Insurance, Vertical Restraints and Competition

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1 Introduction

One of the least settled areas in modern industrial organization is the economics of vertical restraints.[1] There are those, exemplified by the "Chicago School," who contend that there is no possibility of anticompetitive impacts from vertical restraints (Bork, 1978; Posner, 1976; Director and Levi, 1956). A number of recent papers have explored this issue more formally, however, and find that vertical restraints can sometimes be anticompetitive (Salinger, 1988; Ordover, Saloner, and Salop, 1990; Hart and Tirole, 1990; Riordan and Salop, 1994).

These issues have become especially germane in health care. In the last two decades health maintenance organizations (HMOs) and other forms of alternative health plans[2] have been responsible for an increasing percentage of the delivery of health care in the United States. In 1992, 70 percent of nonfederal patient care physicians had a contract with at least one alternative health plan, representing growth of 15 percent from 1988 (Gillis and Emmons, 1993), and there were 2,578 PPO networks of physicians and hospitals, an increase of 164 percent from 1991 (Marion Merrell Dow Managed Care Digest, 1993). These alternative health plans combine insurance and the provision of health care into one package, either through complete vertical integration or by the health insurer contracting with independent health care providers. These integrated offerings involve some restriction on consumers' choices. Consumers may typically only obtain (non-emergency) care from a contracted provider, or face a differential cost for using out-of-plan providers.

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[1]We consider the literature on both vertical integration and restraints which fall short of integration under the term vertical restraints. We will become more specific later in the paper.

[2]The other two most prominent forms are Independent Practice Associations (IPAs) and Preferred Provider Organizations (PPOs).

Vertical restraints can be efficiency enhancing by lowering transactions costs, assuring supply of an input, improving coordination between the firms, and improving monitoring (Williamson, 1989; Carlton and Perloff, 1994; Riordan and Salop, 1994). Research in health economics has concentrated on the efficiency effects of vertical relations between insurers and providers, especially on control of consumer and provider agency problems (see Gaynor, 1994 for a survey). Although the efficiency aspect of vertical relations is important, and there may be large gains from vertical restraints viewed in isolation, few studies have investigated their market consequences. Specifically, although vertical restrictions may enhance efficiency within a single vertical structure, they may also lead to anticompetitive effects. Thus far, the effects of vertical restraints between insurers and health care providers have largely been ignored.

Health plan contracts have been challenged for antitrust violations recently. Blue Cross and Blue Shield, two nonprofit insurance organizations, frequently merged today in many states, have been sued for creating affiliations among previously independent health care providers; see Baker (1989). In both *Reazin v. Blue Cross and Blue Shield of Kansas, Inc.* and *Ocean State Physicians Health Plan, Inc. v. Blue Cross and Blue Shield of Rhode Island*, the defendants, both dominant firms in their respective markets, have been accused of antitrust violations from their aggressive responses to new health maintenance organizations. In both cases, Blue Cross and Blue Shield either terminated existing contracts with a hospital or insisted on a most-favored reimbursement clause, when the hospital was acquired by or made affiliated with a rival health maintenance organization.

One interpretation of the two cases involves the idea of "raising rivals' costs," due to Krattenmaker and Salop (1986). A downstream retailer, here an insurance company, imposes

restrictions on its upstream supplier, here a health care provider, in order to change the industrial structure and subsequently raise the supply costs of other downstream retailers. When an upstream hospital is foreclosed by a restrictive contract of a downstream insurance company, other upstream hospitals compete less rigorously and can raise their supply prices to remaining downstream insurance companies. The restraint thus strengthens the market power of the downstream insurance company that has established the foreclosing contract with the upstream hospital. The gain in efficiency due to the restrictive contract may not be sufficient to outweigh the welfare loss due to increases in consumer prices and insurance premiums.

In this paper I consider the potential anticompetitive impacts of one form of vertical restraint between insurance companies and health care providers: exclusive dealing. Any efficiency gains from exclusive dealing occur independently of market outcomes; thus, our model speaks only to impacts on competition. I construct a simple model with two upstream health care providers we call hospitals and two downstream insurance companies. Consumers have a distribution of preferences for the two hospitals, thus the products are differentiated. Further, consumers are risk averse. This problem is distinguished from previous treatments (Salinger, 1988; Ordover, Saloner and Salop, 1990; Hart and Tirole, 1990) in part by the fact that consumers want to obtain the upstream product, health care, but can purchase it only indirectly through an insurance policy from the downstream firm.[3] This holds some similarity with other products such as cable television, where the consumer can obtain the programs only by purchasing a cable contract; cellular telephone service, where the consumer obtains channels only through the cellular telephone contract; or computer information services such as

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[3]I discuss the relaxation of this constraint in the section on extensions.

America Online or Compuserve, where specific information services are not purchased directly but by purchasing access to the entire bundle sold by the access company.

I find that hospitals' prices are marked up over marginal cost in simple competition, but insurance companies' profits are zero. The diversity of consumer preferences differentiates hospitals' products and gives them power over price. Insurance companies engage in Bertrand competition and have homogeneous products, thus they earn zero profits in equilibrium. When insurers and hospitals sign bilateral exclusive deals so that there are unique insurer-hospital pairs, both hospital and insurance company profits are zero, but consumers are worse off compared to the first-best. Since an insurance policy and hospital choice are the same thing, competition in the insurance market forces hospital profits to zero. Consumers, however, have no choice over hospital once they have signed an insurance contract. Since preferences are diverse, consumers are worse off. The loss of consumer welfare, however, is due to lack of choice, not anticompetitive effects of exclusive dealing. I also consider a unilateral exclusive deal in which one insurer signs a contract to send their policyholders exclusively to one of the hospitals, but the hospital can treat patients from the other insurer as well. I have not fully characterized this case, but conjecture that neither hospital is able to raise price above marginal cost in this situation. None of these cases result in anticompetitive outcomes. I have not, however, considered the case in which an upstream hospital can commit to prices for both downstream insurers, not just its partner in the exclusive deal, as part of the exclusive contract. Equilibrium in this case may have a foreclosure outcome.

