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February 2, 2009

Congressional Research Service

Report RL34101

*Does Price Transparency Improve Market Efficiency?  
Implications of Empirical Evidence in Other Markets for the  
Health Sector*

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April 29, 2008

**Abstract.** The first section of this paper briefly reviews the empirical studies of the effect of changes in price transparency on prices and quality of goods in a variety of industries. Most of this evidence relates to markets where buyers are the final end users of the good, and the bulk of evidence suggests that more transparent prices lead to lower prices and transactions costs. This section includes examples of direct effects of price transparency acting through normal market mechanisms (as in the case of lifting advertising restrictions or reducing search costs) as well as instances in which publicity about pricing strategies altered firms' behavior. (An appendix contains a more detailed discussion.) The second section addresses the extent to which this evidence might be applicable to the health care market. It addresses certain special characteristics of the health care market which may reduce the importance of prices as signals, for example, the complicated nature of health care, the intermediation of physicians in making health care choices including choosing hospitals, and the presence of third party payment (e.g., insurance companies). The third section then turns to a closer examination of how prices are actually set by hospitals and the evidence that exists on price dispersion both across hospitals and across patient categories. The fourth section discusses some initiatives undertaken by governments, insurers, and interest groups to improve information about prices and to regulate price discrimination. The final section draws the pieces together, suggesting that while it is difficult to determine the consequences of greater consumer price transparency, it is reasonable to believe that greater transparency would improve outcomes.

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# CRS Report for Congress

## Does Price Transparency Improve Market Efficiency? Implications of Empirical Evidence in Other Markets for the Health Sector

Updated April 29, 2008

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Prepared for Members and  
Committees of Congress

# Does Price Transparency Improve Market Efficiency? Implications of Empirical Evidence in Other Markets for the Health Sector

## Summary

Consumer advocates, proponents of wider use of market incentives in the health care sector, and some policy makers have called for greater price transparency. These measures might include posting prices in an accessible form or regulations constraining price discrimination (different prices charged to different customers). Price transparency implies that consumers can obtain price information easily, so they can usefully compare costs of different choices. Price transparency may also mean consumers understand how prices are set and are aware of price discrimination. In health care markets consumers often have difficulty finding useful price data. In particular, few consumers have a clear idea of what hospital stays or hospital-based procedures will cost, or understand how hospital charges are determined.

Many empirical studies have investigated how changes in price transparency have affected various markets. Most of this evidence, largely relating to advertising restrictions and lower search costs on the Internet, suggests that price transparency leads to lower and more uniform prices, a view consistent with predictions of standard economic theory. If this evidence could be applied to the health market, it would suggest that reforms that increase transparency would reduce prices. In cases involving NASDAQ and Amazon.com, public reaction created pressure to change pricing strategies. A few studies, involving intermediate goods in one case and less clearly identified advertising effects in others, found that transparency raised prices.

However, the special characteristics of the health market make it difficult to directly apply empirical evidence gathered from other markets. These characteristics include limits on competition among hospitals, complicated products that vary in quality, intermediate agents (physicians) who make choices, and third-party payment of costs through insurance. The dispersion of prices for similar health care procedures is high, which suggests that these markets are not working well with respect to price outcomes, as would be expected in ordinary competitive markets. In addition, prices paid by different types of payers vary dramatically. On average, patients without insurance or who pay their own bills pay much more relative to what private insurers, Medicare, and Medicaid pay.

Despite these complications, greater price transparency, such as accessibly posted prices, might lead to more efficient outcomes and lower prices. Some markets where lifting advertising restrictions led to lower prices also involved complicated products such as eye care, suggesting that the complex nature of health care may not be a barrier to benefits from price transparency. Internet comparison shopping sites also appear to have lowered prices for many products. Better price information might allow patients, either directly or through their physicians, to obtain better value for health care services. Several states and health insurers now provide online data on hospital costs. These price transparency initiatives, at least so far, have had little visible effect on pricing. Public pressure, which in some cases has caused hospitals to curtail aggressive bill collection tactics, might change hospitals' and health care providers' pricing behavior. This report will be updated as events warrant.

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# Does Price Transparency Improve Market Efficiency? Implications of Empirical Evidence in Other Markets for the Health Sector

## Introduction

Price transparency helps consumers obtain price information easily, which allows them to make useful comparisons of costs of alternative choices. Price transparency may also mean that consumers understand how prices are set and are aware of any price discrimination (different prices charged to different customers). In health care markets consumers often have difficulty finding useful price information. In particular, few consumers have a clear idea of what hospital stays or hospital-based procedures will cost, or understand how hospital charges are determined. Prices charged by hospitals vary significantly across hospitals and vary within hospitals across categories of patients.

