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David Dranove
Mark Satterthwaite
Jody Sindelar

The Effect of Injecting Price Competition Into the Hospital Market: The Case of Preferred Provider Organizations

Preferred provider organizations (PPOs) and other discount health care purchasers are injecting price competition into the hospital market, which has hitherto been insulated from price competition by comprehensive and generous insurance coverage. Providing the discounts demanded by PPOs thus poses unaccustomed and difficult problems for hospitals. We constructed a model to study the choices forced by PPOs on the hospital market. We predict that prices will fall, excess capacity will be reduced, and some hospitals may develop financial problems. In the extreme case, prices will fall substantially, some hospitals will go bankrupt, excess capacity will be eliminated, and an unprecedented price volatility will be introduced into the market.

Preferred provider organizations (PPOs) are a rapidly growing new organizational form in the health care market. Employers, insurers, and providers are forming PPOs, and state governments are obtaining competitive bids from hospitals to form what are in effect Medicaid PPOs. Health care providers in PPOs trade patient volume for negotiated, discounted prices, which introduces price competition into the medical care market, previously characterized by little price competition.

In this paper we analyze the pricing problems of hospitals, which are a focal point of PPOs,[1] and the effects of PPOs on the hospital market. Because of the present excess capacity and substantial fixed costs of hospitals, they face difficult pricing decisions. When offering discounts they must bid low enough to attract patients away from other hospitals but high enough to cover their fixed and variable costs in the long run.

To understand the interplay that occurs between the short-run incentives PPOs give hospitals to discount prices competitively and hospitals' long-run necessity to remain financially solvent, we discuss hospitals' pricing decisions in the framework of a monopolistically competitive model of the hospital industry. Within this context the direct, first-order effect of PPOs is that the demand for hospital care becomes more responsive to differences in price. We can then use the monopolistic competition model to trace the indirect, second-order changes that PPO growth is likely to bring about in terms of the number of hospitals in a market, the prices they charge for services, their costs, and their occupancy rates.

We find from our model that significant changes may occur in the hospital services market with the introduction of PPOs. Prices will be lowered and excess capacity will be reduced. In the extreme case, all excess capacity will be wrung

David Dranove, Ph.D., is an assistant professor, Graduate School of Business, University of Chicago. Mark Satterthwaite, Ph.D., is the Earl Dean Howard Professor of Managerial Economics, Kellogg Graduate School of Management, Northwestern University, Evanston, IL. Jody Sindelar, Ph.D., is an assistant professor, Department of Epidemiology and Public Health, Yale University, New Haven, CT. Address correspondence to the senior author at the Graduate School of Business, 1101 East 58th Street, Chicago, IL 60637.

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out of the system, which may lead to price volatility and instability in patient volumes for individual hospitals. Such volatility would be unprecedented in the historically stable hospital market.

Institutional Background

The hospital market traditionally has been insulated from price competition by comprehensive and generous insurance coverage. Many patients are insensitive to the price of hospital care because they do not pay more on the margin for higher-priced hospital care; after a copayment, insurance covers their expenses. Employers, the government, insurers, and eventually patients must pay for the higher-priced hospital care through higher insurance premiums, but this does not affect the patient at the time he or she must choose a provider and use care.

Although substantially protected from price competition, hospitals traditionally have competed against each other through quality of care, location, affiliation (e.g., Catholic hospitals), amenities, and the like. Competition based on these characteristics has had the concomitant effect of developing product differentiation across hospitals. In an urban setting where there are several hospitals in the market, each hospital has tended to offer a strongly differentiated product.

Part of the competition among hospitals involves competition for doctors, inasmuch as doctors are the source of patients and thus revenues. Because doctors are attracted to hospitals that have sufficient beds and modern equipment, hospitals have invested extensive capital to attract doctors. Insufficient beds can drive physicians to other hospitals, a costly proposition for a hospital because it traditionally has not had direct access to patients. Having extra beds, however, is not costly because insurance reimburses fixed costs. Similarly, hospitals find it competitively desirable to provide a large variety of services, thus creating a demand for hospital capital equipment, including surgical suites and diagnostic equipment.

The competitive need for service availability and service variety is only part of the cause of excess investment in the hospital industry. Until recently federal and state governments often encouraged hospital growth through financial assistance. As the population has shifted, however, recently built hospitals, especially in growing suburban areas, have drained patients away from central city hospitals, often leaving beds in the latter institutions empty.

Low occupancy rates attest to this excess investment. Nationally the occupancy rate for nonfederal acute care hospitals is near 60%. McClure estimated that an occupancy rate of 85% nationally would be both "efficient and achievable."[2] Finkler suggests that if open heart surgical suites were used to capacity, the number of these units could in some areas be cut by two-thirds.[3]

Development of PPOs

Excess capacity relieves congestion and may assure service availability, but it does raise health care costs. In response to escalating costs, employers are forming business coalitions to address the issue of rising costs, deductibles and coinsurance rates are being raised, and state governments are instituting competitive bidding for Medicaid patient care. In general, the large payers (governments and employers), previously passive payers, are becoming aggressive purchasers. They are exercising their market power by shopping for low prices.

The new competitiveness in the health care market is epitomized in preferred provider organization (PPO) activity. PPOs transfer the responsibility for selecting a cost-effective hospital from the consumer to the employer and government. These large payers have an incentive to search for cost-effective providers and have the market clout to receive discounts.

PPOs can be started by hospitals, physicians, employers, insurance companies, entrepreneurs, and other health care providers (e.g., HMOs and IPAs). But whoever organizes the PPO, it can be viewed as an expression of the payer's price sensitivity in purchasing health care coverage for the beneficiaries for whom it is responsible. We take this perspective to emphasize the role that PPOs play in injecting competition into the market.