In what follows, I survey the economics literature on vertical restraints in the next section, present the model and analysis in section 3, and describe an extension in section 4. Section 5 contains the summary and conclusions.

2 The Economics of Vertical Restraints

The economics literature derived originally as a response to early antitrust case law on vertical restraints. Early decisions were extremely restrictive in their treatment of vertical integration or exclusionary practices.[4] The courts expressed concern that vertical integration or exclusive deals could lead to market foreclosure and consequently be harmful to competition.

Strong criticism of case law by the Chicago School led to a new perspective in which exclusive dealing (and other forms of vertical relations) were viewed as competitively neutral or procompetitive (Bork, 1978). This view underpins the liberal 1985 Department of Justice Vertical Restraints Guidelines and the permissive policy toward vertical restraints during the Reagan and Bush administrations. Currently, concern about vertical restraints has been renewed. One of Assistant Attorney General Bingaman's first official acts was to repeal the 1985 Vertical Restraints Guidelines. The Department of Justice and the Federal Trade Commission have initiated actions against vertical restraints (see Riordan and Salop, 1994).

The policy interest in vertical restraints is mirrored in the economics literature as well. Current industrial organization theory on vertical relations builds upon the Chicago School critique by applying modern theory to the analysis of more realistic market structures than considered by the Chicago School. This literature identifies situations in which exclusive dealing and other vertical restraints can

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[4]For example, *U.S. v. Aluminum Co. of America*, 148 F.2d 416 (2nd Cir. 1945); *Lorain Journal v. U.S.,* 342 U.S. 143 (1951), *United Shoe Machinery Corp. v. U.S.,* 258 U.S. 451, 458 (1922) for exclusionary practices and *Brown Shoe Co., Inc. v. U.S.,* 370 U.S. 294 (1962); A.G. *Spalding & Bros., Inc.,* 56 F.T.C. 1125 (1960); *Kennecott Copper Corp. v. U.S.* 381 U.S. 414 (1965); *Ford Motor Co., v. U.S.* 381 U.S. 414 (1965); *Ford Motor Co., v. U.S.,* 405 U.S. 562 (1972) for vertical integration.

raise concerns about competition. In what follows, I review the Chicago School critique and the modern theoretical literature on vertical restraints.

Consider relations between firms operating in an upstream and a downstream market. The traditional concern is that if an upstream and a downstream firm integrate or sign an exclusive deal, the access of other downstream firms to upstream supply may be foreclosed (or upstream firms' access to a downstream buyer). This may raise the costs of rival firms, thus bestowing market power on the firm which has integrated or struck an exclusive deal.

The Chicago School critique of antitrust policy toward exclusive dealing consists of three main points. First, exclusive dealing between a firm and a supplier does not necessarily imply that the net supply of inputs to rival firms is reduced. Rival firms may now have access to other suppliers previously utilized by the firm involved in the exclusive deal. Just because access to one supplier is foreclosed does not mean that the net supply of inputs has been foreclosed. Second, the Chicago School claims that a monopolist cannot enhance its monopoly power by the use of exclusive dealing or other vertical restraints. There is a "single monopoly profit," regardless of the nature of vertical relations (Bork, 1978, p.229). Third, the Chicago School criticizes the case law on forward integration on the grounds that sellers could not induce buyers to accept exclusionary contracts if such contracts actually hurt the buyers (Director and Levi, 1956). Posner (1976, p. 212) and Bork (1978, p.309) conclude that exclusionary contracts cannot cause any harm and therefore ought to be disregarded by antitrust law. The Chicago School conclusion is that since there are no anticompetitive impacts of exclusive dealing, exclusive contracts will only exist where they result in efficiencies, hence they must be beneficial.

Despite the impact of vertical integration and restraint on industrial structure and competition, the theoretical literature on the subject is relatively small and recent. The leading papers on the competitive effects of vertical integration are those by Salinger (1988), Ordover, Saloner and Salop (1990), and Hart and Tirole (1990). The first paper uses a Cournot model to analyze competition among upstream and downstream firms, while the last two use Bertrand competition. All three demonstrate that vertical integration sometimes can lead to monopolization outcomes, concluding that vertical integration may be anticompetitive. In the literature, a key issue concerns the incentive of a vertically integrated firm to sell intermediate inputs to other downstream firms. The foreclosure effect obtains only if a vertically integrated firm refuses to sell intermediate inputs, or sells at a higher price, so that nonintegrated downstream firms face a smaller demand, must pay a higher input price and compete at a disadvantage against the integrated firm. Whether such a foreclosure incentive can result as an equilibrium in a rigorous model has been the main research question in these papers.

In the Salinger (1988) model, a fixed number of upstream manufacturers supply intermediate inputs to a fixed number of downstream dealers, who then produce and sell the final goods to consumers. Competition is assumed to be Cournot at each stage of production. Thus, in the downstream market, nonintegrated dealers take the prices of intermediate inputs as given, buy inputs from upstream firms for production and then compete with integrated firms (which use a transfer price equal to the marginal cost of the intermediate input) in a Cournot fashion. Salinger imposes conditions so that integrated firms do not find it profitable to sell intermediate inputs to nonintegrated downstream dealers. The resulting downstream Cournot equilibrium depends on the input prices and the number of nonintegrated upstream suppliers, and yields the derived demands for intermediate inputs produced by upstream firms. With these derived demands, a Cournot equilibrium is solved for the upstream market.

