

Vertical Antitrust Policy as a Problem of Inference

James C. Cooper, Luke M. Froeb, Dan O'Brien, and Michael G. Vita*

Federal Trade Commission
600 Pennsylvania Ave, NW
Washington D.C., 20580

February 18, 2005

Abstract

The legality of nonprice vertical practices in the U.S. is determined by their likely competitive effects. An optimal enforcement rule combines evidence with theory to update prior beliefs, and specifies a decision that minimizes the expected loss. Because the welfare effects of vertical practices are theoretically ambiguous, optimal decisions depend heavily on prior beliefs, which should be guided by empirical evidence. Empirically, vertical restraints appear to reduce price and/or increase output. Thus, absent a good natural experiment to evaluate a particular restraint's effect, an optimal policy places a heavy burden on plaintiffs to show that a restraint is anticompetitive.

¹ James Cooper is Attorney Advisor, Office of Policy Planning. Luke Froeb is Director, Bureau of Economics, on leave from the Owen Graduate School of Management, Vanderbilt University. Dan O'Brien is economist and former Deputy Director, Bureau of Economics. Michael Vita is Assistant Director for Antitrust, Bureau of Economics. The views expressed herein are not purported to be those of the Federal Trade Commission, or any of its Commissioners. This paper is published as the background to Froeb's Plenary address at 2004 meetings of EARIE in Berlin. The authors thank Timothy Brennan, Patrick DeGraba, Mark Frankena, Ken Heyer, Pauline Ippolito, Timothy Muris, David Sibley, and Greg Werden for helpful comments.

I. Introduction

The Supreme Court's 1977 *Sylvania* decision was a watershed.² Faced with an exclusive territory agreement that would have been found illegal *per se* under existing precedent, the Supreme Court eschewed its prior "formalistic line drawing," and instead based its decision on demonstrable economic effects.³ Since *Sylvania*, a successful antitrust plaintiff in U.S. courts must show that a challenged vertical restraint is likely to harm consumer welfare.⁴

A similar movement away from form-based competition analysis of vertical restraints is occurring in the European Union. In 1999 and 2000, the Commission issued a new Block Exemption Regulation (BER) and accompanying guidelines that focus on the competitive effects of vertical restraints entered into by "non-dominant" firms under Article 81.⁵ This new policy establishes a safe harbor for firms with market shares less than 30 percent. Vertical agreements entered into by firms exceeding this threshold (but below the 50 percent level required for "dominance") are judged by their overall competitive effect, including an accounting of

² In *Cont'l T.V. Inc. v. GTE Sylvania Inc.*, 433 U.S. 36 (1977), the U.S. Supreme Court overruled *United States v. Schwinn*, 388 U.S. 365 (1967), and held that non-price vertical restrictions were to be judged under the rule of reason.

³ See *Muris* (2001).

⁴ Since 1977, Sherman § 1 cases involving vertical restraints – with the exception of explicit minimum resale price maintenance – are evaluated under the rule of reason. This standard requires a plaintiff to show that the agreement is likely to have "genuine adverse effects on competition." *Federal Trade Comm'n v. Indiana Fed'n of Dentists*, 476 U.S. 447, 460 (1986). See also *Virgin Atl. Airways, Ltd v. British Airways PLC*, 257 F.3d 256, 264 (2d Cir. 2001) (plaintiff is required to show that the agreements in question "had an actual adverse effect on competition as a whole in the relevant market"); Areeda and Hovenkamp (2003, ¶ 1503a) ("Every antitrust suit should begin by identifying the ways in which a challenged restraint might possibly impair competition."). Likewise, under Sherman § 2, the plaintiff must show that "a monopolist's act . . . [has] an 'anticompetitive effect.'" That is, it must harm the competitive *process* and thereby harm consumers." *U.S. v. Microsoft*, 253 F.3d 34, 58 (D.C. Cir. 2001). Based on his analysis of post-*Sylvania* case law, Ginsburg (1991) concluded that "non-monopolists have been effectively freed from antitrust regulation of vertical nonprice restraints."

⁵ Commission Regulation (EC) No. 2790/99 on the Application of Article 81(3) of the Treaty to Categories of Vertical Agreements and Concerted Practices, 1999 O.J. (L 336) (hereinafter "BER"); Guidelines on Vertical Restraints, 2000 O.J. (C 291) 1 (hereinafter "EU Vertical Guidelines"). For a discussion of the EU's greater reliance on economics when analyzing vertical practices involving non-dominant firms, see Verouden (2003).

efficiencies.⁶ Complementing the law's focus on economics is the creation of the position of Chief Competition Economist, to promote the use of economic analysis in EC competition policy.⁷

To assess the competitive effects of a vertical restraint, one must compare the world with the restraint – which is observed – to the world without the restraint, which typically is not. In general, it is possible to draw inferences about the unobserved state of the world in either of two ways. If a “natural experiment” mimics the effect of the restraint, one can compare a “control group” (without the restraint) to an “experimental group” (with the restraint) to gauge the effect of the practice. Provided one can hold constant other factors that might affect price, output, or other relevant variables, one can estimate the competitive effects of the restraint.

Absent a good natural experiment, one must instead use an economic model of the restraint to help assess its competitive impact; i.e., the analyst must posit a theory under which the restraint can harm competition, against alternatives where the restraint is benign or procompetitive, and then determine which theory best explains the evidence. In this paper we discuss this approach with reference to the theoretical and empirical literature on the economics of vertical control.⁸

We view antitrust policy as a problem of drawing inferences from evidence and making enforcement decisions based on these inferences. In stylized terms, suppose that a given vertical practice can be either procompetitive (denoted “C”) or anticompetitive (denoted “A”), and let x be evidence observed by the decision-maker and correlated with the competitive effects of the

⁶ See EU Vertical Guidelines at ¶ 116.

⁷ On July 16, 2003, it announced the appointment of Lars-Hendrik Röller, Professor of Economics at Humboldt University in Berlin.

⁸ Heyer (2004) also discusses issues involved in applying the economics literature on vertical control in antitrust cases.

practice; for example, primary market power, foreclosure levels, the nature of contracts, the shape of cost and demand functions, etc. Given the evidence x , assume that the decision-maker can either stop the practice or allow it to continue. Using Bayes' rule, we can write the policy maker's belief about the relative odds that a given practice is anticompetitive as a function of his prior beliefs about the practice, and the relative likelihood that the evidence observed would be produced by anticompetitive conduct:

$$(1) \quad \frac{P(A|x)}{P(C|x)} = \frac{P(x|A)}{P(x|C)} \cdot \frac{P(A)}{P(C)}.$$

In the remainder of the paper we use this simple heuristic to examine the antitrust treatment of vertical integration and restraints. Turning first to the likelihood, the task is how to interpret evidence gathered in an investigation in light of economic theory. Section II discusses three classes of theories of harm from vertical practices, focusing on practical implications for competition policy. The theory shows that vertical practices potentially can harm competition. This finding is fragile, however, as anticompetitive equilibria emerge only under specific – and difficult to verify – assumptions about (among other things) costs, demand, the nature of input contracts, conditions of entry, the slope of reaction functions, and the information available to firms. Seemingly minor perturbations to these assumptions can reverse the predicted welfare effects of the practice in question.⁹

A major difficulty in relying principally on theory to guide vertical enforcement policy is that the conditions necessary for vertical restraints to harm welfare generally are the same conditions under which the practices increase consumer welfare. For example, pre-existing market power in the primary market typically is necessary for vertical integration to raise price to

⁹ Of course, if one could establish which assumptions are appropriate --- i.e., which assumptions yield predictions consistent with the evidence and which do not --- then one could select and apply the appropriate theory. Our point is that this is extremely difficult to do in most cases.

unintegrated rivals; but vertical integration under these conditions normally also would eliminate double-markup distortions, a procompetitive effect. Without informative likelihoods, the evidence in a particular case usually leads only to a small revision in prior beliefs about the likelihood that a vertical practice is, on balance, pro- or anti-competitive.

As is seen from (1), with an uninformative likelihood, our posterior beliefs about a given vertical practice will be very close to our prior beliefs about vertical practices generally. In Section III we review a sample of the empirical literature on vertical practices to inform our priors about the practices. In most of the empirical studies reviewed, vertical practices are found to have significant pro-competitive effects.

