
Total	381	69	18.1

the population of the distributor's sales territory and the state-level market share of the distributor's primary supplier.[14] The manufacturer-investment theories suggest brewers gain the most from exclusivity when non-brand-specific investments are important. I use two variables to capture the relative importance of manufacturer investments: the level of national advertising by brewers and laws that restrict intra-state outdoor advertising by distributors and retailers. Finally, the information-asymmetry model argues that gains from exclusivity are driven by informational advantages of distributors. I utilize the number of years a distributorship has been held by the current owner's family as a gauge of their knowledge of local market demand and cost conditions.

A breakdown of the use of exclusive dealing by brewer is presented in Table 2. It is readily apparent that market share is an important determinant of the use of exclusive dealing. Nearly 40% of Anheuser–Busch distributors in the sample sell only A–B products. Less than 2% of distributors whose primary supplier is Miller (the second largest brewer based on national sales) sell only Miller products. Smaller brewers like Coors, Stroh and Pabst have few or no exclusive distributors in the sample.[15] Thus 65 of the 69 exclusive dealers in the sample are A–B distributors.[16]

Confirmation of the importance of scale is provided in the multivariate analysis of the incidence of exclusive dealing presented in Table 3.[17] In the full sample including all distributors, both sales-territory population and supplier statewide market share are positively correlated with the incidence of exclusive dealing. For example, A–B

[14] Since the market share data are at the state level, it should be exogenous to individual distributor contractual decisions. Further, the observed variation across states in the market share of particular brewers appears to be related to regional differences in consumer tastes and not due to brewers decisions about exclusivity of their distributors.

[15] Since the survey was written, two major transactions occurred that have changed the identities of the leading domestic brewers. On July 1, 1996 Stroh completed its acquisition of G. Heileman Brewing. Later, in April 1999, Stroh exited the industry, selling its breweries and brands to Miller and Pabst. Now the four largest brewers (in order) are Anheuser–Busch, Miller, Coors and Pabst.

[16] A sample of 13 states from the *1996 Beverage Marketing Directory* indicated that exclusive dealers are overwhelmingly A–B distributors. There were a total of 115 exclusive-dealing distributors representing one of the top-5 domestic brewers in these states. The supplier breakdown for exclusive dealers was A–B—103, Miller—5, Coors—3, Heileman—4, Pabst—0.

[17] The sample sizes are reduced in large part due to the fact that state-level market-share data are not available for 11 states.

Table 3
Probit estimates of exclusive dealing (reported coefficients are marginal effects)

Explanatory variable	All distributors	Anheuser–Busch distributors
Population of sales territory	0.0001* (1.87)	0.0005** (1.99)
State-level market share of primary supplier	0.0079** (2.79)	0.0338** (4.16)
Years distributorship owned by current owner's family	−0.0017** (2.10)	−0.0078** (2.70)
National advertising by primary supplier	−0.0002 (0.38)	
State ban on billboard/sign advertising	−0.0955** (2.12)	−0.4808** (2.83)
Constant	−0.3202** (3.60)	−1.5807** (3.83)
N	215	87
Psuedo-*R*2	0.428	0.299
Proportion correctly predicted	0.884	0.759

An * indicates significance at the 10% and ** denotes significance at the 5% level in a two-tailed test. Absolute values of the asymptotic *t*-ratios appear in parentheses. Psuedo-*R*2 equals $1-(\log(L_{\max})/\log(L_0))$ where $\log(L_{\max})$ is the log likelihood of the estimated model and $\log L_0$ is the log likelihood of a model with only a constant.

distributors in a state where A–B has a 60% market share (e.g. Arkansas) would be 24 percentage points more likely to be exclusive, all else equal, than in a state where the statewide A–B market share is 30% (e.g. Oregon). Similarly, a market with an adult population of 1,000,000 would have a 4 percentage point higher probability of supporting an exclusive distributor than the average size market (in the sample) of 360,000. This observed positive correlation between market size and the likelihood of exclusive dealing runs counter to the notion that exclusive dealing is an exclusionary device in the beer industry.