To form a PPO, employers (or other entity), acting either on their own or through a third-party intermediary such as an insurance company, negotiate a set of fees and a service package with a subset of the area's hospitals and physicians. During the negotiation process, the employer is generally assured of reduced fees by promising volume increases to the contracting providers. The PPO arrangement usually includes utilization review and financial incentives to use outpatient

care, both of which can generate additional savings. The employer gives its employees financial incentives to select the PPO option and seek care from participating providers. These incentives may include favorable coinsurance rates and reduction in monthly contributions toward premiums. Unlike health maintenance organizations (HMOs), however, most PPOs at least partially reimburse beneficiaries for care from nonparticipating providers. Thus, beneficiaries have free choice of providers although they have financial incentives to use the "preferred" providers.

An employer organizing a PPO can make sensible comparisons of hospital charges on the basis of each hospital's average charges for a market basket of services, and need only make the comparison among alternative providers once. Because the fixed cost of this shopping is spread across all the employees in the PPO, the employer can economically justify investing far more effort into price shopping than any single employee acting independently could do.

One important result of the PPO negotiation process is that consumer information concerning hospital and physician prices becomes more widely available. Frech argues persuasively that physicians and hospitals are willing to provide discounts even to PPOs that have minuscule market shares and therefore no purchasing power because the PPO is a good vehicle by which a provider can credibly publicize its low fees.[4] A consumer who selects a participating provider knows that the fee will be competitive. Moreover, even though some consumers may associate low fees with low quality, the consumer may be less likely to make such an inference about PPOs if he or she understands the low fees are the result of the negotiated buying process, not inferior service. Because consumers are likely to respond to the financial incentives and choose a participating provider, the PPO should generate new business for providers, even if the PPO is small.

To summarize, the purchase of care through a PPO has four effects:

- ☐ It transfers the responsibility of shopping to an agent (the buyer), who has an incentive to shop diligently on the basis of price.
- ☐ Large employers and the government have some monopsony power vis-à-vis individual hospitals and can play each against the other for a better price.
- ☐ Employers and governments have easier access to cost information and can therefore make sharper distinctions between hospitals than consumers are able to make.
- ☐ Providers, by joining a PPO, secure a credible means to publicize that their fees (but not quality) are discounted relative to nonparticipating hospitals.

Each of these effects makes the demand that individual hospitals face more elastic. By demand being more elastic we mean that the presence of PPOs tends to make the volume of services a hospital provides more sensitive to the net price it charges payers than is the case under traditional reimbursement.[5] As demand becomes more elastic, a hospital has an increased incentive to reduce its charges because a reduction in charges generates a larger volume increase than formerly was the case.

California, which leads the nation in the number of PPOs, provides an example of the growth of PPOs.[6] In 1982, California was the first state to enact legislation enabling PPOs to operate without violating state freedom-of-choice statutes.[7] Johns et al. report that there are at least 50 operational PPOs in the state, with another 150 or more being considered. These PPOs are achieving 10%–20% discounts on average.[8] California Blue Cross had more than 50,000 PPO enrollees in the state in 1983 and nearly 1 million enrollees by the end of 1985. Premiums for its "Prudent Buyer" plan are as much as 24% below premiums for the standard Blue Cross Plan coverage. Since 1983 MediCal has negotiated discounts (about 12% for inpatient services) with individual hospitals and is, in effect, a large PPO that has contracts with many of the state's hospitals.[9] We attribute the phenomenal success of PPOs in California in part to the state's very low hospital average occupancy rate of 60%, which has made hospitals eager to gain volume by giving price concessions to groups that are price sensitive.

The success of PPOs in obtaining price discounts can be maintained only if the organizers continue to respond to high-priced sellers by purchasing services elsewhere. In its first year MediCal, for example, demonstrated this price sensitivity by awarding contracts to roughly 60% of the state's hospitals. In the second year, however, this percentage increased to about 70%.[10] In its first year of contracting, Arizona's Medicaid pro-

gram reached agreements with more than 85% of the organizations seeking contracts.[11] These upward trends suggest two hypotheses: 1) price sensitivity on the part of Medicaid buyers is diminishing or 2) a greater proportion of the state's hospitals are submitting competitive bids. If the former is true, providers might respond by raising future bids.

Employer-contracted PPOs face problems in demonstrating continued price sensitivity, for at least two reasons. First, physicians still play an important role in choosing which hospitals to send their patients to. If patients are loyal to their physicians, they will have to be offered substantially lower prices to visit a hospital that is not their physician's first choice. This can (and apparently does) make it difficult for PPOs to deliver the volume increases they promise.

Second, employees who are forced to change physicians as a consequence of the PPO's shopping decisions may incur significant real and psychological costs. This is more likely to occur if physicians belong to only one PPO. If so, an employer who drops physicians or hospitals from its PPO puts pressure on some of its employees to switch physicians. The PPO (and participating hospitals and physicians) with the current contract may, as a consequence, be able to extract a price premium in future contract negotiations because of the employer's unwillingness to impose costs on valued employees.[12]

A Model of a Typical Hospital Market

We present a model of the hospital market and focus on the typical hospital's pricing problem in the face of excess capacity. Initially, we assume that all hospitals are alike and are profit maximizing. We assume that PPOs increase the price sensitivity of consumers to hospital services. Initially we allow only one type of consumer, but later we relax these restrictive assumptions.

The monopolistic competition model of Chamberlin is an appropriate model for describing the market structure for hospital services in most metropolitan areas.[13] Metropolitan areas typically have several hospitals, each of which has a small share of the urban market. Each hospital produces a differentiated product, has a unique location, and offers a distinctive mix of services, clinical quality, affiliated physicians, amenities, and prices. Thus, one hospital's services are only imperfectly substitutable for another's services.