Section IV discusses the implications of these findings for competition policy toward vertical practices. Continuing with the Bayesian framework, we derive a rule that classifies evidence as either being produced by an anticompetitive or procompetitive vertical practice depending on error costs, prior beliefs, and the likelihood. Prior beliefs and the likelihood may vary according to the restraint at issue and the pro- and anticompetitive theories posited. Although empirical evidence on vertical practices is limited, the current state of this evidence supports a prior that vertical practices are likely to be efficient. In our framework, there are two ways that this prior belief can be overturned: evidence that the restraint harms competition in a particular application (an informative likelihood), and/or a belief that type-II errors are much more costly than type-I errors.

In an individual case, we would be convinced that a particular practice is anticompetitive by direct evidence (e.g., from a natural experiment) that a practice has had anticompetitive effects. The relative losses from type-I and type-II errors are empirical issues that have not been addressed systematically in the literature. In principle, the relative losses might depend on the

particular practice and market characteristics. Such differences have at least the potential to explain differences in policy toward vertical practices in different jurisdictions.

II. Theories of Harm from Vertical Practices¹⁰

A. Softening Horizontal Competition

1. *Raising Rivals' Costs*

The possibility that firms could profit from raising rivals' (and potentially their own) costs constitutes much of the basis for challenging the "Chicago School" view that vertical restraints seldom harm competition.¹¹ For example, Salop and Scheffman (1983, 1987) point out that vertical integration or restraints sometimes provide ways for firms to raise their rivals' costs and thereby profitably reduce market output.

Salop and Sheffman (1987) consider a dominant firm that controls a parameter (α) that affects the costs of the dominant firm and a competitive fringe, possibly in different ways. In one special case, they interpret α as an input price controlled by the dominant firm by varying its input purchases. In this case, the dominant firm can raise input costs (both its own and its rivals') by "over-purchasing inputs," through either excessive purchases of inputs on the open market or excessive purchases of productive capacity through vertical integration.¹²

Salop and Scheffman show that over-purchasing inputs may be profitable, and may reduce partial equilibrium welfare, depending on cost and demand parameters and the cost-raising technology. However, there is no general incentive to raise rivals' costs, and even when it is privately profitable to do so, the attendant welfare consequences may be positive.¹³ If the

¹⁰ In limited space our discussion does not come close to a thorough survey.

¹¹ In this paper we focus on the case of fixed proportions technology, which formed the basis for most of the "Chicago view" that vertical integration and restraints are benign or efficient.

¹² A substitute for vertical integration in this context may be the cartelization of the upstream market. For example, Granitz and Klein (1996) argue that Standard Oil raised rival refiners' costs by cartelizing the oil transportation market (the railroads) and conspiring with them to charge rival refiners higher prices for transportation services.

¹³ A cost raising strategy is profitable if it raises the dominant firm's residual demand curve by more than its average cost curve. This generally depends on the cost and demand parameters and the cost-raising technology.

cost raising strategy is profitable, it may lead to an increase or decrease in price. This is because the dominant firm may expand output enough to offset the contraction in the output of the fringe. If the strategy leads to an increase in price, total welfare *still* may rise if the dominant firm is more efficient than the fringe firms, as the shift in output from the fringe to the dominant firm can increase productive efficiency.

2. Game Theoretic Formulations

The use of vertical integration or restraints to soften competition has been extended to oligopoly environments using tools from game theory. Salinger (1988) examined vertical mergers in a market with Cournot oligopolists at both stages of production. He showed that the effects of vertical mergers in this model are ambiguous. The merger can lead to higher input prices for unintegrated downstream firms, which tends to reduce output. However, the merger eliminates the double markup distortion between the integrating upstream and downstream entities, which tends to increase output.¹⁴ The net effects on price and welfare depend on the value of certain parameters.

Subsequent work examines vertical integration by oligopolists under different assumptions about the oligopoly game at each stage.¹⁵ Reiffen and Vita (1995) examine the case of N Cournot oligopolists in the upstream market and differentiated Bertrand duopoly in the

¹⁴ The “double markup” problem arises when producers with market power at adjacent stages of production (or more generally, producers of complements) set prices independently. The resulting prices are too high, and the corresponding outputs too low, to maximize joint profits. Eliminating this double markup through contract or integration not only increases the producers’ profits, but, by increasing output, increases consumer welfare as well. This argument traces all the way back to Cournot (1838), and was first articulated in the context of antitrust policy toward vertical mergers by Spengler (1950).

¹⁵ Ordovery *et al.* (1990) model foreclosure effects assuming homogeneous Bertrand duopolists upstream and differentiated Bertrand duopolists downstream. Ordovery *et al.* argue that integration between one upstream and one downstream firm raises equilibrium final good prices. It is now well-established that this finding results from the tenuous assumption that the vertically integrated entity can somehow commit to high intermediate good prices in the post-merger environment. Without this assumption, Ordovery *et al.*’s predictions of higher prices no longer hold. See Reiffen (1992) and Hart and Tirole (1990).

downstream market. Under linear demand, constant marginal cost, and symmetry, they find that a vertical merger: 1) decreases the final price of the integrating firm, 2) may increase or decrease the cost (input price) and/or the final price of the unintegrated rival, and 3) always increases consumer surplus. In this model, the downward pressure on final prices from eliminating the double mark-up more than offsets the effects of higher prices (when they arise) to unintegrated rivals. In this model, vertical integration is unambiguously good for consumers.

The tradeoff from vertical integration in the Salinger and Reiffen/Vita models is typical whenever upstream margins are positive, which is the normal case in imperfectly competitive markets. The use of nonlinear contracts can mitigate double-marginalization, but they do not necessarily eliminate it. One reason is that the mark-ups in nonlinear contracts can be used strategically by rivals to influence the competition between them. The literature on “strategic agency” (e.g., Fershtman and Judd (1987), Sklivas (1987), Bonanno and Vickers (1988)) compares the profitability and price effects of vertical integration versus “vertical separation” (purchasing from an independent supplier) when firms can write *observable* two-part tariff contracts. Bonanno and Vickers, for example, consider the case of differentiated Bertrand competition. For this case, vertical separation typically is more profitable and leads to higher prices than vertical integration.¹⁶ The idea is that separated firms can write observable two part tariffs with wholesale prices above marginal cost that “soften competition,” whereas integrated firms transfer the input internally at cost.

¹⁶ To understand why, consider a case in which all firms are initially vertically integrated, but then one firm spins off its upstream division. If input contracts are observable, and if firms have upward sloping reaction functions, then the separated firms have an incentive to agree to a two-part tariff contract that raises the separated downstream firm’s marginal cost and thereby commits it to raise its downstream price. This is jointly profitable for the separated firms if it is observed by rival firms, because the rivals will react by pricing less aggressively. In a game in which separation decisions are made prior to pricing, the equilibrium may involve vertical separation by all firms, all of which write contracts that soften competition. Shaffer (1991) shows that the equilibrium contracts among separated firms may involve negative fixed fees, i.e., “slotting allowances.” In his model, slotting allowances lead to softer competition than linear pricing.

The results in the strategic agency literature are fragile, as they depend in subtle ways on the details of the oligopoly game. For example, under Cournot competition, vertical separation typically leads to the opposite result -- more intense competition than vertical integration. The difference between the Cournot and Bertrand cases arises from the different nature of strategic interactions (strategic substitutes versus complements) in the models. The adverse effects of separation also require that contracts are observable to rivals. If contracts are unobservable, firms can do no better than they do by writing efficient two-part tariffs (wholesale prices equal to marginal cost), so the strategic effects of vertical separation disappear.¹⁷ It is worth noting that even if firms can make their contracts observable, they have short term incentives to renegotiate secretly. If secret renegotiations are feasible, the “softer competition” equilibrium unravels.

The strategic agency models that study vertical separation (with observable contracts) focus on situations in which each vertically separated firm deals with only one firm in the other (upstream or downstream) market. That is, there is no input market competition. This assumption is important. For example, if each of the differentiated products in Bonanno and Vickers is competitively supplied, then the strategic effects of vertical separation disappear. The reason is that downstream competition makes it unprofitable for rivals to raise price in response to an increase in the cost of any particular firm. So the commitment by any one firm to a higher wholesale price has no value.