The estimates of the incidence of exclusive dealing also shed light on the relevance of the manufacturer-investment and information-asymmetry models. Contrary to the manufacturer-investment models, national advertising by brewers is not significantly correlated with the probability of exclusive dealing and state-level bans on outdoor advertising are negatively correlated with the incidence of exclusive dealing.[18] Contrary to Martimort's original asymmetric-information hypothesis, the likelihood of exclusive dealing declines with distributor tenure in both specifications. This negative correlation between distributor tenure and exclusivity is consistent, however, with a dynamic interpretation of Martimort's model in which distributor's are reluctant to forego informational rents they have acquired over time.

Given that nearly all exclusive dealers in the sample are A–B distributors, there exists the possibility that the full-sample results could reflect unmeasured characteristics associated with A–B distributorships, rather than exclusivity. To account for this

[18] The negative coefficient on national advertising likely results from the fact that Miller advertises almost as heavily as A–B but has about half the market share and a much smaller proportion of exclusive dealers. In addition to the regressions reported in Table 3 I also estimated exclusive-dealing equations that included market-specific advertising expenditures by brewers. Since advertising data are only available for larger media markets, this resulted in a significantly reduced sample size. For this smaller sample, neither national or local advertising expenditures by brewers had a significant effect on the probability a given distributor would be an exclusive dealer.

possibility, I also estimate the determinants of exclusivity for A–B distributorships alone. The results are very similar to those for the full sample.

7.2. The impact of exclusive dealing on own-firm's cost, price and output

I estimate the relationship between exclusive dealing and four outcomes: brewer price, distributor price, primary (highest sales volume) brand output and total (all brands) output. Reduced-form equations, rather than structural equations, are estimated to avoid problems associated with estimating a system of simultaneous equations.[19]

Brewer prices are modeled as a function of brewer costs as well as the derived demand for beer from distributors. Brewer costs are represented by shipping distances from the primary supplier's nearest brewery to the distributor, state-level restrictions on outdoor advertising of beer and by the sum of state and federal taxes per case of beer. Following other alcoholic beverage studies, demand determinants include income and the size and age distribution of the population.[20] The allocation of sales across the three major domestic brewers as well as a dummy for distribution of foreign beers are included in the model to account for other (unmeasured) brand-specific brewer costs and demand factors.

The distributor's price and per-capita quantity sold of his primary brand is hypothesized to depend on demand determinants, brewer costs (which determine the wholesale price of beer) and other distributor costs. Distributor-specific costs include the costs of delivering beer to retailers, measured by the number of stops per delivery-truck route,[21] and the market knowledge and experience of distributors, proxied by the number of years a distributorship has been owned within a family. The identity of the primary supplier is included to control for brand differences that could influence product costs and consumer demand.

The total quantity of beer sold is modeled as a function of all of the factors underlying cost and demand, namely brewer costs, distributor costs and variables representing consumer tastes and preferences.

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[19] Although reduced-form equations are being estimated, there may still exist a correlation between regressors and errors if factors that increase the likelihood of exclusive dealing also effect cost, price or output and are omitted from the outcome equations. Hausman tests for the endogeneity of exclusive dealing fail to reject the null hypothesis that OLS is consistent. Although the fit of the first-stage exclusive dealing equation is relatively good (pseudo-R^2 of 0.4), any weakness in the instruments for exclusive dealing would tend to bias the two-stage least squares estimates toward the OLS estimates and bias the Hausman test toward not rejecting the consistency of OLS. Of course the potential for omitted variable bias and the problems of finding good instruments are not unique to the study at hand. In order to minimize the potential for omitted variable bias, I have included as explanatory variables any (measured) determinants of exclusive dealing that might be reasonably expected to influence outcomes in the cost, price and output equations. The effect of exclusive dealing is therefore identified by the omission of state-level market shares from the outcome equations and the nonlinear functional form of the probit.