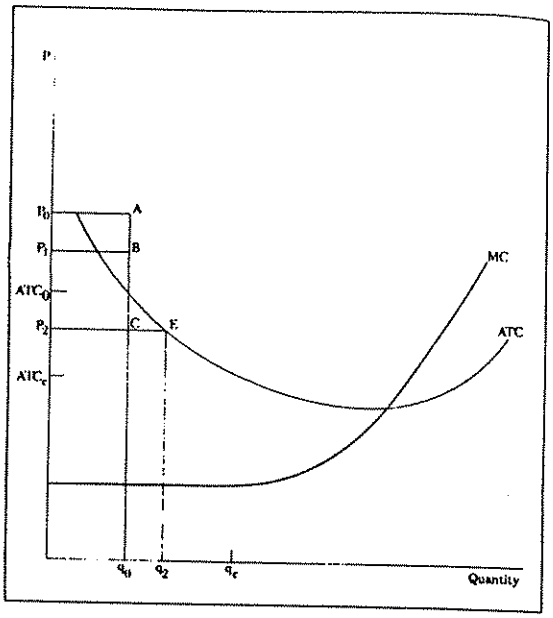

Figure 1. The cost curves, prices, and output of a typical hospital: Scenarios 1 and 2 with exit

Each hospital sells a differentiated service, has some market power, and consequently faces a downward-sloping demand curve.[14] Each hospital is free to increase its supply of beds and its complement of services, subject to certificate-of-need regulations, whose effectiveness has not been clearly established.[15]

Application of the monopolistic competition model to the hospital industry requires consideration of the generic nature of the costs, demand, and the resulting pricing strategies of hospitals. Given these, one can analyze the short- and long-run effects of PPOs and other sources of competition.

Cost Curves

The cost curves of a typical hospital are shown in Figure 1, where MC is the marginal cost curve, ATC is the average total cost curve,[16] and the quantity q_C is the designed capacity of the hospital.[17] These curves are drawn consistent with the empirical evidence that, within the normally observed range of quantity variation, hospitals in the short and medium run have marginal costs that are well below their total costs.[18] The flatness of the MC curve to the left of q_C reflects the divisibility of unskilled personnel and supplies. The current quantity, q_0, is drawn well to the left of q_C, current capacity, to reflect the fact that

hospitals generally have excess capacity and therefore have average total costs (ATC) well above marginal costs (MC). As a consequence, price must exceed marginal and variable costs, often substantially, for the hospital to remain solvent. Take the pricing of CAT scans as an example. If a CAT scanner is not used to capacity, the marginal cost of a scan (technician time and supplies) is essentially constant and significantly less than the average cost of a scan produced on a scanner used to capacity.[19] The hospital would require a large price/marginal cost differential on each CAT scan to recover fixed costs.

Once capacity, q_C, is reached, the marginal cost of providing more services rises rapidly. Physical capacity and the time of top-level personnel become constrained, and it becomes expensive to expand further the quantity of services delivered. For example, when operating room use is increased beyond capacity, the hospital must reshuffle schedules at the cost of substantial managerial and professional time if it wishes to make greater use of the operating room. Bottlenecks and congestion occur and become more severe.[20]

Hospital and Market Demand

The overall demand for hospital services has been estimated to be price inelastic.[21] Nevertheless, the demand for individual hospitals' services appears to be price elastic[22] because hospitals compete for the patients in a community. When a hospital contemplates raising its price, it considers potential losses of business caused both by patients using less care in general and by patients switching to more attractively priced competitors.

These observations imply that Chamberlin's description of the demand structure facing monopolistically competitive firms[23] applies reasonably well to hospitals. The main elements of the Chamberlin model as applied to hospitals are as follows: First, if all hospitals charge the same price, they share equally in the market. (This symmetry assumption is for convenience and can be relaxed.) Second, each hospital believes that a price decrease will increase its market share and a price increase will decrease its market share. Of course, if all hospitals simultaneously reduce their prices to increase market share, all will end up with unchanged shares.

For ease of analysis, we assume that each hospital faces a constant price elasticity of demand that is invariant with other hospitals' prices and its own price. The justification for this assumption is the model of consumer choice among health care providers proposed by Satterthwaite.[24] He suggests that the dominant determinants of the elasticity of demand relate to purchasers' informational resources as they shop for providers, not to the price or quantity of care. Thus, informational resources are unlikely to be sensitive to a hospital's own price or its competitors' prices.

If a hospital faces a constant elasticity of demand, its optimal price depends only on its marginal cost and the elasticity it faces. In particular, if the elasticity increases, the optimal price falls, because as demand becomes more elastic, a given price reduction generates a greater volume increase, and therefore generates an incremental contribution toward fixed costs.

To see more clearly the relationship among elasticities, prices, and profits, consider the following example. Suppose that initially, a hospital faces a price elasticity of demand of +1.5, so that a 1% decrease in price generates a 1.5% increase in quantity. Let its current price and quantity be \$600 and 100 units, respectively, and let its marginal costs be a constant \$200 per patient. In this case the hospital is generating $100 \times (600 - 200) = \$40{,}000$ toward fixed costs. If it were to lower its price 6% to \$564, quantity would increase 9% to 109 units and the hospital would now generate only $109 \times (564 - 200) = \$39{,}676$ toward fixed costs. Its financial condition will have worsened in spite of the volume increase. But suppose demand becomes more elastic, increasing from 1.5 to 2.0, reflecting greater price sensitivity of payers and consumers. Now a 6% decrease in price generates a 12% increase in quantity. Then if the hospital lowers price to \$564, quantity increases to 112 units and the hospital generates $112 \times (564 - 200) = \$41{,}132$ toward fixed costs. The increase in demand elasticity switches the effect of the price cut from unprofitable to profitable.

An increase in the magnitude of the price elasticity of demand thus represents increased competitiveness in the market and causes lower prices. The value of the elasticity depends on the competitiveness of the local market in which the hospital is competing. It may vary across metropolitan areas, over time, by regulatory environment, and by the degree of PPO penetration into the market.[25]

Industry Equilibrium

For the moment, we restrict our attention to the symmetric situation where all hospitals have identical cost curves and, in both short- and long-run equilibrium, all choose the same price. Short-run equilibrium exists whenever all hospitals in a market are pricing their services optimally; that is, given the pricing decisions of other hospitals, no hospital wants to change its prices either upward or downward. Long-run equilibrium in the hospital services industry has three defining characteristics: 1) the industry is in short-run equilibrium, 2) no hospital wishes to either expand or reduce its capacity, and 3) no existing hospital is exiting from the industry and no new hospital is entering.[26]

Point A in Figure 1 represents a typical hospital—one with excess capacity—that is charging price P_o, delivering quantity q_o of hospital services, and earning positive profits ($p_o > ATC_o$). Point A is consistent with the requirements of long-run equilibrium; that is, assuming that p_o is the price where the typical hospital's profits are maximized given the prices of other hospitals, p_o is the profit-maximizing price for every hospital, since all hospitals are symmetric to it.[27] No hospital wants to exit the market, because each is making profits. High fixed costs and small profits are consistent with a market in which no hospital wants to expand and no hospital wants to enter.