Vertically separated firms may deal with a single supplier or buyer due to exclusive contracts. Using the implications of the strategic agency literature, it is a short step from this observation to see that exclusive territory contracts may have the effect of softening competition. In particular, exclusive contracts can effectively transform a situation with a competitive

¹⁷ As Katz (1991) points out, this assumes that two-part tariffs “solve” the agency problem between upstream and downstream firms. He shows that unobservable contracts may still have some commitment value when the agency problem between the upstream (principal) and downstream (agent) firms does not have a first-best solution.

downstream market, where upstream competitors cannot use two-part tariffs to soften competition, into a game of strategic agency in which two-part tariff contracts can be used for this purpose. This is the source of the anticompetitive effect of exclusive territories in the two-part tariff variant of the model in Rey and Stiglitz (1995). As with vertical separation, this effect is fragile. In particular, the result disappears if wholesale prices are unobservable to rivals; and the restraints' competitive effects depend on the form of competition (e.g., Cournot or Bertrand).

A number of papers have appeared that employ the two-stage framework that originated in models of strategic agency to examine the effects of vertical integration and restraints in a variety of environments. We will not attempt to survey this literature further, but simply note some consistent themes that emerge. First, under linear input pricing, vertical practices typically affect the double-marginalization externality, sometimes making it worse¹⁸ and sometimes mitigating it.¹⁹ Firms must be aware of this effect when evaluating the profitability of strategies designed to soften competition. Second, the results often depend on the ability of rivals to observe wholesale prices; this observability allows firms to make credible commitments through their contracts. Third, the predictions of these models often depend on the nature of the oligopoly model employed.²⁰

¹⁸ For example, Rey and Stiglitz (1995) examine the effects of exclusive territories by Bertrand oligopolists that charge linear prices (they also consider nonlinear contracts, as noted in the text). In their model, exclusive territories may benefit firms by inducing softer competition, but they may also exacerbate the double-marginalization externality. Thus, it may or may not be profitable to use exclusive territories to soften competition under linear input pricing.

¹⁹ For example, several authors have shown that resale price maintenance can eliminate double mark-up distortions.

²⁰ There is another class of models that identify the possibility of “foreclosure” deriving from “multilateral opportunism.” See Rey and Tirole (2003) for a survey of the relevant literature. By “multilateral opportunism” we mean joint decisions by an upstream and downstream firm that adversely affect the profits of rival downstream firms. (We note that mitigation of bilateral opportunism often is an important procompetitive motive for vertical mergers (see, e.g., Klein, Crawford, and Alchian (1978); Klein (1978); Joskow (1985)). We do not believe that the models described by Rey and Tirole provide a basis for antitrust enforcement. Antitrust policy towards monopolies and dominant firms should be directed against conduct that the monopolist uses to preserve or extend its monopoly. An upstream firm's use of vertical integration or restraints to mitigate opportunism has nothing to do with protecting itself from horizontal competition (as conventionally defined), or with extending or entrenching this market power.

C. Dynamic Effects

The theories discussed above are static, in the sense that they do not consider the effects of vertical practices on entry, exit, or long-run investment incentives. A third general class of theories of harm from vertical practices addresses these dynamic effects. This literature has focused mainly on the competitive effects of tying/bundling²¹ and exclusive dealing.²²

Whinston (1990) was the first to examine rigorously the potential entry deterring effects of tying. His model shows that a commitment to tying can cause a firm to price more aggressively against oligopoly rivals in the tied good market. If there are economies of scale in production in this market, this commitment can deter entry into production of the tied good because the potential entrant realizes that competition will be too vigorous for it to earn enough to cover its average costs. Carlton and Waldman (2002) show how a monopolist can use tying to preserve its monopoly in future periods or extend it into newly emergent markets. Nalebuff (2004) shows that a company with market power in two products that can bundle them together can make it harder for a rival selling only one of the products to compete.

The welfare effects of tying and bundling in these models are theoretically ambiguous, for a variety of reasons. In Whinston's model, for example, the commitment to compete more

Instead, vertical integration helps the firm avoid opportunism so that it can exercise (potentially legitimately acquired) existing market power. Under the theory, the upstream firm will have incentives to use vertical practices even if there is no scope for altering competition at the upstream level. In this sense, the use of vertical restraints for this purpose is analogous to price discrimination by an incumbent monopolist – it allows the monopolist to capture a larger share of the social value created by its product, often increasing social welfare in the process.

²¹ A literature we have not discussed explores the use of tying/bundling to price discriminate (e.g., Bowman, 1957; Stigler, 1963; Adams and Yellen, 1976) or to extract surplus through additional margins (e.g., Burstein, 1960; Mathewson and Winter, 1997; Martin, 1999). The welfare effects of tying/bundling in this literature are theoretically ambiguous.

²² There is an informal perception in the policy arena that vertical integration can deter entry if it forces potential entrants to enter at more than one level (e.g., both upstream and downstream). See, for example, the Non-Horizontal Merger Guidelines issued by the U.S. Department of Justice, at <http://www.usdoj.gov/atr/public/guidelines/2614.htm>, §4.21. While this point seems plausible enough, to our knowledge it has not been formally modeled in the economics literature.

aggressively caused by tying can also lower price. In addition, the welfare effects of entry into the tied good market are typically ambiguous because of the usual tradeoff between greater product variety and the fixed costs of entry. Whinston summarizes the welfare and policy implications of his analysis as follows:

While the analysis vindicates the leverage hypothesis on a positive level, the normative implications are less clear. Even in the simple models considered here, which ignore a number of other possible motivations for the practice, the impact of this exclusion on welfare is uncertain. This fact, combined with the difficulty of sorting out the leveraged-based instances of tying with other cases, makes the specification of a practical legal standard extremely difficult. (Whinston, 1990, p. 855-856)

Carlton and Waldman also express caution in using their analysis to condemn tying. In the working paper version of their paper, they discuss the antitrust implications of their analysis:

It would be a grievous mistake to condemn such strategic behavior and attempt to use the antitrust laws to condemn it without an analysis of the welfare consequences of such behavior and without an analysis of the likelihood of being able to correctly identify such behavior without simultaneously condemning welfare enhancing behavior. Too often in the past, antitrust advocates have confused the theoretical possibility of harm with an empirical demonstration of such a harm. (Carlton & Waldman, 1998, p. 37)

We agree with Whinston and Carlton & Waldman about the hazards of using these models to justify antitrust hostility towards these practices.²³ In particular, we think it is essential when attempting to apply these models to evaluate the welfare consequence of the practice. As a stark illustration of this point, we note that Nalebuff's (2004) bundling article often arises in policy discussions as a possible justification for antitrust hostility toward bundling. However, bundling in his model typically *lowers* prices and *increases* welfare.

Many models of vertical practices find that competitors are excluded precisely because the practices in question intensify competition. Antitrust policymakers tempted to draw policy

²³ See also Evans *et al.* (2004) for a discussion of the problems associated with applying per se or badly designed rule of reason analyses to tying cases.

inferences from these analyses always must bear in mind that harm to competitors (e.g., harm to the non-bundling firms in Nalebuff) is not the same as harm to competition. Instead, harm to competitors is often – indeed, usually – consistent with enhanced competition. We normally would not condemn firms for making cost-reducing investments that induce more aggressive price competition, even if this competition harms competitors. Why, then, challenge tying or bundling arrangements having similar effects?

Evaluating the welfare consequences of tying is difficult in part because tying has several potential benefits (price discrimination, quality enhancement, lower transaction costs, etc.) Carlton and Waldman make a distinction between “physical tying,” where products are tied by physical attributes like compatibility, and “contractual tying,” where products are tied by contract. Noting the difficulty of using cost-benefit analysis to identify harmful tie-ins, they conclude that, “other than in exceptional cases, plausible efficiency justifications for a physical tie should defeat an antitrust attack on tying.”²⁴ They suggest that the standard for contractual tying might be lower with the balancing of costs versus benefits done as it is now done in exclusive dealing cases in the U.S.

Similar to the dynamic effects of tying and bundling, the dynamic effects of exclusive dealing arise from denying rivals sufficient scale to be profitable. We agree that this is the biggest source of anticompetitive risk from these practices. However, conducting a welfare analysis of exclusive dealing is also extremely difficult.

Rasmusen et al. (1991), Bernheim and Whinston (1998), and Winston and Segal (2000), among others, show that exclusive dealing (ED) potentially can deter entry by preventing entrants from achieving minimum viable scale. Like most of the literature on vertical restraints,

²⁴ Carlton and Waldman (1998), p. 39.

the exclusive dealing models are highly stylized. For example, these articles assume that downstream markets are served by local monopolists, and that the scale economies in the upstream market take a particular form. Even in these simple settings, the welfare effects of exclusive dealing are theoretically ambiguous.²⁵ For more realistic settings, e.g., with downstream oligopoly, and general assumptions about the degree of scale economies, the theory has not been fully worked out.