[20] Various other possible demand determinants, including race/ethnicity, religious affiliation, and the extent of tourism were also tried but had little explanatory power. Their inclusion did not significantly alter the estimated impact of exclusivity on market outcomes.

[21] Two measures of the mix of retail accounts, the percent of on-premise retailers and the percent of chain-store accounts, were also tried as proxies for distribution costs. Including these variables reduced the sample size considerably and did little to improve the explanatory power of the model. Their inclusion did not alter the basic findings with respect to the impact of exclusive dealing on market outcomes.

Table 4
SUR estimates of the effect of exclusive dealing on supplier and distributor prices and distributor output [all distributors]

Explanatory variable	L(suppliers' average price)		L(distributor's price of primary brand)		L(distributor's per-capita sales of primary brand)		L(distributor's per-capita sales of all brands)	
Exclusive dealer	0.0630**	(2.73)	0.0368**	(2.13)	0.3241**	(3.09)	0.2816**	(2.74)
L(distance to brewery)	0.0141*	(1.90)	0.0118*	(1.72)	−0.0531	(1.31)	−0.0076	(0.22)
L(excise tax rate)	0.0471**	(3.89)	0.0339**	(3.02)	0.0194	(0.29)	−0.0004	(0.01)
State ban on billboard/sign advertising	0.0135	(0.79)	0.0018	(0.11)	−0.0379	(0.39)	−0.0834	(1.02)
L(income)	−0.0107	(0.34)	0.0047	(0.16)	−0.1277	(0.75)	−0.1022	(0.71)
Percent age 20–44	0.0028*	(1.95)	0.0030**	(2.28)	−0.0052	(0.66)	−0.0018	(0.27)
Population of sales territory	0.0173**	(2.21)	0.0006	(0.08)	−0.1570**	(3.68)	−0.1452**	(4.04)
L(stops per route)			0.0110*	(1.92)	−0.0190	(0.39)	−0.0361	(0.88)
L(years distributorship owned by current owner's family)			−0.0016	(0.21)	0.0698	(1.35)	0.0646	(1.57)
Percent of sales—AB	0.0020**	(5.09)					0.0023	(1.44)
Percent of sales—Miller	0.0018**	(4.62)					−0.0008	(0.55)
Percent of sales—Coors	0.0026**	(5.30)					−0.0035*	(1.79)
Carry imports	0.0432**	(2.60)					0.0788	(1.31)
Primary supplier—AB			0.2179**	(6.77)	0.9531**	(5.60)		
Primary supplier—Miller			0.1731**	(5.46)	0.5488**	(3.33)		
Primary supplier—Coors			0.2524**	(7.43)	0.0813	(0.47)		
Constant	1.7296**	(13.51)	1.9422**	(16.41)	1.7769**	(2.49)	2.1210**	(3.49)
N=203	System-weighted $R2$=0.334							

An * indicates significance at the 10% and ** denotes significance at the 5% level in a two-tailed test. Absolute values of the t-ratios appear in parentheses.

Seemingly Unrelated Regression (SUR) estimates[22] of the relationship between exclusive dealing and cost, price and output for the entire sample appear in Table 4. Controlling for brewer cost and demand determinants, prices brewers charge to exclusive

[22] Given I am estimating reduced-form equations, there is no direct simultaneity problem. Further, as discussed in note 19, Hausman tests fail to reject the null hypothesis that exclusive dealing is exogenous and OLS is consistent. Also, changing distributor contracts is costly and they are altered rather infrequently. Only 5% of distributors in my sample changed exclusive dealing status between 1995 and 1996. Similarly, only 6% of sampled distributors experienced any changes in the assigned sales territory between 1995 and 1996. Thus the exclusive-dealing contract decision can be viewed as essentially predetermined. Therefore, current market conditions should have little effect on the choice of contract. However, shocks that effect one equation, say brewer prices, would also likely effect the others, suggesting the cross-equation disturbances are correlated and ordinary least squares (OLS) is inefficient. Indeed, likelihood ratio tests reject the null hypothesis that the disturbances are uncorrelated across equations thus necessitating the use of SUR rather than single-equation OLS. The disadvantage of SUR relative to OLS is that it requires valid observations common to all four equations. In order to maintain a sufficient number of degrees of freedom, missing values of three variables, stops per delivery route, years distributorship owned by present owner's family, and sales-territory population were imputed using the multiple imputation method of Rubin (1987) as implemented in the SAS procedures PROC MI and PROC MIANALYZE. The OLS estimates (without imputation) of the effects of exclusive dealing are identical in terms of signs and statistical significance and are similar in magnitude to the SUR results presented in Tables 4 and 5.