The Effect of an Increase in the Price Elasticity of Demand

We suggest that existing long-run equilibrium is disrupted by the development of PPOs, which cause demand to become more price elastic. This in turn puts downward pressure on prices. In this section we trace the process by which the hospital industry moves from an initial long-run equilibrium (point A in Fig. 1) to a new long-run equilibrium.

Short-Run Equilibrium

Assuming that increased competitiveness does not change the overall demand for hospital services, if each hospital retains the status quo price, p_o, each will continue to sell quantity q_o. Thus, the typical hospital will remain at point A.[28] But because the increase in elasticity gives the hospital an incentive to decrease price below p_o, it lowers its price to, say, p' and anticipates increasing its market share.

Given the symmetry among hospitals, every hospital lowers its price to p' and market shares do not change. Thus, assuming that the price elasticity of demand does not vary with either price or quantity and that marginal cost is constant in the vicinity of q_o, the reduced price p' is the new short-run equilibrium price in the industry.

Long-Run Equilibrium

A new long-run equilibrium depends on how far the price p' in the new short-run equilibrium drops relative to the hospital's average total costs. We identify three possible variants of a new long-run equilibrium, depending on the magnitude of the price decrease, the amount by which excess capacity is reduced, and the role price plays in subsequent competition. The three variants, or scenarios, are listed in Table 1 and are described in terms of the relationship that the new short-run price (p') has to average total costs at the short-run equilibrium quantity (ATC_o) and at the full-capacity quantity (ATC_c).

Scenario 1: $p' \geq ATC_o$. For a typical hospital, the new short-run equilibrium is point B in Figure 1, where the optimal price p' is denoted by p_1. This point represents the new long-run equilib-

Table 1. Three possible scenarios resulting from the presence of PPOs in the hospital market

Scenario	Decrease in price	Excess capacity remaining	Exit of firms	Primary method of competition	Price compared with average total costs (ATC)
1	Small	No change from initial position	None	Product differentiation	$p' \geq ATC_o$
2	Moderate	Decreased but not eliminated	Some	Product differentiation	$ATC_o > p' \geq ATC_c$
3	Large	Eliminated	Substantial	Product differentiation coupled with price competition	$p' < ATC_c$

rium. No hospital wants to change its price from p′, because it is the profit-maximizing price. In particular, no hospital wants to exit the market, because positive economic profits are being earned (price exceeds average total cost). No entry or expansion occurs, because point B is less favorable than point A and point A, as the initial long-run equilibrium, did not attract either entry or expansion. Under scenario 1 two offsetting forces affect utilization: PPO-induced price reductions tend to increase utilization, and PPO-imposed utilization controls tend to reduce utilization. Capacity summed across hospitals is unchanged.

Johns et al. report that, to date, the growth of PPOs in California has not affected hospital capacity, although hospital revenues have fallen.[29] This suggests either that the PPO effect has been small and scenario 1 is operative or, possibly, the hospital market in California is experiencing only short-run responses to PPOs, with the long-run consequences of scenario 2 or 3 still to come.

Scenario 2: $ATC_0 > p' \geq ATC_c$. The new short-run equilibrium for a typical hospital is at point C in Figure 1. The short-run equilibrium price p′ is labeled p_2, which, at the hospital's current volume of q_0, lies below the average total costs of ATC_0. Because the typical hospital is suffering losses, this short-run equilibrium will not become a long-run phenomenon. The new long-run equilibrium is achieved through hospitals exiting the industry and other, surviving hospitals downsizing to bring their burden of fixed costs into line with the industry's new competitiveness.

Consider first how the exit of hospitals tends to restore the industry to long-run equilibrium. This process is presented in Figure 1, which represents a hospital that is surviving the new market pressures. As other, weaker hospitals drop out of the market, it gains a share of the patients those hospitals formerly served. In the figure, the hospital's position moves from point C with volume q_0 to point E with volume q_2. As its volume increases, it continues to charge the price $p' = p_2$ because its marginal cost stays constant over this range of volumes. Point E is the new long-run equilibrium for the typical surviving hospital because there it spreads its fixed costs over sufficient volume to allow it to break even. At this new equilibrium, price is lower than initially ($p_2 < P_0$) and utilization as a proportion of capacity is increased ($q_2/q_c > q_0/q_c$).

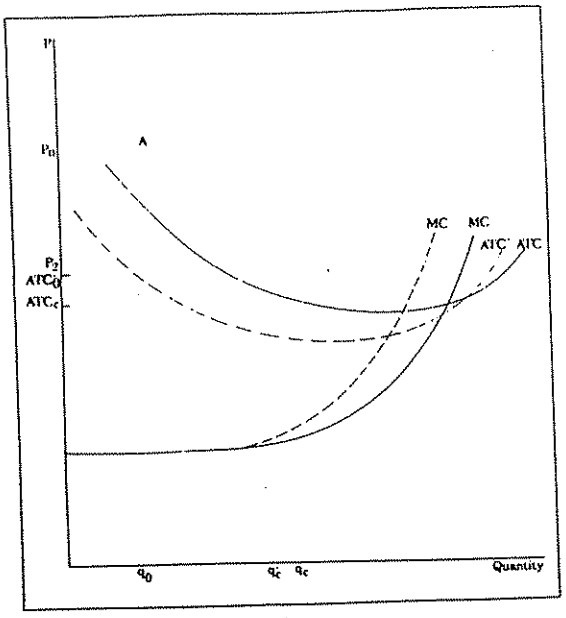

Figure 2. The cost curves, prices, and output of a hospital that has been restored to long-run equilibrium through downsizing