Transparent prices play a key role in the efficient allocation of goods and services. Under certain conditions, the decentralized and self-interested decisions of firms and households in a price system yield resource allocations that avoid waste and that match what suppliers make and what consumers want, which is how economists define efficiency. Financial economics researchers typically define markets as efficient when prices reflect all available information and when prices adjust swiftly as new information arrives. If buyers and sellers do not know what prices are, then some mutually agreeable trades will fail to occur, thus creating inefficiencies. If buyers can see and compare prices for the same good offered by different sellers, the buyers then save money by choosing the cheapest vendor. If goods are similar but not identical, buyers then can compare prices and qualities offered by different sellers and pick whichever offer suits them best. The buyers' ability to choose an offer that suits them best puts tremendous pressure on all sellers to lower prices, improve quality, or both. Without such competitive pressure firms that are less efficient or that are earning excess profits can remain in the market, and prices will be higher than they would otherwise be.

Lack of transparent prices may also contribute to price discrimination, which can cause different customers to pay higher prices, an outcome that may be acceptable in some markets but may lead to undesirable consequences in others. For example, if the customers with the least bargaining power also tend to be those with the least ability to pay, such discrimination may be deemed particularly undesirable.

Barriers to price transparency include both explicit restrictions on information (such as government restrictions on price advertising or concealment by firms of prices or price-setting approaches, including negotiated prices) and costs of search

by consumers. The simplest theories suggest that more information about prices should decrease prices and also bring prices closer together, but certain theories predict that more price information could raise average prices, and advertising might raise prices by increasing demand or brand identification.

The first section of this paper briefly reviews the empirical studies of the effect of changes in price transparency on prices and quality of goods in a variety of industries. Most of this evidence relates to markets where buyers are the final end users of the good, and the bulk of evidence suggests that more transparent prices lead to lower prices and transactions costs. This section includes examples of direct effects of price transparency acting through normal market mechanisms (as in the case of lifting advertising restrictions or reducing search costs) as well as instances in which publicity about pricing strategies altered firms' behavior. (An appendix contains a more detailed discussion.)

The second section addresses the extent to which this evidence might be applicable to the health care market. It addresses certain special characteristics of the health care market which may reduce the importance of prices as signals, for example, the complicated nature of health care, the intermediation of physicians in making health care choices including choosing hospitals, and the presence of third party payment (e.g., insurance companies).

The third section then turns to a closer examination of how prices are actually set by hospitals and the evidence that exists on price dispersion both across hospitals and across patient categories.

The fourth section discusses some initiatives undertaken by governments, insurers, and interest groups to improve information about prices and to regulate price discrimination.

The final section draws the pieces together, suggesting that while it is difficult to determine the consequences of greater consumer price transparency, it is reasonable to believe that greater transparency would improve outcomes.

## **Empirical Evidence on the Effects of Price Transparency**

Isolating the effects of price transparency from other determinants of price is empirically difficult, and the literature contains a variety of approaches used to identify these effects. A more detailed discussion of this extensive literature is presented in the appendix.

Some examples of the effects of price transparency relate to the effect of publicity about pricing practices that may be viewed as inappropriate and that may lead to fears of regulatory involvement or consumer backlash. One such example relates to NASDAQ. In 1994, William Christie and Paul Schultz, two Vanderbilt University financial economists, noticed that NASDAQ dealers almost never quoted prices using odd eighths (i.e.,  $1/8$ ,  $3/8$ ,  $5/8$ , and  $7/8$ ) for many high-volume stocks of

companies such as Microsoft, Intel, and Apple. This practice effectively created a quarter dollar minimum spread between sellers' asks and buyers' bids, which increased the trading profits of dealers. The day after these economists issued a press release about their findings the practice was abandoned, and spreads for several major stocks fell by about half.<sup>1</sup>

Some other examples of transparency in financial markets suggested transparency lowered prices. When Island, an electronic communications network, ceased displaying limit order data in 2002, trading costs rose; when Island resumed a year later, trading costs fell. Another study found prices more volatile after hours than during regular market hours when trades are immediately reported.