III. Empirical Evidence on the Competitive Effects of Vertical Integration and Control

In Table 1 we summarize existing empirical studies of vertical integration and vertical restraints. In carrying out this survey, we limit our review to those papers that address issues of explicit antitrust policy interest.²⁶

In reviewing this literature, two features immediately stand out: First, there is a paucity of support for the proposition that vertical restraints/vertical integration are likely to harm consumers. Of all the studies cited in Table 1, only one (Ford & Jackson 1997, a study of vertical integration between cable television franchises and cable programmers) purports to find unambiguously an instance where vertical integration was harmful to consumers. And in this

²⁵Mathewson and Winter (1987) examine the case of two firms selling through a downstream monopolist using linear prices. Abstracting from economies of scale, show that the effect of ED on prices is ambiguous. For parameters in which ED is profitable, it may lead to more aggressive bidding for the right to be the exclusive supplier and thus a lower input price. This is a potential benefit of ED that must be weighed against possible entry deterrent effects. O'Brien and Shaffer (1997) and Bernheim and Whinston (1998) consider the case of nonlinear contracts (but retain the downstream monopoly assumption). Bernheim and Whinston show that ED can potentially deter entry and thereby reduce competition in "non-coincident" markets, i.e., markets other than those in which exclusive dealing is used. Exclusive dealing is costly in the markets in which it is imposed because it induces more aggressive bidding by manufacturers for the right to be exclusive (O'Brien and Shaffer, 1997). However, the benefit of less competition in non-coincident markets may outweigh this cost. The welfare effects of ED in these models are ambiguous. Among other difficulties, equilibria exist in which only one firm serves the market even without exclusive dealing (O'Brien and Shaffer, 1997), so entry deterrence can occur given the right scale conditions even if ED is not used (Bernheim and Whinston, 1998).

²⁶ We do not discuss the extensive literature on contract choice in franchise relationships (*see* LaFontaine & Slade, 1997), nor do we discuss the literature (with one exception) that examines optimal contract/integration choice in the face of asset specificity (*see, e.g.*, Joskow 1985).

instance, the losses are minuscule (\$0.60 per cable subscriber per year).²⁷ Second, a far greater number of studies found that the use of vertical restraints in the particular context studied improved welfare unambiguously (i.e., resulted in lower prices and larger quantities).

More specifically, the studies in Table 1 appear to provide strong support for the proposition that vertical integration/vertical restraints often help solve double markup problems, and/or reduce costs in other ways. These studies include:

- U.S. gasoline (petrol) markets [Vita (2000); Barron & Umbeck (1984 & 1985); and Shepard (1993) found that retail prices were lower when vertical integration was permitted];
- Retail beer sales through pubs in the UK [Slade (1998a) found that the “beer orders” reducing vertical control of pubs resulted in higher retail beer prices];
- Cable television [Chipty (2001) found that integration of cable TV programmers with distributors lowered retail prices];
- Fast food [Graddy (1997) found that prices are higher in franchised fast food restaurants as compared with company-owned stores].

Other studies bearing on the double-markup or other cost savings issues analyze the competitive effects of vertical restraints in a broader cross-section of industries. For example, in her study of litigated RPM cases, Ippolito (1991) found that 30% of litigated resale price maintenance cases involved *maximum* RPM, strongly suggesting that in these instances vertical restraints were used as a means for constraining downstream market power.

The literature summarized in Table 1 also provides at least indirect evidence that vertical restraints sometimes are used to induce the provision of demand-increasing activities by retailers.²⁸ Ippolito (1991) and Ippolito & Overstreet (1996) found that in their samples, the use

²⁷ We note that Chipty (2001) found that vertical integration between cable systems and cable programmers resulted in lower prices to consumers.

²⁸ That is, manufacturers might wish to induce their retailers to provide services to consumers that will increase demand for the product (e.g., showing consumers how to operate complicated electronic equipment). One problem is that these services may be subject to “free-riding;” that is, the customer goes to the full service retailer to learn

of RPM generally was consistent with demand-increasing activities by retailers. Also consistent with this rationale for vertical restraints are Sass & Saurman's (1996) findings that the ban on exclusive territories in beer sales reduced beer consumption by 6%. Mullin & Mullin (1997) found vertical integration induced investment in relationship-specific assets in steel production; Hersch (1994) also concluded that his stock market event study provided evidence consistent with the efficiency rationale for RPM. Heide, Dutta, & Bergen's (1998) study of exclusive dealing contracts found that a key determinant of the use of exclusive dealing contracts was whether manufacturer compensated dealers for services potentially "free rideable" by rival manufacturers. Notably, Heide *et al.* found also that the perception by managers that entry was likely *reduced* the probability that exclusive dealing contracts would be used, thus casting doubt upon the empirical importance of exclusionary motives for vertical restraints among the firms in their sample.

A few studies obtained results consistent with both pro- and anticompetitive characterizations of vertical restraints. Gilligan's event study (1986) obtained negative abnormal returns upstream when RPM contracts were challenged, a result consistent with efficiency and manufacturer collusion explanations for RPM (because manufacturer profits would be expected to fall under either of these possibilities). In their study of cable television, Waterman and Weiss (1996) found that cable systems that owned pay movie channels were less likely to carry rival pay channels, a finding consistent both with pro- and anticompetitive behavior (a decision to integrate vertically into programming is presumptively profitable; the profits could arise either from greater efficiency (elimination of double markups) or from foreclosure of some sort). Last,

about the product, and then proceeds to purchase the product from a no-frills discount retailer (this motive for vertical restraints was first articulated by Telser (1960)). Vertical restraints (such as minimum RPM) can be used to prevent this free-riding. More generally, vertical restraints can be used to provide incentives for the provision of any non-contractable service that enhances demand with or without service externalities among retailers (Mathewson & Winter, 1984).

Hastings (2004) found that retail petrol prices increased when “unbranded” stations were acquired by branded refiner. However, she concludes that the change in price at newly-acquired stations is attributable to the effects of “branding” formerly “unbranded” retailers, *not* to greater vertical control by refiners; indeed, she notes explicitly that her empirical evidence does not support “divorcement” restrictions (i.e., proscriptions on the vertical control of gasoline retailers by refiners).

Overall, we would characterize the empirical literature on vertical restraints/vertical integration as follows:

- Most studies find evidence that vertical restraints/vertical integration are pro-competitive;
- This efficiency often is plausibly attributable to the elimination of double-markups or other cost savings;
- A number of studies also find evidence consistent with “dealer services” efficiencies;
- Instances where vertical controls were unambiguously anticompetitive are difficult to find.

IV. Discussion

In this section we apply our review of the literature on vertical restraints to our Bayesian decision framework. We first summarize what we believe our review of the relevant literature says about the likely competitive effects of various vertical contracting practices:

- Most models that predict (potential) harm from vertical restraints require pre-existing market power at multiple stages of production. This condition usually implies the existence of efficiencies from vertical control, and the magnitude of the efficiency often rises monotonically with the level of pre-existing market power. The models that fail to find such efficiencies do so by invoking assumptions that are empirically unrealistic and hard to verify.
- Even when the *only* merger-related efficiencies are those deriving from the

elimination of double markups – theory shows that most vertical restraints have competitive effects that are ambiguous theoretically, and whose sign and magnitude are extremely sensitive to the presence of conditions and circumstances that are difficult to verify in practice.

- Empirical analyses of vertical integration and control have failed to find compelling evidence that these practices have harmed competition, and numerous studies find otherwise. Some studies find evidence consistent with both pro- and anticompetitive effects; but virtually no studies can claim to have identified instances where vertical practices were likely to have harmed competition.