Downsizing can also restore the industry to long-run equilibrium. By downsizing we mean that a hospital cuts its capacity and fixed costs to reduce, at any given price, its break-even volume. Figure 2 shows this. The solid ATC and MC curves represent the hospital's original cost curves, and the dashed ATC′ and MC′ curves represent its new cost curves with capacity reduced from q_c to q_c'. As the figure shows, this downsizing, if it is sufficiently rigorous, can restore the hospital to financial health even if no other hospitals exit the market. Specifically, ATC_0', the hospital's new average total cost of volume q_0, is less than p_2. Note that from a social point of view, downsizing achieves the same desirable consequences as does forced exit of a fraction of existing hospitals. Price is reduced to p′ and the capacity utilization rate is improved ($q_0/q_c' > q_0/q_c$). Some excess capacity, however, still exists in the typical hospital ($q_0 < q_c'$).

Given the possibility of downsizing, how likely is exit to occur? Clearly most hospitals would prefer to downsize rather than die as an organization. This suggests that even if PPOs put substantial pressure on hospitals—as manifested by p′ being well below ATC_0—exit is likely to be unusual. Nevertheless, limits exist as to how much a hospital can downsize while still retaining its

traditional identity. For example, a heart surgery service or a magnetic resonance imaging (MRI) unit may be impossible to downsize because of the necessity of having certain staff and support equipment available.

Significant downsizing may be impossible for some hospitals because of the debt burden that they accumulated in growing to their current capacities of q_c. Downsizing reduces future fixed costs to a level that is supportable by the volume and margins that the new, more competitive market permits. Because downsizing does not necessarily reduce debt service costs, some hospitals may find it impossible in the new environment to meet their historically incurred obligations. If PPOs put significant pressures on these hospitals, adjustment to a new long-run equilibrium will involve first downsizing and ultimately exiting.

Scenario 3: $ATC_c > p'$. In this, the most extreme, scenario, the new short-run equilibrium for a typical hospital is at point F on Figure 3, where it charges p′ and provides q_0 quantity of services. Note that p′ lies below p_0, ATC_0, and ATC_c. As in scenario 2, the new long-run equilibrium can be reached through hospitals exiting, downsizing, or a combination of both. We trace the adjustment process only for the case of hospitals exiting; the case of downsizing is qualitatively the same.

Assume the typical hospital represented in Figure 3 survives and does not exit. As other hospitals exit it picks up a share of the demands they formerly served. Therefore at price p′ the quantity the hospital provides increases from q_0 at point F to q_c at point G. It keeps its price constant during this phase of the adjustment process because both its marginal cost and demand elasticity remain constant. At point G, however, the typical hospital is still failing to break even, and therefore exit of financially strapped hospitals continues. As the typical surviving hospital's volume increases to q_3 its marginal cost rises. In response it raises its price to p_3 to preserve the constant optimal percentage markup above marginal cost.[30] Point J is consistent with long-run equilibrium because the hospital is breaking even. Price has risen to p_3 and quantity to q_3, lifting it above its ATC curve. Only in this scenario does the hospital end up with no nominal excess capacity ($q_3 > q_c$). In this equilibrium it operates in a range where its marginal cost curve is sloping rapidly upward because of congestion costs.

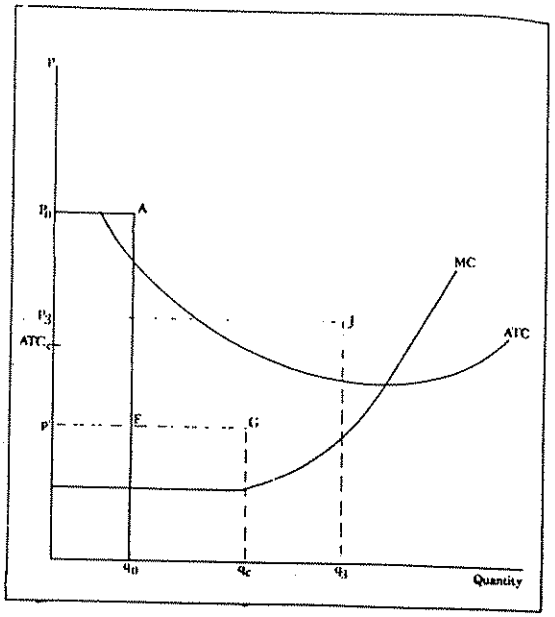

Figure 3. The prices and output of a hospital with no excess capacity (scenario 3)

Although our focus has been PPOs, several other factors are putting pressure on hospitals to reduce capacity, including the growth and aggressive marketing of HMOs and the increasing stringency of utilization controls in traditional fee-for-service settings. These pressures tend to cut hospital volume, with consequent impact on profits.[31]

Competition Among Hospitals

Hospitals have always competed with each other, but historically not on price. As a result of PPOs and other changes in the market, however, price competition is now becoming an important element of the hospital market. Even after the market achieves a new long-run equilibrium, with reduced prices and reductions in excess capacity, surviving hospitals will continue to compete with each other by adding new services, expanding capacity, and differentiating their services through marketing programs. How hospitals respond will depend on both the local market and the nature of competitive initiatives.

For example, suppose that some hospitals in the market area adopt a service innovation and improve their competitive position, thereby increasing their market shares at the expense of the remaining hospitals. Hospitals that are now not competitive face two futures. The first is analogous to scenario 1, where the hospital maintains its price at p′ and loses some volume, but not

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The second possibility is in part analogous to scenario 2. The hospital maintains its price at p', but loses sufficient volume that it no longer breaks even. The hospital now has three choices: 1) it can fail to react and exit the market, 2) it can downsize to bring its capacity into line with its reduced volume, or 3) it can competitively match its competitors' innovations to regain its lost volume. If these innovations involve only variable costs, the hospital will pass these costs (plus the optimal markup) through to consumers, so that the eventual equilibrium will require neither exiting nor downsizing. If, however, the innovations involve fixed costs, the hospital's optimal price will not change and the hospital will fail to pass the additional fixed costs through to consumers. If total volume among all hospitals in the market does not increase as a result of the innovations and if no hospital gains a permanent advantage from adopting them, all hospitals will end up below the break-even point. Hospitals will then have to either exit or downsize, even though each has successfully adopted the innovations.