Using a linear demand function for final goods, Salinger finds that when the number of integrated firms is sufficiently large, and the number of downstream dealers is sufficiently larger than the number of upstream producers, then an increase in the number of integrated firm increases the final product price, and equilibrium consumer welfare decreases.

Despite its simplicity, the Salinger analysis has a weakness. The assumption that downstream producers take the price of the intermediate goods as given implies that the strategic interaction between imperfectly competitive output and input markets is assumed away. That is, a downstream firm behaving in a Cournot fashion when making its output decision actually ignores the fact that its input demand may influence the input price. Because of this assumption, the corresponding extensive-form game that formally represents the model is awkward to formulate precisely. Despite this shortcoming, the paper still contrasts with the well-known double marginalization result when an upstream monopoly supplies a downstream monopsony (see Spengler (1950)). When the number of integrated firms increases, the supply of the intermediate goods to nonintegrated firms decreases, and input and output prices tend to increase as a result. Nevertheless, since integrated firms use a transfer price equal to marginal cost, the supply of the final output tends to increase as the number of integrated firms grow. Salinger's main result described earlier is the net consequence of these opposing effects.

Ordover, Saloner and Salop (1990), and Hart and Tirole (1990) use a Bertrand model of competition in the upstream and downstream markets. In these papers, there are two upstream firms, *U1* and *U2*, producing homogenous inputs, and there are two downstream firms, *D1* and *D2*, producing differentiated products for consumers. Ordover, Saloner and Salop assume that *U1* and *U2* are identical firms, while Hart and Tirole assume that *U1* and *U2* produce inputs with different costs. The fundamental intuition of these two papers can be described as follows. Vertical integration

internalizes the joint surplus available to an upstream and a downstream firm as a coalition. If, say, *U1* and *D1* do not integrate, then monopolization is infeasible, since the upstream firm always will have an incentive to sell to *both* downstream firms. Upon integration, *U1-D1* must consider the competitive outcome in the final output market when it makes a decision to sell inputs to *D2*, the unintegrated downstream rival. If by not selling, *U1-D1* forces *D2* to buy from the less efficient *U2*, then *D2* will compete at a disadvantage since its cost will be higher. It therefore becomes optimal for *U1-D1* to foreclose its supply to *D2*.

In the simplest deterministic-cost version of the formal model in Hart and Tirole, upstream firms compete à la Bertrand to sell intermediate inputs to downstream firms. Identical downstream firms, *D1* and *D2*, in turn compete in quantities in a Cournot fashion. The constant marginal costs of supplying inputs may be different for the two upstream firms. Suppose that upstream firm *U1* has a lower cost than *U2*. Under nonintegration, *U2* will be unable to beat *U1* to supply downstream firms. Thus, *U1* supplies to both downstream firms at a price equal to the cost of *U2*. As a result, *D1* and *D2* will compete in quantities with equal input costs. Under nonintegration, *U1* will not have any incentive to supply any downstream firm at its lower marginal cost, and *U2* will not supply at all.

Now consider integration, and without loss of generality, assume that *U1* and *D1* have integrated. The transfer price for the intermediate input within the *U1-D1* coalition will be equal to *U1*'s (lower) marginal cost. Since *D2* can always buy from the higher cost upstream firm *U2*, the merged firm *U1-D1* cannot do better than supplying the intermediate inputs to *D2* at a price equal to *U2*'s (higher) cost. Thus, the final product market equilibrium will be a Cournot equilibrium with *asymmetric* costs. Downstream firm *D2* now competes at a disadvantage against *U1-D1*, since its input cost is higher. This is the exclusion effect of integration: downstream firm *D2*'s input market is

partially foreclosed, and is hurt by the vertical integration between *U1* and *D1*. As a result the profit of the integrated firm rises.

In contrast to the Hart and Tirole model, Ordover, Saloner and Salop assume that upstream firms are identical. It would then seem that the foreclosure effect would disappear, since a downstream firm can always obtain inputs from a nonintegrated upstream firm at the same cost as an integrated firm. Nevertheless, Ordover, Saloner and Salop assume that an integrated firm can commit to sell to a nonintegrated downstream firm at a certain price. Clearly, the merged firm will commit to sell to a nonintegrated downstream firm at a price higher than the marginal cost of the intermediate input. Since the upstream firms' prices are strategic complements, the best response of the nonintegrated upstream firm is to supply the intermediate input at this higher price as well. Again, the nonintegrated downstream firm will only acquire inputs at a higher cost than the merged firm, and the foreclosure effect reappears. Because of the assumption of symmetric upstream firms, the foreclosure effect in Ordover, Saloner and Salop must entail a commitment on the part of the integrated firm to behave suboptimally ex post (since the nonintegrated firm can undercut ex post).

The recent literature on vertical restraint addresses a somewhat different question than vertical integration. Observed practices between nonintegrated manufacturers and retailers exhibit a variety of agreements, often markedly different from the simple price-mediated exchange framework. The major questions in this literature are whether a contract between two vertically related firms can duplicate the integration or joint profit maximization outcome, or the characteristics of optimal contracts between manufacturers and their retailers. Three features that are commonly seen in practice are *resale price maintenance* (RPM), *exclusive territories* (ET), and *exclusive dealing* (ED). Thus, the literature also has concentrated on the properties of these three kinds of contracts.