In an antitrust case involving a vertical restraint, the authority must decide whether to challenge the practice based on the evidence. A useful decision rule will classify evidence by the likelihood that it was generated by a procompetitive or anticompetitive practice. Two types of errors, and concomitant losses, will attend any decision rule: the loss from prosecuting a procompetitive practice (type-I error),²⁹ and the loss from failing to prosecute an anticompetitive practice (type-II error). Writing the losses associated with each type of error as L_I and L_{II} , the expected losses from type-I and type-II errors given the evidence x can be written as:

$$(2) \quad E[Loss_I | x] = L_I P(C | x) = \frac{L_I P(x|C)P(C)}{P(x)}$$

$$(3) \quad E[Loss_{II} | x] = L_{II} P(A | x) = \frac{L_{II} P(x|A)P(A)}{P(x)}$$

where $P(\bullet)$ denotes probability, and the last term in each equality follows from Bayes' rule, as stated in (1). A Bayesian classification rule leads the enforcer to challenge a vertical practice based on the available evidence only if the expected type-II loss from letting it go is greater than the expected type-I loss of challenging it, or from rearranging (2) and (3):³⁰

²⁹ If an investigation continues, but a court later finds against the enforcement authority, the loss may only be that associated with a temporary stay of the conduct at issue.

³⁰ See Hogg & Craig (1978, 385-89) and DeGroot (1970, 138-41) for a detailed exposition of Bayesian classification with two possible parameter values. In our framework, there are only two degrees of conduct – pro or anticompetitive. In reality there is likely to be a full density of possible effects on competition for any given behavior, ranging from extremely procompetitive to extremely anticompetitive. However, partitioning parameter

$$(4) \quad \frac{P(x|C)}{P(x|A)} < \left(\frac{L_{II}}{L_I} \right) \left(\frac{P(A)}{P(C)} \right).^{31}$$

It is easy to see from (4) that the optimal enforcement rule depends on the likelihoods, loss functions, and the prior beliefs. A decision to challenge a given restraint is more likely if: (1) the cost of type-II errors is high relative to the cost of type-I errors; (2) there are strong priors that a practice is anticompetitive; and (3) theory suggests a strong likelihood that the evidence was generated by an anticompetitive rather than a procompetitive or benign practice. In this framework, likelihoods and priors may vary according to the type of restraint at issue and the pro and anticompetitive theories posited. For example, based on the empirical evidence reviewed in section III, our priors that RPM or exclusive dealing are procompetitive may be stronger than our priors for other forms of vertical control on which there has been little empirical work. Further, evidence of downstream foreclosure and economies of scale will affect the likelihood differently in the case of maximum RPM than in the case of exclusive dealing.

As a threshold matter, this classification scheme assumes that a decision maker can measure x accurately. In reality, this assumption may not hold. Whether the models discussed in section II give rise to an anticompetitive outcome depends on details of the competitive environment. For example, the welfare effects of RRC models depend on the values of cost and demand parameters. Similarly, the outcome of a strategic agency model depends on the nature of downstream competition (*i.e.*, Bertrand or Cournot) and the observability of input contracts. In practice, it may be difficult or impossible to determine these details.

Assuming the decision maker can measure x accurately, evidence will fall into one of

space into two regions, where conduct that on net harms welfare is classified as A, and that which on net increases welfare or is neutral is classified as C, however, allows for ease of exposition.

³¹ That the rule in (4) minimizes the risk associated with deciding whether to classify conduct as pro or anticompetitive follows directly from the Neyman-Pearson lemma. See DeGroot (1970, 146-47).

three categories. First, some evidence may contradict the necessary conditions for anticompetitive effects under the relevant theory (*i.e.*, $P(x|A) = 0$). For instance, upstream market power is a necessary condition for anticompetitive effects in many models, and non-linear pricing is often important for models of strategic agency or multilateral opportunism to apply. Thus, if highly competitive upstream markets are observed, a policy maker can rule out most theories of competitive harm. Similarly, if linear input contracts are observed, certain theories of multilateral opportunism or strategic agency can be ruled out. In this way, the presence of evidence contradicting necessary conditions for anticompetitive harm can be used to design safe harbors.³²

The second type of evidence a decision maker may observe is that which is consistent with the necessary conditions for anticompetitive harm, but that is *at least* equally consistent with procompetitive theories, or $P(x|A) \leq P(x|C)$. For example, upstream market power is necessary for theories of harm as well as efficiencies from elimination of double markups to obtain. Further, observing wholesale prices near marginal cost may diminish claims of efficiencies from eliminating the double mark-up, but this evidence does not rule out other efficiencies from vertical practices, like enhanced promotional incentives or the attenuation of hold-up problems.³³

Finally, a policy maker may observe evidence that is associated only (or predominantly) with anticompetitive outcomes. In this case, $P(x|A) > P(x|C)$. Our review of theory, however, suggests that this may be a close to empty set. For example, in the case of tying or exclusive dealing, even large levels of downstream foreclosure and scale economies may not suggest a net

³² It is important for policy makers to avoid the pitfall of creating safe harbors that allow necessary conditions for harm to evolve into *de facto* sufficient conditions.

³³ See, *e.g.*, Klein & Murphy (1988); Marvel (1982).

anticompetitive effect, because such evidence does not rule out an inference that plausible efficiencies from these practices outweigh any competitive loss.³⁴ To the extent that theory cannot provide sufficient conditions for vertical restraints to have net harmful effects, a decision maker may observe only the first two types of evidence. If this is the case, $0 \leq \frac{P(x|A)}{P(x|C)} \leq 1$.

This has two important implications for antitrust enforcers. First, because the empirical literature suggests that $P(C) > P(A)$, if the likelihood is bounded from above by one, the posterior odds of a practice being anticompetitive are at most equal the prior odds. Thus, given strong priors that vertical restraints are efficient, enforcement against vertical restraints should be rare absent direct evidence of harm to welfare. Second, even assuming that $\frac{P(x|A)}{P(x|C)} = 1$ and $P(C) > P(A)$, expression (4) can hold if L_{II} is sufficiently larger than L_I . This means that different jurisdictions can share the same beliefs regarding the theoretical and empirical effects of vertical restraints, but quite legitimately can arrive at different enforcement postures. Loss functions can vary according to conditions in different markets. It is possible, for example, that the U.S. and EU enforcement regimes agree on the likely welfare effects of vertical agreements, but because other considerations are an important determinant of EU competition policy, the cost of type-II errors from vertical agreements may be perceived as higher in Europe. For example, certain vertical restraints – like exclusive territories based on national boundaries– can impair integration, which is the EU’s paramount goal. Such considerations rationally may lead European officials to treat vertical restraints with greater hostility than U.S. counterparts. Likewise, more flexibility in U.S. markets and the legal doctrine of *stare decisis* (which counsels

³⁴ See discussion of Carlton & Waldman (1998), noting how plausible claims of efficiencies should defeat an “antitrust attack” on physical tying, and urging courts to “demand much more than mere theoretical possibility” when balancing competitive harms versus benefits for contractual and virtual ties.

against the overturning of legal precedents except in extraordinary circumstances) rationally may lead U.S. authorities to be biased against type-I errors.³⁵

V. Conclusion

The outcome-based approach to antitrust ushered in by *Sylvania* in the United States (and gaining momentum in the EU) requires enforcement officials to demonstrate likely adverse effects on welfare. We view this primarily as a problem of inference: given the evidence, what is the probability that a given practice is anticompetitive? One approach to the inference problem is to set up “screens” based on structural conditions like market share, where harm is presumed if the conditions are met. Unfortunately, the search for a screen that works well in all but a few well specified instances has proved elusive.³⁶

A second approach is one based on an economic model of the restraint; i.e., posit a theory under which the restraint in question can harm competition, against alternatives in which the restraint is benign or procompetitive, and then determine which theory best explains the available evidence. In this paper, we have argued that it is difficult to distinguish welfare-enhancing from welfare-reducing vertical practices based on evidence because the theory of vertical control tells us only that anticompetitive effects are possible. Until theory can be used to determine how likely it is that a restraint will lead to an anticompetitive outcome, it does not give

³⁵ The reluctance to overrule precedent, and the collective action problem associated with private incentives to challenge bad precedent, is likely to insulate the deterrent effect of a type-I error, while the market may be self-correcting with respect to type-II errors. As Easterbrook (1984, pp. 2-3) observes:

If the court errs by condemning a beneficial practice, the benefits may be lost for good. Any other firm that uses the condemned practices faces sanctions in the name of *stare decisis*, no matter the benefits. If the court errs by permitting a deleterious practice, though, the welfare loss decreases over time. Monopoly is self-destructive. Monopoly vices eventually attract entry.

See also McChesney (2003, 1401, 1412) (“The cost of Type II errors . . . will be low, as long as barriers to entering markets plagued by suspected anticompetition are also low. As prices rise because of anticompetitive contracts or practices, new entrants emerge to alleviate or even eradicate the problem.”).