Consider now the possibilities if scenario 3 leads to long-run equilibrium. If a hospital improves a service, it will have little excess capacity to absorb the increased demand. If the innovating hospital rations the demand by raising its price, other hospitals will be minimally affected. If, however, the hospital absorbs the demand by increasing capacity, other hospitals will lose volume and profits. Those that lose volume will have lower marginal costs than previously and will reduce their prices as a consequence. These price cuts will reduce utilization at the innovating hospital, thereby reducing its marginal costs. The innovating hospital will now lower its prices, and so on. Eventually equilibrium will be reached through a combination of downsizing, exiting, and matching the innovation.

Competition among hospitals in scenario 3 is different from that in scenarios 1 and 2. A hospital's pricing strategy may be important in its efforts to retain market share when competing hospitals market new services or improve existing ones. The aggressive hospital in scenario 3 must not only have a good marketing plan but must also be able to withstand the financial losses that price competition may inflict on all hospitals in the industry from time to time.

Additional Effects

We recognize that our model is simplistic in its use of the machinery of monopolistic competition to show how PPOs may force some hospitals to exit from the industry and cause others to downsize, leading to a general drop in the price of hospital care. In this section we informally investigate how our conclusions should be altered when we relax some of our more restrictive assumptions.

Quality of Care

A hospital facing price and revenue reductions will, subject to ethical and medical constraints, seek to reduce costs as well. By doing so the hospital can conserve financial resources and enhance its chances of surviving in the market. Exactly how such cost reductions will be accomplished is unclear. They may increase efficiency, reduce inpatient amenities, reduce technical quality of care, or specialize in a range of services to realize the scale economies that full utilization of fixed facilities and equipment brings.

Any increase in efficiency is clearly a beneficial change. Increased specialization and reduction in amenities may or may not be beneficial. Reduction of technical quality is potentially harmful, although some observers believe that the present U.S. health care system has pushed technical wizardry beyond its useful limits.[33] Reductions beyond a certain point, however, are certainly undesirable. The question therefore is: Will the reductions in quality and amenities proceed substantially further than is desirable? The answer is uncertain because cost has a direct effect on the organizer of a PPO whereas quality has only an indirect effect.

Quality becomes important to a PPO only if its customers find it insufficient and they have a means of making their displeasure an issue of importance to the PPO. Firms whose fringe benefit plan attracts and retains quality personnel have a strong incentive to make quality an important factor, along with price, in their decisions about which providers to include within their PPOs. Similarly, a union may make quality an important bargaining point. Johns et al. note that at least one southern California teaching hospital has successfully competed for PPO contracts in spite of its higher prices.[34] It apparently benefits from its high quality. If the consumers do not have

leverage, however, quality may suffer. Government insurance (Medicaid in particular) may be an example where quality could suffer because of a lack of countervailing power on the part of consumers.[35] It is uncertain whether the medical ethics of hospitals' staffs and hospitals' malpractice exposure place a socially acceptable floor under the cuts in quality that hospitals may be willing to make.

The Differential Effects of Competition on Hospitals

Although all hospitals may be affected by PPOs, they will not all respond identically to price pressure. Up to now we have made the convenient assumption that all hospitals are identical. In fact, of course, they vary with regard to financial stability, services offered, efficiency, and clients. Some hospitals may be able to adapt and even flourish with price pressure. Others will suffer and drop services, reduce quality, find other sources of income, or go out of business. Crucial factors that influence a hospital's success include its size and range of services, the size and price sensitivity of its natural clientele, sources of funding, and business acumen. Charitable donations, for example, can cushion a hospital. It is hurt, of course, if a large percentage of its patients join PPOs.

For example, large inner-city hospitals may find the pressures of the new competitive regime to be especially severe. Their cushion of tax dollars and philanthropic donations is eroding, as is their patient base and the wealth of their patients. Consequently a large number of inner-city hospitals have neither enough patients to fill their beds nor enough governmental or charitable funds to subsidize their excess capacity. Moreover, political pressure may exist for these hospitals to provide charity care, further aggravating their problems. Inner-city hospitals therefore clearly face severe financial pressures as their markups shrink in response to increased competitiveness. Furthermore, if quality is a normal good, their patients may be less sensitive than average to quality reductions. Thus, these hospitals may sharply reduce quality along with price, which may encourage further emergence of a two-tier hospital system, one for the middle class and one for the poor.

Competition and Not-for-Profit Hospitals

Although our analysis assumes that hospitals maximize profits, our intuition is that our results would not change qualitatively if other goals were substituted for profit maximization. Therefore we believe our analysis is relevant to the hospital industry as it now stands, dominated by not-for-profit organizations. The first basis for our intuition is the survivor principle. Not-for-profit hospitals must break even, just as for-profit hospitals must. As the market becomes more competitive, break-even strategies emulate the profit-maximizing strategy. Thus, increasing price competition among not-for-profit hospitals forces them to behave increasingly like profit-maximizing hospitals because only the profit-maximizing strategy (or strategies that emulate the profit-maximizing strategy) satisfies the break-even constraint.

The second basis for our intuition is more specific. If a hospital is maximizing some objective function that includes arguments besides profits, it must be balancing the gains from lowering prices against losses. If its own price elasticity decreases, reducing prices causes its profits to increase more (or decrease less) than previously. This tilts the hospital's calculus in favor of a price reduction. Specifically, if profit enters its objective function, which even for the most charitable hospital is likely to be the case, and if price elasticities are irrelevant to its other goals, which seems likely if these goals are nonpecuniary, then a price reduction is called for even though the hospital is not profit maximizing.