In Mathewson and Winter (1984), the authors show that RPM and ET can be used to internalize promotion spillovers in the downstream retail markets. Downstream retailers often perform significant investments in promoting the manufacturer' products. For example, advertising by the retailer may lead to better information for consumers to make product choices; product warranties that are serviced by retailers may increase product qualities; the retailers' choice of sale locations may affect the accessibility of products, etc. These investments that are made by one retailer, however, may affect other retailers. Advertisements on a TV network may make consumers aware of product availability not only in the retailer that poses the advertisement, but other retailers as well. A retailer that provides warranty services may later repair a defective product that has been purchased at another retailer. Such spillover effects are valued by the manufacturer, but not necessarily or fully by a retailer. Mathewson and Winter demonstrate that a manufacturer may impose RPM or ET so that a retailer will have an incentive to internalize such effects in order to maximize the joint profit of the manufacturer and the retailer.

In Rey and Tirole (1986), the manufacturer-retailer relationship is described as a principal-multiagent model. The analysis focuses on risk sharing between the manufacturer and its retailers. RPM fully insures a retailer since the price, and hence profits, will be fixed. Nevertheless, RPM does not permit the retailer to make use of local information, such as demand and cost conditions when setting the final price to consumers. On the other hand, ET allows the retailer to exploit its monopoly power, and hence use decentralized information more efficiently, but the retailer has to bear the risk of demand and cost uncertainty. Rey and Tirole show that the relative merit between RMP and ET on the one hand and competition on the other, depends on the importance of the kind of uncertainty that a retailer faces and the retailer's degree of risk aversion.

The major objection to ED is that it can lead to market foreclosure, thereby damaging competition and reducing social welfare. This critically depends on whether an exclusive deal reduces the net supply of inputs to rival firms in the downstream market. If access is reduced, then ED will raise the cost of doing business to rival firms (Krattenmaker and Salop, 1986a, 1986b; Salop and Scheffman, 1983, 1987). This will put rival firms at a cost disadvantage, increase the monopoly power and the profits of the firm with the exclusive deal, and reduce social welfare (Katz, 1989; Comanor and Frech, 1985; Mathewson and Winter, 1987; Schwartz, 1987).[5] Not only can this deter entry or increase the unilateral monopoly power of the firm with exclusive contracts, it can make collusive agreements more likely. An increase in the power of the firm with exclusive contracts can provide it with the necessary power to implement and enforce collusive agreements (Riordan and Salop, 1994).

The crucial criticism to this line of reasoning is why a buyer would sign an exclusive contract. Director and Levi (1956), Posner (1976), and Bork (1978) have stated that exclusive deals could not be anticompetitive, because if they were they would leave buyers worse off and rational buyers would not sign a contract that reduces their welfare. If there are many buyers, however, lack of coordination among the buyers can lead to this outcome. Each buyer is small and thinks that his/her signing of an exclusive contract has an extremely small impact. Consequently, there is a Nash equilibrium in which each one signs an exclusive contract (Katz, 1989). This argument lacks force, however, when the number of buyers is small.

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[5]Comanor and Frech claim to show that an exclusive deal can be anticompetitive by raising rivals' costs of entry. Mathewson and Winter and Schwartz are comments on the generality and technical validity of Comanor and Frech's results. Mathewson and Winter show that the relevant focus is on potential competition, not only actual competition. Schwartz shows that Comanor and Frech, by ignoring downstream firms' responses, have not constructed a subgame perfect equilibrium.

Aghion and Bolton (1987) show that individual buyers can find it rational to sign an exclusive contract, even when the number of buyers is small. The exclusive contract is a long-term contract with a penalty for breach of contract. The penalty is set so that the buyer will accept an offer from an entrant and breach the contract only at a high price. Thus some entry is deterred. Aghion and Bolton's results are obtained with the following assumptions: the excluding firm can commit to a future price level; each buyer can escape the contract by paying a penalty; the incumbent has constant marginal cost, but the rival's cost is random and can be higher or lower; and production has a fixed cost, so if the rival attracts fewer buyers its cost rises. Precommitment to future prices may be very difficult to implement, as may actually imposing penalties for breach of contract. Rasmusen et al. (1991) rely only on a minimum efficient scale of production such that a seller must serve at least two buyers, and on buyers being unable to coordinate with each other. They find a pure strategy Nash equilibrium in which buyers sign exclusionary contracts and entry is deterred.

Whereas recent theories on vertical integration have cast doubt on the liberal standards of the legality of vertical integration, vertical restraint theories have demonstrated that the *per se* illegality of vertical restraints is unsound. These theories have used formally unrelated models, however. Thus, in models of vertical restraints, integration is simply assumed impossible. Issues that are thought to be important in vertical restraints are usually ignored in models of vertical integration. Perhaps most important, the analysis of these models is quite general. Thus, it is unclear whether existing results have strong bearings on the health market, where insurance, consumer moral hazard due to copayments being less than ex post treatment costs, and provider cost sharings are important. The objective of this project is to construct and analyze a model in which these dominant features in the health market are included explicitly. The next section describes such a model.

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3 THE MODEL

3.1 Introduction

Consider the following game. The players are hospitals, insurance companies, and consumers. There are two hospitals, *H1* and *H2*, and two insurance companies, *I1* and *I2*. Hospitals are treated as upstream firms, and insurance companies as downstream firms. The assumption is that hospitals have access to the market only through insurance companies, or alternatively, no consumer will go directly to a hospital without an insurance policy. There is a continuum of consumers, with density normalized to one. The multistage game is defined as follows:

Stage 1: *I1* and *I2* each simultaneously offer reimbursement policies to *H1* and *H2*.

Stage 2: Each of *H1* and *H2* receives all the proposals and decides to accept or reject them. Providers *H1* and *H2* can accept multiple proposals if doing so does not lead to inconsistency. After these decisions have been made, a set of arrangements between insurance companies and the hospitals will be established. These arrangements are made known to consumers.