A second example of the effect of publicity involves the case of Amazon.com, the internet seller. Amazon, according to reports, used characteristics gathered about individual customers from the Internet itself (such as whether a customer was new to the site, what browser the customer was using and what the customer purchased in the past, etc.) to charge different prices to different individuals. Once this strategy was publicized, the protests led Amazon to cease the pricing variations and apologize.<sup>2</sup>

Another case study focused on the intermediate market. In 1993, the Danish Competition Authority required that all ready-mixed concrete contracts be made public, which it hoped would stimulate greater competition. Instead, average prices rose by 15%-20% and other factors such as changing demand conditions played no discernable effect.<sup>3</sup> There are two possible explanations for this unexpected increase in prices with publicity. First, public prices may make collusion among sellers easier. Rivals can observe sellers who undercut their competitors, and may be able to mete out punishments in various ways. Second, price transparency may alter the strategic incentives of sellers, inducing them to become tougher bargainers.

A larger body of studies estimates the effects of restrictions on advertising and posting of prices. Most of these studies involved comparing jurisdictions that banned certain types of advertising, primarily for vision exams and eyeglasses. Some studies focused on the effects of restrictions on the advertising of prescription drugs and alcoholic beverages and restrictions on posting gasoline prices. (It is important with advertising, which can increase demand for branded products, to examine cases where some outside authority, in this case the government, restricts advertising.) Two studies examined the effects of local advertising of food prices, one examining the effects of the 1978 newspaper strike in New York City and another where researchers provided advertising via direct mail. Although studies of quality are more difficult

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<sup>1</sup> William H. Christie and Paul H. Schultz, "Did NASDAQ Market Makers Implicitly Collude?," *Journal of Economic Perspectives*, vol. 9, summer 1995, pp. 199-208.

<sup>2</sup> Robert M. Weiss and Ajay K. Mehrotra, "Online Dynamic Pricing: Efficiency, Equity and the Future of E-commerce," *Virginia Journal of Law & Technology*, vol. 6, no. 11 (2001), available at [<http://www.vjolt.net>].

<sup>3</sup> Svend Albaek, Peter Møllgaard, and Per. B. Overgaard, "Government Assisted Oligopoly Coordination? A Concrete Case," *Journal of Law and Economics*, vol. 45, December 1997, pp. 429-443.



to undertake, two studies examined these effects: one study examined the effect of mandatory fat content labeling and another the effect of requiring restaurants to post hygiene quality grade cards. Almost all of these studies found that more information on prices and quality lowered prices, improved quality, or both.

The final part of the appendix discusses the relatively new and growing body of studies on the effect of better price information and lower search costs through computers and the Internet. Studies have examined a wide range of items: automobiles, books and CDs, airline tickets, and life insurance. The evidence was mixed for cars and for books and CDs, but showed reductions in prices for airline tickets and insurance. These studies suggested that consumers using comparison sites did pay lower prices and later studies, as the Internet became more common, more frequently pointed to lower prices. Part of the difficulty of studying the effect of the Internet is that Internet sellers may offer benefits to customers compared to conventional sellers, so that the evidence on price comparison sites, which appeared to reduce prices and price variation, may be more relevant than comparing prices of Internet and conventional sellers.

Considering all of the evidence of price transparency, the majority of the empirical studies tend to find that greater price transparency, including advertising and reduction in costs of finding information through the Internet, leads to lower and more uniform prices.

## **What Are the Implications for Health Care Markets?**

Can the evidence from other markets be used to analyze the effects of greater price transparency in health care markets, or provide guidance about what measures might best be considered? While the special features of the health care market that distinguish it from other markets are well known among health economists, researchers and policy makers have sought ways to capture the potential gains from increasing efficiency in the health care sector by the introduction of market-like reforms. Whereas published prices in other markets provide important signals of the true economic value of goods and services in other parts of the economy, the impenetrability of many health care billing practices creates a barrier to rational decision making and analysis.

Prices in the health care markets reflect physician charges, hospital pricing, prescription drugs, costs for medical devices and diagnostics, as well as other types of health care goods and services. Certain market characteristics of industries that provide many of these products are important in analyzing the effects of price transparency: they are subject to quality differences (and are thus not entirely homogeneous products); the product may be one whose nature and benefits are not easily understood by the customer; sellers charge different prices to different customers and customers pay different (and often small) shares of the costs because of insurance; and within specific geographic areas there may be few providers, at least in the case of hospitals. These aspects of the health care market not only mean that prices will vary but they also (in many cases) complicate the consumers' understanding of expected prices or their response to price differences; they also may

mean that it is difficult for prices to bring about economic efficiency (for example, because of lack of competitive markets). All of these aspects of the health care market therefore may mute the effects of transparency on prices.