Two Types of Patients

A hospital may serve patients who are in a PPO as well as others who are not. The intuition developed in the model holds for all hospitals that serve PPOs, although the impact of PPOs will obviously be smaller the smaller the percentage of a hospital's patients are in PPOs. For the sake of simplicity, suppose there are two types of patients. Those in a PPO (or HMO or other cost-reducing insurance plan) become relatively more price sensitive and those outside the PPO (i.e., with standard insurance coverage) remain relatively insensitive to price.

Within the context of our model of for-profit hospitals, price is established for each group to maximize the profits obtained from each group. The optimal price to charge each group is a function of marginal cost and the group's price elasticity of demand. Therefore, in scenarios 1 and 2 the price charged to the non-PPO group is unaffected

by the presence of the PPO because the PPO affects neither marginal costs nor the price elasticity of the non-PPO group.

Two circumstances can cause the lower prices of PPOs to spill over to change the prices for the non-PPO group. First, under scenario 3, hospitals will increase prices for the non-PPO group even as they reduce prices for the PPO group, because the increased occupancy rates in each surviving hospital force marginal costs to sharply rise above the level in scenarios 1 and 2. These increased costs are passed on to the unorganized consumers. Second, if a not-for-profit hospital aims only to break even, it may be setting prices below the profit-maximizing prices. If the PPO obtains price discounts, the hospital may have to raise its price for the unorganized group. Or suppose that one group is subsidized in the sense that price is less than variable cost, say for Medicaid patients. The hospital may still treat these patients if it can make sufficient profits from private paying patients. If, however, the PPO secures a price discount from the hospital, the hospital will have to curtail the amount of care it gives to the subsidized group in order to maintain its solvency.

Conclusion

The emergence and rapid growth of preferred provider organizations may be a turning point for the hospital industry. Employers and governments, previously passive payers for health services, have become aggressive purchasers, which is forcing hospitals to make difficult choices: either lower prices or lose market share. As a result, PPOs are cutting into the aggregate profits of the hospital sector.

These cutbacks will force a reduction in the excess capital stock that has characterized the industry for the past few decades. Many hospitals will reduce their capacity and some will exit. If this new competitive environment is rigorous enough, an increased volatility in prices may accompany these capacity reductions. Hospitals may also respond by reducing variable costs, most noticeably by laying off personnel. Reductions in capital stock and personnel are likely to engender some reductions in access to care and possibly reductions in the technical quality of care.

Another hospital response may be to reduce the amount of uncompensated care they deliver. Organizers of PPOs are sending a clear message to the hospital industry that they will no longer financially support more than the marginal costs of treating their own insured groups. Hospitals will have to turn elsewhere to find the resources necessary to cover the costs of treating the uninsured. Local, state, and federal governments are the obvious places for them to turn. As PPOs grow in importance, explicit funding of uncompensated care will have to replace the hidden cross-subsidies that years of high hospital markups have made possible. This will force onto taxpayers and their governmental representatives the unwanted responsibility for making explicit decisions concerning the level of care that the uninsured receive.

Notes

The comments of Ted Frech and the editor have been instrumental in improving this paper.

1 See Linda Ellwein, "A New Form of a Competitive Health Plan?" (photocopy, 1982).

2 W. McClure, *Reducing Excess Hospital Capacity*, Report HRP-0015199 (Rockville, MD: Bureau of Health Planning and Resources Development, 1976).

3 Steven Finkler, "Cost-Effectiveness of Regionalization: Further Results for Health Surgery," *Health Services Research* 16, no. 3 (1981): 325–333.

4 H. E. Frech III, "Preferred Provider Organizations and Health Care Competition," in *Private and Public Health Insurance: Research and Policy*, ed. H. E. Frech III (Cambridge, MA: Pacific Institution for Public Policy Research and Ballinger Publishing Co., 1986).

5 We define net price to be total revenue divided by total quantity. Thus, if a hospital increases its nominal price by 10% but a Blue Cross Plan, because of its purchasing power, refuses to honor the increase, the net price will increase by considerably less than 10%. Specifically, if the Blue Cross Plan has a 50% market share, the hospital would have to increase nominal prices by at least 20% for privately insured patients for net price to increase by 10%.

6 See Jon Gabel and Dan Ermann, "Preferred Provider Organizations: Performance, Problems, and Promise," *Health Affairs* 4 (Spring 1985): 24–40.

7 Antitrust considerations are important in shaping the development of PPOs. In one case, the courts found a medical foundation that offered discounts in a manner similar to discounts secured by PPOs to be in violation of antitrust restriction against price-fixing agreements (*Arizona vs. Maricopa County Medical Society*, 457 U.S. 332 [1982]).

8 Lucy Johns, "Selective Contracting in California," *Health Affairs* 4 (Fall 1985): 32–49. See also Lucy Johns et al., "Selective Contracting in California: Experience in the Second Year," *Inquiry* 22 (Winter 1985): 335–347.

9 See California Medical Assistance Commission, *Report to the Legislature on the Operations of the California Medical Assistance Commission* (Sacramento: CMAC, May 1984).

10 Ibid.

11 J. Christianson et al., "The Arizona Experiment: Competitive Bidding for Indigent Medical Care," *Health Affairs* 2 (Fall 1983): 88–103.

12 Of course this logic should lead to especially low bids to obtain initial PPO contracts. The large discounts given by many new PPOs may in fact reflect this expectation of future profits.

13 E. H. Chamberlin, *The Theory of Monopolistic Competition* (Cambridge, MA: Harvard University Press, 1956).

14 We do not consider oligopolistic interactions. Certainly some do occur, but the effects appear to be small. We make this assertion because the aggregate demand for hospital care is inelastic. If strong oligopolistic interactions leading to tacit collusion were the norm in the industry, charges for hospital care would be much higher than they are currently. The aggregate inelastic demand means that hospitals that act collusively could greatly increase profits by raising prices. This has not happened, implying that hospitals are acting competitively to a large degree. See also note 22 below.