Stage 3: Each insurance company offers an insurance contract to consumers. An insurance contract consists of a premium, an out-of-pocket cost each consumer has to pay (either the insurance company or the provider), and any other conditions under which the treatment costs incurred by the patients will be assumed through the insurance contracts.

Stage 4: Consumers decide whether to buy insurance policies, and from which insurance company or plan.

Stage 5: Uncertainty about health status is realized, and some consumers become sick and seek treatment under the terms of their insurance contracts.

This extensive form is sufficiently general to include a number of observed health plan contracts. First, a reimbursement policy can be a simple two-part tariff: a lump-sum transfer and a price per patient treated by the hospital under the insurance plan. Second, it can specify a capitation payment for each insured consumer. Third, it can be an exclusive contract; that is, if *H1* accepts a contract offered by *I1*, it may not accept another contract offered by *I2*. Fourth, it may even specify that *I1*'s reimbursement rate be a most-favored rate: whenever *H1* accepts a contract offered with *I2* with a lower rate, that lower rate becomes effective for *I1* as well. In summary, the reimbursement policy between an insurance company and a hospital can embody a variety of vertical restraints.

The health plan contracts offered to consumers also allow a variety of cost control to counteract consumer moral hazard. For example, it may specify a PPO type contract: a consumer having a contract with *I1* may pay a lower copayment when his treatment is obtained at *H1*, higher if at *H2*. It may be a simple fee-for-service insurance contract. Or it may be an HMO contract: a contract offered by *I1* may allow full reimbursement if treatment is provided at *H1* only. The consumer's decision at Stage 4 forces him to evaluate the value of the insurance contract in terms of the insurance company's network of reimbursement policies that already has been established with providers.

In the model, the providers can be regarded as upstream firms supplying treatment quantities to downstream insurance companies, which bundle insurance and treatment and sell them as final products to consumers. Contracts between insurance companies and providers on the one hand and between insurance companies and consumers on the other respectively represent vertical restraints on

the upstream suppliers and controls on consumers whose ex post behavior is a form of moral hazard due to the existence of insurance.

Having said all that, for the present I restrict the analysis to exclusive dealing. The reason for this is that exclusive dealing is a common feature of contracts between insurers and hospitals. The goal is to characterize equilibrium outcomes and compare them with perfectly competitive allocations. In particular, I will investigate whether foreclosure is present in equilibrium, and what form foreclosure will assume.

3.2 Preliminaries

Each consumer is risk averse, and may become ill with probability θ. When ill, a consumer values a unit of treatment at hospital Hi at v_i, $i = 1,2$. The random variables v_1 and v_2 are identically and independently distributed on the support $[\underline{v},\infty)$, with distribution and density functions Φ and ϕ respectively. Furthermore, define the random variable v by $v =$
$v_1 - v_2$. Let F and f be the distribution and density functions of v, respectively. Clearly, v has a support on the real line, and is symmetric at 0. An insurance policy is described by a triple: (α,β_1,β_2), where α is the premium, and β_1 and β_2 are the copayments associated with use of hospitals $H1$ and $H2$, respectively. Then utility from using Hi is:

(1)
$$U(W_s - a) + v_i - b_i, \quad i = 1,2.$$

Suppose that $\beta_1 \geq \beta_2$. Let β denote $\beta_1 - \beta_2$. Then the expected utility from the insurance policy:

(2)
$$(1-q)U(W_h-a) + q U(W_s-a) + q \int_{\underline{v}}^{\infty} \int_{v_2+b}^{\infty} (v_1 - b_1)f(v_1)dv_1 f(v_2)dv_2 +$$
$$q \int_{\underline{v}}^{v+b} \int_{\underline{v}}^{\infty} (v_2-b_2)f(v_2)dv_2 f(v_1)dv_1 + q \int_{\underline{v}+b}^{\infty} \int_{v_1-b}^{\infty} (v_2-b_2)f(v_2)dv_2 f(v_1)dv_1.$$

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The expected utility can alternatively be written as

$(1 - \theta)U(W_h - \alpha) + \theta U(W_s - \alpha) + \theta\{E_{v2}[E_{v1}(v_1 \mid v \geq \beta)] - p_1(1 - F(\beta))E_{v1}[E_{v2}(v_1 \mid v < \beta)] - p_2F(\beta)\},$

where E_x is the expectation operator with respect to the random variable x. Similar expressions can be written down for the case of $b_1 < b_2$. The insurance company's expected profit from the insurance policy is:

$$\textbf{(3)} \qquad\qquad a \ + \ q\,[1 - F(b)]\,(b_1 - p_1) \ + \ F(b)(b_2 - p_2).$$

Lemma 1 *For any given pair of hospital prices p_1 and p_2 at H1 and H2 respectively, let $b_1(p_1,p_2)$ and $b_2(p_1,p_2)$ denote the equilibrium copayments required by the insurance companies I1 and I2. Then $b_1 - b_2 = p_1 - p_2$.*

Proof: Because consumers are ex ante identical and each insurance company faces the same set of prices from the hospitals, an equilibrium insurance policy will offer the maximum expected utility to the consumer and yield nonnegative profit. Thus, an equilibrium insurance policy maximizes (2) subject to the constraint that (3) is nonnegative. Consider a given pair of hospital prices p_1 and p_2. Let $(\alpha;\beta_1,\beta_2)$ denote the equilibrium insurance policy (respectively premium and copayments at $H1$ and $H2$). Clearly, under the equilibrium policy, the hospital earns zero expected profit, so that (3) is equal to 0. Furthermore, let s denote the probability that the consumer will use $H1$; that is s equals the probability that $v_1 - \beta_1 \geq v_2 - \beta_2$, or $1 - F(\beta)$. Note that the insurance company's expected profit is $\alpha + \theta[s(\beta_1 - p_1) + (1 - s)(\beta_2 - p_2)]$.