dealers are estimated to be 6% higher than the prices charged to non-exclusive dealers.[23] Correspondingly, prices charged by exclusive distributors are 4% higher, on average, than the prices charged by non-exclusive distributors. Consistent with predictions of the free-riding and dealer-effort models (and contrary to the foreclosure and dampening-of-competition models), exclusive dealing is positively correlated with sales of the distributor's primary brand. Per-capita sales of the primary brand are estimated to be 38% higher when a distributor sells only that brand. This increase in primary-brand sales more than offsets sales foregone by not carrying other brands, leading to a 33% increase in per-capita total sales.

Estimates of the reduced-form cost, price and quantity equations for the subsample of A–B distributors are presented in Table 5. The results generally mirror those from the full sample. Exclusive dealing among A–B distributors is associated with 6% higher brewer prices, 5% higher distributor prices, a 29% increase in per-capita A–B sales and a 23% increase in total sales per capita.

7.3. The impact of exclusive dealing on rival's cost, price and output

The dampening-of-competition models predict that exclusive dealing will decrease the perceived demand elasticity faced by a brewer and increase the prices charged by distributors of rival beers. To test these predictions, I now turn to an analysis of the impact of exclusive dealing on the behavior of rivals.

Given the predominance of A–B distributors, each A–B distributor was used as the starting point for determining the identity of rivals. All non-A–B distributors with territories that overlapped an A–B distributor's territory in one or more counties were initially selected and paired with the corresponding A–B distributor. Thus each observation is an A–B/non-A–B distributor pair.[24] If an A–B distributor, other than the one initially paired, was located in the rival's home city, the pair was dropped. Likewise, if a different distributor of the rival's brand was located in the home city of the A–B distributor, the initial pair was eliminated. Consequently, I can be relatively confident that the remaining pairs of distributors are true rivals.

Table 6 presents estimates of the impact of exclusive dealing among A–B distributors on the average price charged by brewers supplying the A–B distributor's rival, the rival's average price (of all brands) to retailers and the rival's total case sales. Using a two-tailed test, one cannot reject the null hypothesis that exclusive dealing has no impact on the prices charged by rival brewers or the price and output of rival distributors. However, one can reject with some confidence the dampening-of-competition prediction that exclusive

[23] A number of states have statutes that specifically prohibit brewers from price discriminating among distributors in a state. The enforceability of these statutes is unknown. However, there is no evidence that such statutes effect brewers' decisions about exclusivity. When a "no price discrimination statute" dummy variable was added to the equation estimating the incidence of exclusive dealing its coefficient was insignificantly different from zero in all cases.

[24] If more than one non-A–B distributor's territory overlapped with an A–B distributor then each pair was included in the sample. Thus a few multiple observations with the same A–B distributor, but different rival distributors, exist in the sample.

Table 5
SUR estimates of the effect of exclusive dealing on supplier and distributor prices and distributor output [A–B distributors only]