³⁶ For a discussion of screens *see* Vickers (2004).

us a way to interpret evidence in most cases.³⁷ In this world, enforcement decisions should be guided by prior beliefs and loss functions. Our review of the empirical evidence – which informs our priors – suggests that vertical restraints are likely to be benign or welfare enhancing. An aggressive enforcement policy, therefore, would have to be justified by relatively large type II error costs.

Given the current state of knowledge, we suggest that enforcement policy should be guided by a third approach: draw inferences about the competitive effects of the restraint from a natural experiment. The quality of the experiment and how closely it mimics the effect of the restraint would be issues for the court or decision maker to resolve.

³⁷ The theory and policy of international trade provides an apt analogy. For most the past two centuries the (seemingly irrefutable) economic case for free trade rested on models that assumed price-taking behavior and constant returns technology. In the 1980's, however, the *theoretical* case for free trade was challenged – and the possibility of welfare-enhancing restrictions on trade vindicated -- once economists introduced increasing returns and imperfect competition into these models. Should policymakers conclude, therefore, that opportunities for productive trade intervention are abundant? According to one of the new trade literature's principal architects (Krugman, 1997, 110), "most economists working on international trade [including new trade theorists] have agreed that strategic trade policy can work in principle but have been highly skeptical about its importance and usefulness in practice."

References

- Adams, Walter, and Janet Yellen, 1976, "Commodity Bundling and the Burden of Monopoly," *Quarterly Journal of Economics*, 90, 475-498.
- Areeda, Phillip, & Herbert Hovenkamp, 2003, *Antitrust Law (2d ed.)*.
- Barron, John M., and John R. Umbeck, 1984, "The Effects of Different Contractual Arrangements: The Case of Retail Gasoline Markets," *Journal of Law and Economics*, 27, 313-328.
- Barron, John M., A. Taylor Beck, and John R. Umbreck, 2004, "Will Open Supply Lower Retail Gasoline Prices?," *Contemporary Economic Policy*, 22, 63-77.
- Bernheim, B. Douglass and Michael D. Whinston, 1998, "Exclusive Dealing," *Journal of Political Economy*, 106, 64-103.
- Bonanno, Giacomo, and John Vickers, 1988, "Vertical Separation," *Journal of Industrial Economics*, 36, 257-265.
- Bowman, Ward S., 1957, "Tying Arrangements and the Leverage Problem," *Yale Law Journal*, 67, 19-36.
- Burstein, Martin L., 1960, "The Economics of Tie-In Sales," *Review of Economics and Statistics*, 42, 68-73.
- Carlton, Dennis, and Michael Waldman, 1998, "The Strategic Use of Tying to Preserve and Create Market Power in Evolving Industries," NBER Working paper No. 6831, December 1998.
- Carlton, Dennis, and Michael Waldman, 2002, "The Strategic Use of Tying to Preserve and Create Market Power in Evolving Industries," *Rand Journal of Economics*, 33, 194-220.
- Chipty, Tasneem, 2001, "Vertical Integration, Market Foreclosure, and Consumer Welfare in the Cable Television Industry," *American Economic Review*, 91, 428-453.
- Cournot, Augustin, 1838, *Mathematical Principles of the Theory of Wealth*, Reprints of Economic Classics, Augustus M. Kelley, New York, 1971.
- DeGroot, Moris H., 1970, *Optimal Statistical Decisions*.
- Easterbrook, Frank, 1984, "The Limits of Antitrust," *Texas Law Review*, 63, 1-40.
- Evans, David S. *et al.*, 2004, "A Pragmatic Approach to Identifying and Analyzing Legitimate Tying Cases," in David S. Evans & Jorge Padilla eds., *Global*

Competition Policy: Economics Issues and Impacts

- Ferhstmann, Chaim, and Kenneth L. Judd, 1987, "Equilibrium Incentives in Oligopoly," *American Economic Review*, 77, 927-940.
- Ford, George S., and John D. Jackson, 1997, "Horizontal Concentration and Vertical Integration in the Cable Television Industry," *Review of Industrial Organization*, 12, 501-518.
- Gifford, Daniel J. and Robert T. Kudrle, 2003, "European Union Competition Law & Policy: How Much Latitude for Convergence with the United States?," *The Antitrust Bulletin*, 48, 727-780.
- Gilligan, Thomas W., 1986, "The Competitive Effects of Resale Price Maintenance," *Rand Journal of Economics*, 17, 544-556.
- Gilo, D., 2003, "Retail Competition Percolating Through to Suppliers and the Use of Vertical Integration, Tying, and Vertical Restraints To Stop It," *Yale Journal on Regulation*, 20, 25-75.
- Ginsburg, Douglas, 1991, "Vertical Restraints: De Facto Legality Under the Rule-of-Reason," *Antitrust Law Journal*, 60, 67-81.
- Graddy, Kathryn, 1997, "Do Fast-Food Chains Price Discriminate on the Race and Income Characteristics of an Area," *Journal of Business & Economic Statistics*, 15, 391-401.
- Granitz, Elizabeth, and Benjamin Klein, 1996, "Monopolization by Raising Rivals' Costs: The Standard Oil Case," *Journal of Law and Economics*, 39, 1-47.
- Hart, Oliver, and Jean Tirole, 1990, "Vertical Integration and Market Foreclosure," *Brookings Papers on Economic Activity* (Microeconomics Issue), 1990, 205-286.
- Hastings, Justine S., 2004, "Vertical Relationships and Competition in Retail Gasoline Markets: Empirical Evidence from Contract Changes in Southern California," *American Economic Review*, 94, 317-328.
- Heide, Jan B., Shantanu Dutta, and Mark Bergen, 1998, "Exclusive Dealing and Business Efficiency: Evidence from Industry Practice," *Journal of Law and Economics*, 41, 387-407.
- Hersch, Philip L., 1994, "The Effects of Resale Price Maintenance on Shareholder Wealth: The Consequences of Schwegmann," *Journal of Industrial Economics*, 42, 205-216.
- Heyer, Ken, 2004, "A World of Uncertainty: Economics and the Globalization of Antitrust," US Department of Justice, Economic Analysis Group Working Paper, (2004).
- Hogg, Robert, & T. Craig Allen, 1978, *Introduction to Mathematical Statistics*, 4th ed.

- Joskow, Paul, 1985, "Vertical Integration and Long-term Contracts: The Case of Coal-burning Electric Generating Plants," *Journal of Law, Economics, and Organization*, 1, 33-80.
- Katz, Michael L., 1991, "Game Playing Agents: Unobservable Contracts as Precommitments," *Rand Journal of Economics*, 22, 307-328.
- Klein, Benjamin, Vincent Crawford, and Armen Alchian, 1978, Vertical Integration, Appropriable Rents, and the Competitive Contracting Process, *Journal of Law & Economics*, 297-326.
- Klein, Benjamin, 1988, "Vertical Integration as Organizational Ownership: The Fisher Body-General Motors Relationship Revisited," *Journal of Law, Economics, & Organization*, 4, 199-213.
- Klein, Benjamin, and Kevin Murphy, 1988, "Vertical Restraints as Contract Enforcement Mechanisms," *Journal of Law & Economics* 31, 265 [get pages]
- Krugman, Paul, 1997, *Pop Internationalism* (Cambridge, MA: MIT Press).
- Martin, S., 1999, "Strategic and Welfare Implications of Bundling," *Economic Letters*, 62, 371-376.
- Martin, S., T.H. Normann, and C. Snyder, 2002, "Vertical Foreclosure in Experimental Markets," *Rand Journal of Economics*, 32, 466-495.
- Marvel, Howard, 1982, "Exclusive Dealing," *Journal of Law & Economics*, 25, 1-25.
- Mathewson, G.F, and Ralph A. Winter, 1984, "An Economic Theory of Vertical Restraints," *Rand Journal of Economics*, 15, 27-38.
- Mathewson, G.F. and Ralph A. Winter, 1997, "Tying as a Response to Demand Uncertainty," *Rand Journal of Economics*, 28, 566-583.
- McAfee, R. Preston, and Marius Schwartz, "Opportunism in Multilateral Vertical Contracting: Nondiscrimination, Exclusivity, and Uniformity, *American Economic Review*, 84, 210-230.
- McChesney, Fred, 2003, "Talking 'Bout My Antitrust Generation: Competition for and in the Field of Competition Law," *Emory Law Journal*, 52, 1401-38.
- Mullin, Joseph C., and Wallace P. Mullin, 1997, "United States Steel's Acquisition of the Great Northern Ore Properties: Vertical Foreclosure or Efficient Contractual Governance?" *Journal of Law, Economics & Organization*, 13, 74-100.
- Muris, Timothy J., 2001, "GTE Sylvania and the Empirical Foundations of Antitrust," *Antitrust*