Now suppose the lemma is false. Without loss of generality, suppose $\beta_1 - \beta_2 > p_1 - p_2$. Consider another policy $(\alpha; \beta_1 - \varepsilon, \beta_2 + \delta)$, where ε and δ are both strictly positive, and satisfy

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$$(\beta_1 - \varepsilon) - (\beta_2 + \delta) > p_1 - p_2$$

$$s\varepsilon = (1 - s)\,\delta.$$

By the definition of ε and δ, if the consumer continues to choose $H1$ if and only if

$v_1 - \beta_1 \geq v_2 - \beta_2$, his expected payment and hence his expected utility remain unchanged; the insurance

company's profit remains unchanged also. Now suppose that the consumer re-optimizes and chooses

$H1$ if and only if $v_1 - \beta_1 + \varepsilon \geq v_2 - \beta_2 - \delta$, then his expected utility must increase. Notice that according

to this new decision rule, the consumer will pick $H1$ with probability $s + x$, for some $x > 0$.

Under the new decision rule, the insurance company's expected profit when the consumer has

become sick is

$$= [s(b_1 - p_1) + (1-s)(b_2 - p_2)] - [s\mathrm{e} - (1-s)\mathrm{d}] + [x(b_1 - \mathrm{e} - p_1 - b_2 + \mathrm{d} - p_2)].$$
$$(s+x)(b_1 - \mathrm{e} - p_1) + (1 - s - x)(b_2 + \mathrm{d} - p_2)$$

By the definition of ε and δ, the second set of terms is zero, and the last set strictly positive. Thus, the

expected profit from the policy $(\alpha;\ \beta_1 - \varepsilon, \beta_2 + \delta)$ has increased.

We can conclude that the feasible policy $(\alpha;\ \beta_1 - \varepsilon, \beta_2 + \delta)$ increases both the consumer's

expected utility and the insurance company's expected profit. Thus, the assumption that

$\beta_1 - \beta_2 > p_1 - p_2$ must be false. So it is established that $\beta_1 - \beta_2 = p_1 - p_2$. *Q.E.D.*

The intuition of Lemma 1 is straightforward. Ex post choice of hospital is efficient when β_1

and β_2 are set to ensure that $H1$ is selected if and only if $v_1 - p_1 \geq v_2 - p_2$. But consumers decide

between H_1 and H_2 on the basis of $v_1 - \beta_1$ and $v_2 - \beta_2$. Thus, to implement the ex post efficient selection

between H_1 and H_2, the difference between β_1 and β_2 must be the same as that between p_1 and p_2.

Although implementing this efficient selection rule requires shifting all the risks from fluctuations of v_1

and v_2 to consumers, the implementation is not costly because the consumer is risk neutral with respect to his preferences over v_1 and v_2.

We can observe that the magnitudes of β_1 and β_2 will be typically well below those of p_1 and p_2. The consumer is risk averse with respect to the income fluctuations due to health and sickness; therefore, the insurance company will absorb some of the costs ex post. Thus the consumer typically will be responsible for a fraction of the costs p_1 and p_2. But according to Lemma 1, the difference between the copayments will be exactly equal to the difference of the costs.

Lemma 1 actually allows one to characterize the optimal contract $(\alpha;\beta_1,\beta_2)$ that Ij offers to consumers. Since at a solution to the maximization of (2) subject to (3) equal to 0, $\beta_1 - \beta_2 = p_1 - p_2$, we have $\beta_1 - p_1 = \beta_2 - p_2$. Substituting this into (3) equal to 0, it simplifies to $\alpha + \theta(\beta_2 - p_2) = 0$. Furthermore, one can replace $\beta_1 - \beta_2$ in (2) by $p_1 - p_2$, and β_1 in the first integrand of (2) by $\beta_2 - p_2 + p_1$ to get

(4) $\quad (1-q)U(W_h-a)+qU(W_s-a) \; + \; q\int_{\underline{v}}^{\infty}\int_{v_2-p_2+p_1}^{\infty}(v_1-b_2+p_2-p_1)f(v_1)dv_1f(v_2)dv_2$

$\quad q\int_{\underline{v}}^{\underline{v}+p_1-p_2}\int_{\underline{v}}^{\infty}(v_2-b_2)f(v_2)dv_2f(v_1)dv_1+q\int_{\underline{v}-p_2+p_1}^{\infty}\int_{v_1-p_1+p_2}^{\infty}(v_2-b_2)f(v_2)dv_2f(v_1)dv_1.$

The maximization of (2) subject to (3) equal to zero by choosing α, β_1, and β_2 is equivalent to the maximization of (4) by choosing β_2, with $\alpha = \theta(p_2 - \beta_2)$. The first order condition for this maximization is

$$(1-q)U'(W_h-q(p_2-b_2)) \; + \; qU'(W_s-q(p_2-b_2))=1.$$

In terms of α, this first order condition can be written as

(5) $\qquad\qquad\qquad (1-q)U'(W_h-a) \; + \; qU'(W_s-a) \; = \; 1.$

To conclude, the equilibrium insurance contract can be obtained in the following way. First, use (5) to obtain α. Then use $\alpha + \theta(\beta_2 - p_2) = 0$ to set the level of β_2, and finally, set β_1 by $\beta_1 - \beta_2 = p_1 - p_2$.

For future reference, note that Lemma 1 will be true even if the minimum profit for Ij is some arbitrary amount $K > 0$. I will now consider market interactions between hospitals and insurers. I first consider the case where both the hospital and insurance markets are competitive.