Explanatory variable	*L*(suppliers' average price)		*L*(distributor's price of primary brand)		*L*(distributor's per-capita sales of primary brand)		*L*(distributor's per-capita sales of all brands)	
Exclusive dealer	0.0616**	(2.80)	0.0529**	(2.86)	0.2534**	(2.71)	0.2058**	(2.21)
L(distance to brewery)	0.0162*	(1.94)	0.0223**	(2.57)	−0.0080	(0.19)	−0.0130	(0.32)
L(excise tax rate)	0.0317**	(2.27)	0.0202	(1.38)	0.2073**	(2.86)	0.2060**	(2.96)
State ban on billboard/ sign advertising	−0.0043	(0.23)	0.0005	(0.03)	0.0239	(0.24)	−0.0032	(0.03)
L(income)	−0.0123	(0.35)	−0.0048	(0.13)	−0.2890	(1.63)	−0.2957*	(1.75)
Percent age 20–44	0.0019	(1.17)	0.0024	(1.39)	−0.0017	(0.20)	−0.0021	(0.26)
Population of sales territory	0.0001	(0.01)	−0.0033	(0.32)	−0.1406**	(2.91)	−0.1304**	(2.82)
L(stops per route)			−0.0027	(0.43)	−0.0413	(0.73)	−0.0539	(0.99)
L(years distributorship owned by current owner's family)			−0.0007	(0.12)	0.1134**	(2.15)	0.1133**	(2.26)
Carry imports	0.0269*	(1.70)					−0.0035	(0.11)
Percent of sales—AB	0.0024**	(2.37)					−0.0146**	(7.39)
Percent of sales—Miller	0.0014	(1.21)					−0.0067**	(2.88)
Percent of sales—Coors	0.0036**	(3.07)					−0.0109**	(4.81)
Constant	1.7412**	(10.20)	2.1962**	(15.11)	2.9016**	(3.94)	4.5189**	(6.18)
$N=109$	System-weighted $R2=0.407$							

An * indicates significance at the 10% and ** denotes significance at the 5% level in a two-tailed test. Absolute values of the t-ratios appear in parentheses.

dealing raises the prices charged by rival manufacturers and dealers. A one-tailed test of the null that prices of rivals rise with exclusive dealing can be rejected at the 91% confidence level for manufacturers and the 87% confidence level for distributors.

8. Conclusions and policy implications

Three major theories of exclusive dealing have been proposed in the literature: exclusion of rivals, "dampening" of competition among manufacturers, and solving incentive conflicts between manufacturers and downstream dealers. While the former two hypotheses imply that exclusive dealing is primarily anticompetitive, the later hypothesis suggests that exclusive dealing is efficiency enhancing and pro-competitive. Using data on U.S. beer distributors, this paper presents the first empirical analysis to directly test the implications of all three theories of exclusive dealing.

I find that exclusive dealing is more common in larger markets, where it is relatively difficult to keep rivals from achieving at least a minimum efficient scale. Further, exclusive dealing is associated with greater sales of the exclusive brand and greater total sales as well. These results, coupled with the fact that major domestic beers are universally available in the United States, suggest that exclusion is unlikely the motivating factor behind the use of exclusive dealing in the beer industry. The applicability of the foreclosure hypothesis to other real-world markets also seems

Table 6
SUR estimates of the effect of exclusive dealing by an A–B distributor on rival's supplier and distributor prices and distributor output

Explanatory variable	*L*(rival suppliers' average price)		*L*(rival distributor's price of all brand)		*L*(rival distributor's per-capita sales of all brands)	
A–B exclusive dealer	−0.0392	(1.17)	−0.0475	(1.38)	0.1088	(0.47)
L(rival's distance to brewery)	0.0225	(1.08)	0.0220	(1.06)	−0.1378	(1.06)
L(excise tax rate)	0.1334**	(4.64)	0.1292**	(4.45)	−0.1339	(0.71)
State ban on billboard/sign advertising	0.0176	(0.42)	0.0046	(0.11)	−0.1990	(0.71)
L(income)	−0.0733	(1.56)	−0.0584	(1.25)	−0.0351	(0.12)
Percent age 20–44	0.0027	(0.73)	0.0020	(0.54)	0.0002	(0.01)
Population of rival's sales territory	0.0016	(0.09)	0.0035	(0.20)	−0.1246	(1.12)
L(rival's stops per route)			0.0020	(0.19)	−0.1047	(0.81)
L(years rival distributorship owned by current owner's family)			0.0001	(0.01)	−0.0110	(0.10)
Rival's percent of sales—Miller	0.0014**	(2.03)	0.0018**	(2.65)	0.0073*	(1.68)
Rival's percent of sales—Coors	0.0023**	(2.57)	0.0028**	(3.22)	0.0048	(0.88)
Rival carries imports	0.1128**	(2.43)	0.1002**	(2.15)	−0.1671	(0.55)
Constant	1.9572**	(8.24)	2.2076**	(9.13)	2.2714	(1.40)
$N=37$	System-weighted $R2=0.453$					