- Law Journal* 68, 899-912.
- Lafontaine, Francine, and Margaret Slade, 1997, "Retail Contracting: Theory and Practice," *Journal of Industrial Economics* 45, 1-25.
- Nalebuff, Barry, 2004, "Bundling as an Entry Barrier," *Quarterly Journal of Economics*, February, 159-187.
- O'Brien, Daniel P. and Greg Shaffer, 1992, "Vertical Control with Bilateral Contracts," *Rand Journal of Economics*, 23, 299-308.
- O'Brien, Daniel P. and Greg Shaffer, 1997, "Nonlinear Supply Contracts, Exclusive Dealing, and Equilibrium Market Foreclosure," *Journal of Economics and Management Strategy*, 6, 755-785.
- Rasmusen, Eric B., J. Mark Ramseyer, and John Shepherd Wiley Jr., 1991, "Naked Exclusion," *American Economic Review*, 81, 1137-1135.
- Reiffen, David, 1998, "Partial Ownership and Foreclosure: An Empirical Analysis," *Journal of Regulatory Economics*, 12, 227-244.
- Reiffen, David, and Michael G. Vita, 1995, "Comment: Is There New Thinking on Vertical Mergers?" *Antitrust Law Journal*, 63, 917-941.
- Rey, Patrick, and Joseph Stiglitz, 1995, "The Role of Exclusive Territories in Producers Competition," *Rand Journal of Economics*, 26, 431-451.
- Rey, Patrick, and Jean Tirole, "A Primer on Foreclosure," forthcoming in *Handbook of Industrial Organization*, vol. 3, edited by Armstrong, M. and R. Porter, North Holland.
- Rey, Patrick, and Thibaud Verge, 2004, "Bilateral Control with Vertical Contracts," forthcoming in *Rand Journal of Economics*.
- Rosengren, Eric S. and James W. Meehan Jr., 1994, "Empirical Evidence on Vertical Foreclosure," *Economic Inquiry*, 32, 303-317.
- Salinger, Michael A., 1988, "Vertical Integration and Market Foreclosure," *Quarterly Journal of Economics*, 103, 345-356.
- Salop, Steven C. and David T. Scheffman, 1983, "Raising Rivals' Costs," *American Economic Review*, 73, 267-271.
- Salop, Steven C. and David T. Scheffman, 1987, "Cost Raising Strategies," *Journal of Industrial Economics*, 36, 19-34.
- Sass, Tim R., and David S. Saurman, 1996, "Efficiency Effects of Exclusive Territories:

- Evidence from the Indiana Beer Market,” *Economic Inquiry*, 34, 597-615.
- Segal, Ilya R. and Michael D. Whinston, 2000, “Naked Exclusion: Comment,” *American Economic Review*, 90, 296-309.
- Sklivas, Steven D., 1987, “The Strategic Choice of Managerial Incentives,” *Rand Journal of Economics*, 18, 452-458.
- Shaffer, Greg, 1991, “Slotting Allowances and Resale Price Maintenance: A Comparison of Facilitating Practices,” *Rand Journal of Economics*, 22, 120-135.
- Shepard, Andrea, 1993, “Contractual Form, Retail Price, and Asset Characteristics in Gasoline Retailing,” *Rand Journal of Economics*, 24, 58-77.
- Slade, Margaret E., 1998a, “Beer and the Tie: Did Divestiture of Brewer-Owned Public Houses Lead to Higher Beer Prices?” *Economic Journal*, 108, 565-602.
- Slade, Margaret E., 1998b, “Strategic Motives for Vertical Separation: Evidence from Retail Gasoline,” *Journal of Law, Economics, and Organization*, 14, 84-113.
- Spengler, Joseph J., 1950, “Vertical Integration and Antitrust Policy,” *Journal of Political Economy*, 58, 347-352.
- Telser, Lester, 1960, “Why Should Manufacturers Want Fair Trade?” *Journal of Law and Economics* 3, 86-105.
- Verouden, Vincent, 2003, “Vertical Agreements and Art. 81(1) EU: The Evolving Role of Economic Analysis,” *Antitrust Law Journal*, 71, 525-575.
- Vickers, John, 2004, “Abuse of Market Power,” Office of Fair Trading working paper.
- Vita, Michael G., 2000, “Regulatory Restrictions on Vertical Integration and Control: The Competitive Impact of Gasoline Divorcement Policies,” *Journal of Regulatory Economics*, 18, 217-233.
- Vita, Michael G., 1997, “Must Carry Regulations for Cable Television Systems: An Empirical Analysis,” *Journal of Regulatory Economics*, 12, 159-72.
- Waterman, David, and Andrew A. Weiss, 1996, “The Effects of Vertical Integration Between Cable Television Systems and Pay Cable Networks,” *Journal of Econometrics*, 72, 357-395.
- Whinston, Michael D., 1990, “Tying, Foreclosure, and Exclusion,” *American Economic Review*, 80, 837-859.
- Williamson, Oliver, 1968, “Wage Rates as a Barrier to Entry: The Pennington Case,” *Quarterly*

Journal of Economics (February), 85-116.

Article	Product	Method & Data	Finding	Conclusion
Ippolito & Overstreet (1996)	Glassware	Analyzed (1) changes in market shares of Corning and its rivals; (2) abnormal stock returns for Corning and rivals when Corning's use of RPM ruled illegal	Corning lost market share in the years following forced abandonment of RPM. Corning suffered negative abnormal returns (12-16%) when FTC complaint announced, principal rival (Anchor Hocking) enjoyed positive (3-7%) abnormal return.	Evidence rejects anticompetitive theories that the RPM contracts facilitated dealer or manufacturer cartels, and instead supports a "principal-agent" explanation in which RPM helped increase demand for Corning's products.
Ippolito (1991)	various	Examined a large sample of private and government RPM cases brought between 1976 and 1982. From reading of published decisions, attempted to assess the "strength" of plaintiff's case according to several criteria designed to assess the case's relative strength.	Collusion theories were potentially applicable to a most 15 percent of the cases in this sample. Virtually all of the cases were consistent with some version of the "special services" theory of minimum RPM (e.g., whereby RPM induces retailers to provide services at the point of sale, or take other actions to preserve the manufacturer's reputation for quality).	Treating RPM as illegal per se deters use of RPM to solve principal-agent problems, does little to deter collusion.
Gilligan (1986)	gasoline, clothing, household products, electronics, recreational equipment, cosmetics, brewing, industrial products	Stock market event study of the impact of RPM legal challenges on the market value of manufacturing firms which used RPM contracts.	On average, manufacturing firms suffered negative (-1.7%) abnormal returns when their use of RPM contracts was challenged.	Evidence rules out the dealer cartel explanation for RPM; it is consistent with both efficiency and manufacturer cartel explanations.

Article	Product	Method & Data	Finding	Conclusion
Hersch (1994)	spirits, apparel, electronics, appliances, toiletries, tires, watches, department stores, grocery chains, retail drug chains, variety chains	Stock market event study of the impact of the Supreme Court's 1951 <i>Schwegmann</i> decision, which substantially weakened the enforceability of RPM contracts. .	Analyzed the impact of the decision on the share prices of both manufacturers and dealers. Generally found that the decision generated minimal abnormal returns for most of the firms in his sample.	Results provide (weak) support for the dealer cartel theory (principally in one industry, consumer electronics) and the efficiency rationales for RPM. No support was found for the manufacturer cartel theory
Slade (1998)	beer	Investigated the UK Merger and Monopolies Commission's decision to require large vertically integrated brewer/retailers to divest themselves of pubs and also to offer the beer of at least one rival brewer. Estimated reduced form retail price equations for "tied" and "free" pubs using panel specification.	Found that the implementation of the beer orders resulted in higher retail prices at vertically controlled retailers ("tied houses"), while prices at unintegrated retailers ("free houses") remained unchanged.	Divestiture policy did not accomplish its goal of reducing retail beer prices. The variety of beers available at retail may have increased.