3.3 Nonexclusive Simple Competition

Proposition 1 *In the game in which both hospitals simply pose prices and accept patients from both insurance companies at those prices, each hospital earns strictly positive profits in equilibrium. Furthermore, both insurance companies earn zero profits.*

Proof: From the proof of Lemma 1, we already know that each insurance company will earn zero profits in equilibrium. It remains to demonstrate that in equilibrium each hospital earns strictly positive profits. This can be established by showing that each hospital sets a price to the insurance companies strictly above its marginal cost.

From Lemma 1, we know that for any pair of prices set by $H1$ and $H2$, namely p_1 and p_2 respectively, the equilibrium copayments will satisfy $\beta_1 - \beta_2 = p_1 - p_2$. Thus, given p_1 and p_2, $H1$'s expected profit is

$$(p_1 - c)[1 - F(p_1 - p_2)].$$

The first order derivative is

(6) $$[1 - F(p_1 - p_2)] - (p_1 - c)f(p_1 - p_2)$$

In an equilibrium, for any p_2, $H1$ will choose p_2 so that the above first order derivative will be zero. Also, by symmetry, in an equilibrium $H1$ and $H2$ will set equal prices. Thus, setting $p_1 = p_2 = p^*$ and (6) to zero, we have

$$p^* = c + \{2f(0)\}^{-1} > c.$$

Notice that $f(0) = F'(0)$. But for $X \geq 0$, $F(x) = \int_{\underline{v}}^{\infty} \int_{\underline{v}}^{v_2+x} f(v_1) dv_1 f(v_2) dv_2$. We have

$f(x) = \int_{\underline{v}}^{\infty} f(v_2 + x) f(v_2) dv_2$. Thus, the above expression for p^* also can be written as

Hence, $H1$ and $H2$ must earn strictly positive profits. Q.E.D.

3.4 Bilateral Exclusive Deals

Now consider bilateral exclusive dealings in which each insurer signs a contract to send their policyholders to only one hospital. Thus the two hospitals and two insurance companies form two exclusive hospital-insurer pairs Hi accepts consumers from Ij if and only if $i = j$. Thus, the consumer's ex post differences in his valuations from services of $H1$ and $H2$ have no consequences: a consumer who has joined Ij will be unable to use Hi if $i \neq j$. Thus, his expected utility from an insurance policy (α_j; β_j) offered by Ij is

(7) $$(1-q)U(W_h - a_j) + qU(W_s - a_j) + q\int_{\underline{v}}^{\infty}(v - b_j)f(v)dv.$$

Clearly, he picks the insurance policy that offers the highest expected utility.

Suppose Ij faces a price p_j from H_i, $(i = j)$. Then it can offer consumers an expected utility as in (7). If the contract is accepted, his expected profit is $\alpha_j + \theta (\beta_j - p_j)$. Clearly, Ij will only offer a policy that enables it to make a nonnegative profit. Now observe that the maximum expected utility Ij can offer to consumers is negatively related to p_j. Suppose $I1$ and $I2$ face prices p_1 and p_2 respectively, then the maximum utility $I1$ can offer will be greater than I_2 if and only if $p_1 < p_2$. Indeed, if $p_1 < p_2$, then only $I1$ will be able to sell to consumers, and both $I2$ and $H2$ get no market share. This argument

establishes that in an equilibrium under bilateral exclusive contracts, both $H1$ and $H2$ must set their prices equal to marginal cost. Thus, we have:

Proposition 2 *In the game in which hospital Hi only accepts patients from insurance company Ij, where i = j, each hospital earns zero profit. Furthermore, each insurance company earns zero profits.*

When hospitals are tied to a single insurer by an exclusive contract, Bertrand competition in the insurance market extends into the hospital market, thus no markup over price is possible. Consequently, bilateral exclusive deals have no anticompetitive impacts. Nevertheless, consumers are clearly worse off than under the first best. Since consumers do not know which provider they will value more highly when they get sick, expected utility is higher with a choice of providers. The optimal contract characterized previously is no more costly than the bilateral exclusive deals at $p_1 = p_2 = c$, but has higher expected utility. Note that this ignores any efficiency gains from exclusive deals. This implies that bilateral exclusive deals will exist only when they achieve efficiency gains substantial enough to outweigh lower expected utility from decreased choice.[6]

3.5 Unilateral Exclusive Deals

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[6]The comparison with the first best may not be the relevant one. At present we have not worked out the welfare comparison of competition and bilateral exclusive dealings.

Now consider unilateral exclusive dealings in which one insurer signs a contract to send its policyholders exclusively to one hospital but no other exclusive deals are struck. The key question is whether there is a foreclosure effect á la Ordover, Saloner and Salop, in which the upstream hospital in the exclusive deal sells to the other downstream insurer at a price above marginal cost while selling to its partner in the exclusive deal at marginal cost.

Consider the following game. Hospital $H1$ sets a price p to $I1$, and $I1$ will not be able to accept any contract from $H2$. Next, $H1$ and $H2$ simultaneously offer prices p_1 and p_2, respectively to $I2$. Then, $I1$ and $I2$ offer insurance contracts to consumers.

Consider the subgame defined by the price p that $H1$ offers to $I1$ in the exclusive contract. The maximum expected utility that $I1$ can offer the consumer is given by the optimized value of (7) subject to the constraint that the insurance policy makes zero profit. Let $EU_{I1}(p)$ denote the maximum of (7) subject to $\alpha\ \theta(\beta - p) = 0$. The function $EU_{I1}(p)$ is strictly decreasing in p.