An * indicates significance at the 10% and ** denotes significance at the 5% level in a two-tailed test. Absolute values of the *t*-ratios appear in parentheses.

questionable.[25] Indeed, the courts in recent years have recognized that successful exclusion requires that competitors be cut off from low-cost distribution channels and have required a higher standard of proof when alternative means of distribution exist.[26]

The other anticompetitive explanation for exclusive dealing is that it "dampens" competition by reducing the perceived elasticity of demand for manufacturers. The beer industry would seem to fit well with the underlying assumptions of this theory; brewers operate in an oligopolistic market and sell to a limited number of distributors operating in exclusive territories. Yet the model's implications are found to be inconsistent with observed behavior. Exclusive dealing by Anheuser–Busch distributors leads to increased sales of A–B products and has no significant effect on the prices of rival brewers or distributors.

My empirical results are consistent with the notion that exclusive-dealing contracts serve to reduce incentive conflicts between manufacturers and their dealers. Consistent with Marvel's manufacturer-investment hypothesis and Sass and Gisser's dealer-effort theory, exclusive dealing is found to be positively correlated with both the price charged by brewers and the quantity of beer sold by distributors. However, contrary to Marvel's theory, the level of national advertising by brewers is not a significant determinant of distributor exclusivity.

Although my analysis is limited to the U.S. beer industry, it is the only existing empirical evidence of the actual effects of exclusive dealing on the behavior of individual

[25] Rasmusen, Ramseyer and Wiley, the authors of one of the theoretical papers on exclusion, note in a later paper (Rasmussen et al., 1999) that the exclusion theory does not apply to the major Supreme Court cases on exclusive dealing (*Jefferson Parish*, *Standard Stations*, and *Tampa Electric*).

[26] See *Omega Envtl., Inc. v. Gilbarco, Inc. 127 F.3d 1157 (1997)* and *Ryko Mfg. Co. v. Eden Services*, 823 F.2d 1215, 1235 (1987).

exclusive dealers and their rivals. As such, it at least casts some doubt on the general applicability of the anti-competitive models of exclusive dealing and suggests that exclusivity may often have net pro-competitive impacts in practice. Therefore I would argue that a rule-of-reason analysis for exclusive dealing is appropriate and that evidence of exclusionary effects or increases in rival's prices be empirically demonstrated before an antitrust violation is found.

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Appendix A

Data Appendix

Variable	Mean (all firms)	Mean (ED firms)	Mean (non-ED firms)	Description and source
Carry imports	0.678	0.000	0.841	Dummy variable = 1 if distributor markets an imported beer brand. Source: *1996/1997 NBWA Distributor Productivity-Brand Equity Survey*.
Distance to brewery	357.352	212.942	389.638	Driving distance from distributor's headquarters to nearest brewery of primary supplier. Sources: *1996/1997 NBWA Distributor Productivity-Brand Equity Survey, 1996 Beverage Marketing Directory,* and MapBlast! web site (www.mapblast.com/mblast/index.mb).
Excise tax rate	0.535	0.604	0.518	Sum of Federal and State excise taxes on packaged beer in dollars per case equivalent (24 12 oz. containers). Source: *Brewer's Almanac 1996*.
Exclusive dealer	0.180	1.000	0.000	Dummy variable = 1 if distributor only sells the products of a single brewer. Sources: *1996/1997 NBWA Distributor Productivity-Brand Equity Survey* and the *1996 Beverage Marketing Directory*.