Prices clearly vary in the health industry, and why they vary is relevant to the implications of price transparency. The discussion below reviews basic aspects of pricing that lead to different prices in a market and are relevant to discussing barriers to the effect of transparency on prices in the health market. The first section discusses two reasons that different prices persist for the same product: product differentiation and price discrimination. As we shall see, both characteristics exist in the health care market. Secondly, the cost structure of an industry may lead to market power that allows different prices to be charged. Following that discussion, some specifics of the health care market and how they relate to pricing characteristics are discussed. Many of these characteristics are directly related to the role of price in consumers' decisions. Finally, the empirical evidence on price transparency presented in the first part of this report is examined in light of these issues.

## **Why Do Different Prices Persist? Differentiated Products and Price Discrimination**

The "Law of One-Price," which states the same good will sell for the same price, is a simple consequence of buyers' ability to pick the most advantageous offer. In many situations, however, prices will vary. This may happen because two goods are not identical. For example, a store in a more convenient location can charge more than a store in an out-of-the-way location. Spending time in a resort during peak season is different than spending time in the same resort during low season. Conversely, as the real estate maxim states, if the price of an apartment with a view is the same as an otherwise similar apartment without a view, then there really isn't a view. Moreover, products that otherwise seem quite similar may be differentiated, if no more than in consumers' minds, by brand, and certainly a great deal of advertising appears directed at differentiating similar products, which permits suppliers to increase prices and profits. Because health care depends on location, quality, and patient characteristics it is not a homogeneous product, and so some price differential is expected.

Some sellers may gain larger profits by charging different prices to different groups of consumers. For this to happen, firms must have some market power, meaning that they can raise their average selling price by cutting back on the amount they sell. If the seller can identify different groups that differ in their sensitivity to price changes, and if buyers cannot resell or use arbitrage, then firms will earn higher profits by charging groups with lower price sensitivity a higher price.<sup>4</sup> For instance, airlines know that business travelers are usually less sensitive to prices than leisure travelers. By imposing "Saturday night stayover" requirements for cheaper fares,

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<sup>4</sup> In economic theory charging different groups different prices is called "third-degree" price discrimination. First degree price discrimination occurs when sellers have information on the price sensitivity of individuals, and second degree price discrimination occurs when sellers use quantity discounts.

airlines are able to charge higher prices to business travelers who want to sleep in their own beds on weekends.

Firms can price discriminate in a number of ways.<sup>5</sup> Consumer electronics manufacturers offer mail-in rebates in order to charge higher prices to customers who either value their time highly or who are poorly organized, and who therefore fail to obtain those rebates. Car dealers charge different prices for identical cars, an outcome of the bargaining process.

Price discrimination often benefits some classes of consumers: those who would probably pay higher prices under uniform pricing. If airlines could not charge business passengers higher fares, leisure travelers would certainly have to pay higher fares. Some price discrimination schemes, such as college financial aid, are often justified on the grounds of fairness, although they can also be explained by the desire to maximize profits. Hospitals before the Medicare Act often sought to justify charging different rates to different customers on the grounds of fairness, although some economists who examined the issue at the time were skeptical.<sup>6</sup> Hospitals in the current health finance environment — dominated by large insurers and managed care firms on the private side and Medicare and Medicaid on the public side — typically attempt to charge more to uninsured patients who have less ability to negotiate, even though uninsured patients are more likely to have lower incomes than insured patients.<sup>7</sup>

## Cost Structures and Pricing

The structure of costs within an industry has important effects on the nature of pricing. Firms with market power, which often arises from cost structures, will have some ability to set prices differently from cost, and may be more resistant to competitive pressures that result from price transparency.

Firms will have limited market shares and will face strong competitive pressures to keep profit margins low when firms have

- fixed costs that are small relative to operating costs that can be added or cut in the short run (variable costs), and
- unit costs that increase as output increases.

On the other hand, if fixed costs are large relative to variable costs or if firms use an increasing returns technology, then uniform pricing may be difficult to

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<sup>5</sup> For one list of marketing techniques designed to charge different prices to different customers, see F. M. Scherer and David Ross, *Industrial Market Structure and Economic Performance* (Boston: Houghton-Mifflin, 1990), pp. 491-494.