Next, suppose $H1$ and $H2$ offer prices p_1 and p_2 to I_2. The maximum expected utility that I_2 can offer to consumers is given by the optimized value of (2) subject to the constraint that the insurance policy makes nonnegative profit, or (3) being nonnegative. Denote this maximum expected utility by $EU_{I2}(p_1, p_2)$; EU_{I2} is strictly decreasing in its arguments. Furthermore, let

 denote the equilibrium expected utility under the nonexclusive simple competition regime; that is, = $EU_{I2}(p^*_1, p^*_2)$.

For any given p, p_1, and p_2, all consumers strictly prefer to buy $I1$'s policy if and only if $EU_{I1}(p) > EU_{I2}(p_1, p_2)$. Although $I1$'s policy does not allow consumers to use $H2$ ex post, the policy may be offered at a lower premium, thus competing with $I2$'s policy successfully. Notice that because $I2$'s policy allows flexibility ex post, we must have $EU_{I1}(p) < EU_{I2}(p_1, p_2)$ whenever $p_j \pounds p, j = 1,2$.

Indeed, if $EU_{I1}(p) < EU_{I2}(p_1, p_2)$, then $I2$ need only offer a slightly higher expected utility than EU_{I1} (p) to attract all consumers, and make strictly positive profits. In this case, $I2$'s equilibrium insurance contract will maximize (3) subject to the constraint that consumers' expected utility (2) be equal to $EU_{I1}(p)$. Lemma 1 implies that the equilibrium copayments again will satisfy $\beta_1 - \beta_2 = p_1 - p_2$. The next proposition characterizes the equilibrium for those subgames with p sufficiently high.

Proposition 3 *For those $p \ddagger$, where is defined by $EU_{II}() = $, the equilibrium prices offered by H1 and H2 are p^*; both H1 and H2 earn the same level of profit; all consumers purchase I2's equilibrium policy; consumers' expected utility from I2's policy is strictly decreasing in p; and I2's equilibrium profit is strictly increasing in p.*

Proposition 3 says that if the price of $H1$'s unilateral exclusive contract to $I1$ is sufficiently high, then the equilibrium payoffs for $H1$ and $H2$ will be identical to the one in the nonexclusive simple competition regime. Consumers will be worse off compared to the competition regime, and $I2$ will earn strictly positive profit. When p is so high that $I1$ is unable to offer consumers a level of expected utility equal to the equilibrium under nonexclusive competition, neither $H1$ nor $H2$ will deviate from the nonexclusive competitive equilibrium strategy.

At present I do not have a complete characterization of equilibrium in this case. Nevertheless, my intuition is that for $p < $, simple competitive strategies will prevail. Thus, exclusive dealing will not exist in equilibrium; this remains to be worked out.

The cases described thus far do not seem to involve any equilibrium foreclosure effect. The model, however, does not allow any commitment on the part of the upstream hospital partner (say $H1$)

in an exclusive deal to price differentially to the downstream insurance firm that is *not* in the exclusive deal (say $I2$). If $H1$ can commit to this strategy, it may be optimal for both $H1$ and $H2$ to charge a higher price to $I2$. Thus, $I2$'s costs relative to $I1$'s may have been raised, leading to a foreclosure effect in equilibrium.

4. Extensions

In the bilateral exclusive contract regime, consumers who have signed a contract with $I1$ are assumed to use $H1$ no matter what his ex post realization of v_2 turns out to be. This assumption may be relaxed in the following way. Suppose that in the bilateral exclusive contracts, ex ante $I1$ and $I2$ share the market equally. Suppose that ex post $H1$ offers a price p_1 to consumers. Clearly, those consumers who have signed an initial contract with $I1$ need not consider this price, since the initial contract entitles them to obtain service at $H1$ at copayment β_1 ex post. Consider a consumer who has signed contracts with $I2$, and suppose that his ex post realizations of valuations of services at $H1$ and $H2$ are v_1 and v_2, respectively. With a price p_1 now being offered by $H1$, this consumer will abandon $H2$ to use the service at $H1$ if $v_1 - p_1 > v_2 - \beta_2$, or $v > p_1 - \beta_2$. Thus, if H_1 offers p_1 to consumers ex post, then its profit becomes $0.5[1 - F(p_1 - \beta_2)](p_1 - c)$, and the ex post profit-maximizing price satisfies

(8)
$$p_1 - c = \frac{1 - F(p_1 - b_2)}{f(p_1 - b_2)}$$

The ex post profit-maximizing price for *H*2 is derived similarly. Both *H*1 and *H*2 will make strictly positive profits ex post. It remains true that both *H*1 and *H*2 continue to make zero profits from making exclusive contracts to *I*1 and *I*2. Under the simple competitive regime, the assumption that *H*1 and *H*2 being unable to offer prices ex post can be relaxed in the same fashion.

5 Summary and Conclusions

In this paper I have considered the potential anticompetitive effects of exclusive deals between insurers and health care providers. I fully characterized the optimal insurance contract and considered market equilibria for the cases of nonexclusive simple competition, bilateral exclusive deals, and a unilateral exclusive deal. The results thus far do not support anticompetitive effects of exclusive dealing: neither hospitals nor insurance companies are shown to earn positive profits in equilibrium. However, exclusive deals do reduce consumer welfare by restricting choice of providers. At present, these results must be regarded as preliminary. In particular, the equilibrium for the most general case, unilateral exclusive dealing, has not been fully characterized. Further, it is clearly important to consider unilateral exclusive dealing with commitment, since this may result in an equilibrium foreclosure effect. In addition, future work should consider the impacts of other vertical restraints such as exclusive territories and most-favored-customer clauses which are also currently in use in the health care sector. Last, it may be possible to characterize this in a more general way to encompass markets with similar

access characteristics such as cable television, cellular telephone service, or computer information services.

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