Appendix A (*continued*)

Variable	Mean (all firms)	Mean (ED firms)	Mean (non-ED firms)	Description and source
Income	20.827	19.766	21.106	Per capita personal income in 1995 (1000s of dollars) in distribution territory of primary supplier. Sources: *1996/1997 NBWA Distributor Productivity-Brand Equity Survey, U.S. Dept. of Commerce, Bureau of Economic Analysis web site* (http://www.bea.doc.gov/bea/dr1.htm), *U.S. Census Bureau web site* (http://www.census.gov/population/www/estimates/countypop.html).
National advertising by primary supplier	217,412	276,522	202,942	Expenditures on advertising in magazines, Sunday Magazines, national newspapers, network television, syndicated television, cable TV networks, and network radio (1000s of dollars). Source: *LNA/Mediawatch Multimedia Service Product vs. Media Report.*
Per capita quantity sold (primary supplier/all beer suppliers)	5.427/6.366	8.769/8.798	4.537/5.774	Total distributor case equivalent sales of primary supplier's products/products of all beer suppliers per adult (age 20 and above) in distribution territory of primary supplier. Source: *1996/1997 NBWA Distributor Productivity-Brand Equity Survey*.
Percent aged 20–44	53.228	51.831	53.560	Percent of adult (age 20 and above) population in distribution territory of primary supplier (brewer) aged 20 to 44, in 1994. Sources: *U.S. Census Bureau web site (*http://www.census.gov/population/www/estimates/countypop.html*)* and *1996/1997 NBWA Distributor Productivity-Brand Equity Survey*.
Percentage of sales				Case sales of a given brewer's products divided by the sum of case sales for all major domestic brands (Anheuser–Busch, Miller, Coors, Stroh, Heileman, Pabst), times 100. Source: *1996/1997 NBWA Distributor Productivity-Brand Equity Survey*.
Population of sales territory	450.679	357.967	478.384	Adult (age 20 and above) population in distribution territory of primary supplier (brewer), based on 1996 total population and 1994 age distribution (in thousands). Sources: *U.S. Census Bureau web site (*http://www.census.gov/population/www/estimates/countypop.html*)* and *1996/1997 NBWA Distributor Productivity-Brand Equity Survey*.

(continued on next page)

Appendix A (*continued*)

Variable	Mean (all firms)	Mean (ED firms)	Mean (non-ED firms)	Description and source
Price of primary supplier's brand	11.102	11.576	10.948	Total dollar sales of primary supplier's brands divided by case equivalent (24 12 oz. containers) sales of primary supplier's brands. Source: *1996/1997 NBWA Distributor Productivity-Brand Equity Survey*.
Primary supplier				Brewer of distributor's largest selling brand among the major domestic brands (Anheuser–Busch, Miller, Coors, Stroh, Heileman, Pabst). Source: *1996/1997 NBWA Distributor Productivity-Brand Equity Survey*.
State ban on billboard/sign advertising	0.243	0.232	0.236	Dummy variable = 1 if distributor operates in a state that prohibits billboard/sign advertising of beer. Source: *Modern Brewery Age Bluebook 96/97* and state annotated codes.
State-level market share of primary supplier	31.638	52.151	26.892	Statewide percent market share of primary supplier based on shipments. Sources: *1996/1997 NBWA Distributor Productivity-Brand Equity Survey, 1997 Beer Industry Update*.
Stops per route	48.410	55.292	46.781	Average number of stops/deliveries per delivery route per week. Source: *1996/1997 NBWA Distributor Productivity-Brand Equity Survey*.
Suppliers' average price	8.574	8.803	8.513	Per-case distributor cost of beer. Source: *1996/1997 NBWA Distributor Productivity-Brand Equity Survey*.
Years distributorship owned by current owner's family	34.046	28.439	35.053	Years distributorship owned by current owner's family. Source: *1996/1997 NBWA Distributor Productivity–Brand Equity Survey*.

Note: All variables are measured in 1996 unless otherwise noted.

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