Article	Product	Method & Data	Finding	Conclusion
Barron, Taylor, & Umbeck (2004)	gasoline	Assesses the likely consequences of "open-supply" legislation, which proscribes contracts between gasoline refiners and retailers requiring the latter to purchase their gasoline exclusively from a particular refiner. Estimated reduced form retail price equation using panel data including a dummy variable indicating whether the station was direct-supplied by a refiner	Stations that switched from jobber-supply to direct refiner supply reduce their prices by 0.6¢-1.0¢ per gallon.	Open supply legislation would not result in lower retail prices.
Barron & Umbeck (1984 & 1985)	gasoline	Compared pre- and post-divorcement (vertical separation) pricing behavior of gasoline stations in Maryland.	At stations that had been company-owned before the enactment of the legislation, fullservice prices rose 6.7¢ (relative to competitors); self-service prices rose 1.4¢. They also found that prices at competing stations also rose post-divorcement.	Requiring vertical separation between refiners and retailers results in higher retail prices.
Vita (2000)	gasoline	Estimated reduced form retail gasoline price equation using state level cross-section data.	Found that retail prices about 2.6¢ higher in states with divorcement policies, compared to states without such restrictions.	Requiring vertical separation between refiners and retailers results in higher retail prices.
Shepard (1993)	gasoline	Estimated reduced form retail price equation. Specification includes dummy variable if the station is company owned.	Company-owned (i.e., vertically integrated) stations charged lower prices per gallon (between 1.4¢ and 10¢ per gallon) than their nonintegrated counterparts.	Contractual form important in determining behavior of retailers.

Article	Product	Method & Data	Finding	Conclusion
Hastings (2004)	gasoline	Investigated the retail price effects of the purchase of "unbranded" gasoline stations (i.e., stations doing business under the name of "Thrifty") by a branded refiner (ARCO). Estimated reduced-form price equation with dummies indicating (1) if station competes with independent; and (2) if the station became company-owned	Found that the rivals of the acquired stations raised their prices post-acquisition by about 5¢/gallon, but that the tendency to raise prices did not depend on the vertical structure of the rival ARCO station (i.e., whether it was vertically integrated, lessee-dealer, or open dealer).	The change in price at newly-acquired stations attributed to the effects of "branding" formerly "unbranded" retailers. The evidence does not support divorcement restrictions.
Slade (1998)	Gasoline	Investigated determinants of contractual form between branded gasoline refiners and retailers. Estimated probit equation with dependent variable equal to 1 if retailer sets prices; independent variables station characteristics, including estimate of station-specific demand elasticity	Found that lower retail elasticity associated with higher probability that pricing decisions will be delegated to retailer. Marginal effects were quite small, however.	Stations that can potentially realize increased price-cost margins from vertical separation more likely to be given authority to set retail prices.

Article	Product	Method & Data	Finding	Conclusion
Heide, Dutta, & Bergen (1998)	industrial machinery & electronic/ electric machinery	Conducted a detailed survey of managers responsible for distribution decisions. Estimated a logit model of the probability that distributors were restricted from carrying the products of rivals.	Results suggested three principal factors determining the use of exclusive dealing (ED) contracts: (1) whether manufacturer compensated dealers for services potentially “free rideable” by rival manufacturers (positively affected use of ED contracts); (2) whether manufacturers can determine compliance with ED requirements at low cost (high costs reduced use of ED); (3) consumer preferences for multiproduct distributors (strong preferences reduced use of ED contracts). A perception by managers that entry was likely reduced probability that ED contracts would be used.	Efficiency considerations play a significant role in firms’ decisions to use exclusive dealing.
Sass & Saurman (1996)	beer	Examined the effects of Indiana's 1979 ban on the grant of exclusive territories to beer wholesalers. Using time-series data for 1948-1990, they estimate a reduced form quantity equation.	The ban on use of exclusive territories reduced per capita beer consumption in Indiana by 6 percent.	Decline in output to a reduction demand-enhancing dealer services brought about by the ban.
Ford & Jackson (1997)	cable TV	Estimated structural price equation for cable tv price with dummy variable if system vertically integrated into programming.	Vertical integration results in modest losses in consumer welfare (\$0.60 per subscriber per year). A ten percent increase in MSO size would result in a modest increase in consumer welfare (\$0.10 per subscriber per year).	Vertical integration results in modest welfare losses to consumers.

Article	Product	Method & Data	Finding	Conclusion
Chipty (2001)	cable TV	Estimated reduced form price equation for basic and premium cable services with dummy variable if system vertically integrated into programming	Integration was at worst neutral from consumers' perspectives, and quite possibly beneficial. Any harm to consumers from the exclusion of non-integrated programming services was more than outweighed by the overall superior product-price mix offered by integrated systems. Overall, consumers in unintegrated cable markets received \$1.58 of consumer surplus; consumers in markets where the system was integrated into basic cable received \$1.96; and consumers in areas where the system owned premium programming services received \$2.00 of surplus.	Vertical integration generally beneficial to consumers of cable TV services.
Vita (1997)	cable TV	Analyzed the incentives of cable systems to exclude local broadcasters from their programming lineup. Paper estimated logit equations for whether or not a local broadcaster was carried on a local cable system.	Used "natural experiment" to assess carriage choices after "must carry" regulations struck down by courts. Theory predicted systems would exclude local competing broadcasters, and keep less competitive distant broadcasters. However, results showed that cable systems tended to drop the more distant network station. Generally, dropped stations had low ratings and originated in a different geographic market from the system.	Cable TV carriage decisions with respect to local broadcasters motivated by efficiency considerations.
Waterman & Weiss (1996)	cable TV	Estimated reduced form "carriage" equations (e.g., which pay networks were carried). Dummy variables for vertical integration with particular pay cable networks.	Cable systems that owned pay movie channels (e.g., HBO) were less likely to carry rival pay channels (e.g., Showtime).	Findings consistent both with foreclosure explanations for vertical integration as well as with efficiency explanations.

Article	Product	Method & Data	Finding	Conclusion
Rosengren & Meehan (1994)	various	Stock market event study of the impact of (1) the announcement of a vertical merger, and (2) the announcement of an antitrust complaint against that merger, on the value of unintegrated rivals, using a database of all vertical transactions challenged by federal enforcement agencies between 1963 and 1982.	No significant abnormal returns to rivals when merger-related events announced.	Study provides no evidence for market foreclosure theory.
Reiffen (1998)	railroads	Stock market event study of Union Pacific (UP) Railroad's attempt to obtain a significant minority share of the voting equity in Chicago Northwestern (CNW) Railroad. Rivals of posited a theory of foreclosure that connects UP's partial ownership of CNW to reductions in both the rivals' profits and social welfare.	Theory predicts that CNW should have suffered negative abnormal returns when the proposed deal was announced. Findings are contrary to the predictions of the rivals' theory, but consistent with theories of efficient partial ownership interest.	No evidence to support foreclosure theory
Mullin & Mullin (1997)	steel	Examines competitive implications of USS's long term lease of iron ore properties from the Great Northern Railway. Lease substantially increased USS's iron ore holdings, and was characterized by the U.S. government time as anticompetitively foreclosing rival steelmakers from a key input.	Stock market event study showing that the customers of USS enjoyed positive abnormal returns (1%) upon announcement of the transaction) suggesting that the effect of the lease was to increase steel output.	Transaction likely motivated by efficiency considerations (specifically, to induce both USS and Great Northern to make relationship-specific investments).

Article	Product	Method & Data	Finding	Conclusion
Lopatka & Godek (1992)	aluminum	Assesses the claims that Alcoa maintained its monopoly in aluminum ingot production by raising the costs of potential entrants through "overbuying" supplies of two inputs critical to aluminum production: electricity and bauxite	Demonstrate that foreclosure theory is empirically implausible. Alcoa never controlled more than a minuscule fraction (at most, approximately 5 percent) of the market for electric power. Second, Alcoa's acquisition of bauxite ore accounted for only a fraction of available supplies, and moreover was consistent with its own input demand levels (i.e., there was no credible evidence of the Alcoa "overbought" bauxite ore).	"Raising rivals' costs" theory of harm from Alcoa's input procurement policies empirically implausible.
Graddy (1997)	fast food	Cross-sectional reduced form price regression with dummy variable indicating whether store is company-owned or franchise.	The price of a meal at a company-owned store is approximately 2.8% lower than the same meal at a franchised store.	Evidence supports theory that prices will be higher when franchises have local market power.