15 See, for contrasting evidence on the effectiveness of certificate of need, D. S. Salkever and T. W. Bice, "The Impact of Certificate-of-Need Controls on Hospital Investment," *Milbank Memorial Fund Quarterly: Health and Society* 54 (Spring 1976): 185–214; and J. R. Howell, "Evaluating the Impact of Certificate-of-Need Regulation Using Measures of Ultimate Outcome: Some Cautions From Experience in Massachusetts," *Health Services Research* 19 (December 1984): 587–614.

16 Hospital prices may remain fixed for months at a time. This is certainly the case for hospitals bidding for a PPO contract; typically the contract is for a year. Therefore, in making pricing decisions, hospitals regard some costs such as major capital equipment and the staff necessary to operate it—management and staff physicians—as fixed. Other costs, such as materials and unskilled personnel, are regarded as variable. We have drawn the figures to reflect these distinctions.

17 Capacity is a slippery concept. We define it to be q_C rather than the quantity that minimizes ATC, because as a hospital's utilization rate increases beyond q_C, congestion costs become important. In our view, increasing congestion costs within a hospital facility are normally regarded as a symptom of being stretched beyond designed capacity.

18 For a most insightful discussion of hospital cost curves, see B. Friedman and M. Pauly, "Cost Functions for a Service Firm With Variable Quality and Stochastic Demand: The Cost of Hospitals," *Review of Economics and Statistics* 53 (November 1981): 620–624.

19 For evidence that, in the case of open heart surgery, most hospitals operate well short of the minimum average cost capacity with low marginal costs relative to average costs, see Finkler (note 3).

20 This analysis of the costs of congestion is consistent with Friedman and Pauly's (note 18) discussion of hospital cost. It is also consistent with Harris's argument that congestion may be very difficult for hospitals to effectively manage; see J. Harris, "The Internal Organization of Hospitals: Some Economic Implications," *Bell Journal of Economics* 8 (Autumn 1977): 467–482.

21 For a summary of empirical studies, see Paul Feldstein, *Health Economics* (New York: John Wiley & Sons, 1979), pp. 92–93. See also J. P. Newhouse et al., "Some Interim Results From a Controlled Trial of Cost Sharing in Health Insurance," *New England Journal of Medicine* 305 (Dec. 17, 1981): 1501–1507.

22 Recall that the price elasticity of the demand curve is the positive number $(p_i/q_i) \times (\delta q_i/\delta p_i)$. Thus, if a 1% increase in price causes a 2% decrease in quantity, the price elasticity of demand is +2. Inelastic demand therefore gives values in the interval (0, 1), and elastic demand has values in the interval (1, ∞).

If the demand that the individual hospital faces were not much more elastic than the demand for hospital care generally in the community, hospitals would never, or at least very seldom, find themselves in financial trouble. All estimates of the price elasticity of demand for hospital care in a community indicate that it is inelastic; i.e., a 1% increase in charges causes less than a 1% decrease in the quantity demanded. Therefore, if a hospital found itself in tight financial straits, it could increase its charges 10%. This would cause the hospital's total revenue to increase because, with inelastic demand, a price increase causes total revenue to increase. Simultaneously, the hospital's total costs decline because the price increase reduces the quantity of services demanded. Therefore net revenue increases.

23 See Chamberlin (note 13), p. 91.

24 M. A. Satterthwaite, "Consumer Information, Equilibrium Industry Price, and the Number of Sellers," *Bell Journal of Economics* 10 (Autumn 1979): 483–502, especially section 3.

25 On a national cross-section of primary care physicans' prices, Pauly and Satterthwaite tested, with encouraging results, the hypothesis that price elasticities of demand vary systematically across metropolitan areas; see M. V. Pauly and M. A. Satterthwaite, "The Pricing of Primary Care Physicians' Services: A Test of the Role of Consumer Information," *Bell Journal of Economics* 12 (Autumn 1981): 488–506.

26 We use conditions 2 and 3 rather than the more commonly used condition of zero economic profits, because the zero economic profit condition requires completely free entry and exit for the industry. In the case of hospitals, government intervention may prevent free entry, e.g., certificate-of-need legislation. This, along with whatever lumpiness exists in hospital investment, may allow small positive profits. The regulatory process may prevent free exit of existing hospitals. This exit constraint, however, does not appear to be binding. Specifically, Rose presents evidence that suggests legal barriers to exit fail to prevent exit of hospitals that lose their financial viability; see M. G. Rose, "Can Hospital Relocations and Closures Be Stopped Through the Legal System?" *Health Services Research* 18 (Winter 1983): 551–574. Therefore, throughout our analysis we assume that all hospitals earn nonnegative profits in long-run equilibrium.

27 The logic is that if every other hospital is charging price p_o, hospital *i* finds it in its interest to charge p_o. But given that hospital *i* charges p_o, each other hospital effectively faces the same problem as hospital *i* faced. Each other hospital therefore wishes to continue charging price p_o and delivering quantity q_o of services.

28 The entry of PPOs into the market may reduce overall demand because almost all PPOs include strong utilization controls.

29 Johns et al. (note 8).

30 The optimal percentage markup is a function of the demand elasticity the hospital faces. If $e = 1.5$, the markup should be 150% of marginal cost. If $e = 2$ (demand is more elastic), the optimal markup falls to 100% of marginal cost.

31 Utilization controls probably do not change the competitiveness of the market as measured by the price elasticity the individual hospital faces. They affect volume directly and probably leave price unaffected.

32 It maintains its price at p′ because, given that scenario 1 or 2 produced the equilibrium, marginal cost is constant over the relevant range.

33 Enthoven, e.g., criticizes the practice of "flat of the curve" medicine: the prescription of highly technical procedures

when expected benefits are nil; see A. C. Enthoven, *Health Plan* (Reading, MA: Addison Wesley Publishing Co., 1980).

34 See note 8.

35 William Guy, the "czar" of the MediCal program, when asked about quality, said, "I will not deal with allegations of inappropriate utilization. I am not a licensing agency. I was hired to negotiate a rate." Quoted by W. Trombley and H. Nelson in "UC Warned of $50 Million MediCal Loss," *Los Angeles Times*, Jan. 21, 1984, sec. I, p. 3, col. 1.