<sup>6</sup> R. A. Kessel, "Price Discrimination in Medicine," *Journal of Law and Economics*, vol. 1, 1958, pp. 20-53. Kessel examines physicians' fees and argues the setting of higher fees for those with more means to be a standard case of price discrimination to maximize profits.

<sup>7</sup> This point is analyzed in more detail in the section entitled "Price Variation by Payer."

maintain, especially if the firm cannot store its output.<sup>8</sup> Economic theory suggests that industries that have high fixed costs and which sell perishable goods or services face strong pressures to charge different customers different prices and compete in markets subject to unstable prices.<sup>9</sup> Increasing returns can often be found in industries with network characteristics. For example, a phone connection is more valuable within a large network than within a small one because more connections are possible. Learning-by-doing effects are another example of increasing returns.

In addition, many hospitals provide indigent care for which they are not wholly compensated. Such hospitals must find other ways to finance this care, which often involve cross-subsidies. In these conditions, a simple flat-rate price system may not be a viable strategy for hospitals. Therefore, imposing greater transparency of health care prices may require closer attention to cross-subsidies and uncompensated training and care.

The hospital industry has some natural monopoly or natural oligopoly characteristics. A natural monopoly exists where incremental costs fall as output rises through the relevant range of output for a market. A natural monopoly would suffer losses if it set prices equal to incremental cost, which is a standard condition for socially efficient pricing. Therefore, a natural monopoly must be supported by some subsidy or must charge prices above incremental cost, which from an economic perspective causes inefficiencies and market distortions. Industries with natural monopoly characteristics are often regulated, and prices are often set administratively through rate-of-return type regulations. The outputs of industries regulated under rate-of-return procedures, however, are much simpler than the set of outputs which hospitals provide. For example, electric power distribution, which generally has been subject to rate-of-return regulation, deals with a single commodity which is uniform in its physical characteristics.<sup>10</sup>

Entry of new firms in an industry with natural monopoly characteristics is inefficient because at least some firms will be forced to operate at inefficiently low levels. For example, entry of a new hospital might cause the average number of empty beds in a market area to increase, which increases average prices. Because of the hospital industry's natural monopoly characteristics, state and federal regulators have often imposed restrictions, such as Certificates of Need, on entry of new hospitals. Theoretical models have been developed to better understand the tradeoffs

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<sup>8</sup> Technically, fixed costs and increasing returns create non-convexities in a firm's production function. This will cause gaps in the firm's supply curve, so that supply and demand curves might not intersect. In this case, there is no market equilibrium. Experimental evidence suggests that pricing can be extremely erratic in such cases.

<sup>9</sup> Lester G. Telser, "Competition and the Core," *Journal of Political Economy*, vol. 104, no. 1, 1996, pp. 85-107.

<sup>10</sup> Even if electricity is physically homogeneous, costs of generation and demand for power vary by time of day. Nonetheless, electric power, even if differentiated by time of day, is much more homogeneous than outputs provided by the health sector.

between the gains in competitive pressure and the loss of scale economies.<sup>11</sup> In *U.S. v. Carilion Health System* a federal district court accepted the argument of two hospitals that wished to merge that higher market concentration would lead to lower prices, and rejected the Department of Justice's claim that the merger would raise prices, providing an illustration of a case where the scale economy argument prevailed.<sup>12</sup>

## Special Characteristics of the Health Care Markets

Health care markets differ from markets for standardized commodities described in economics textbooks in several important ways. The special features of health care have had a strong effect on the evolution of health care markets. Five key features of health care markets are discussed below; in general, they point to price being a less important signal than it typically is in other markets. Prices could, however, become more important with a shift to insurance types such as Health Saving Accounts where consumers confront higher prices at the margin.

**Health Care Is Complicated.** By its nature, health care cannot be easily standardized, making price dispersion difficult to monitor. Different diseases affect different people in different ways, and treatments that work for one patient may fail to help another. Patients may not know what disease or condition is affecting them, and may have difficulty in articulating what is wrong with them and what they would like treatment to accomplish. Hospitals are sometimes described as “job shops” to emphasize their dissimilarity to assembly lines. Thousands of different types of procedures may be performed in an average general hospital, and even specialized hospitals must be equipped to face a wide range of conditions and complications.

Because hospitals produce many different outputs with many of the same inputs, allocating costs to particular outputs or to specific patients can be somewhat arbitrary. There is no unambiguous way to allocate the costs of employing nurses, pathologists, accountants, and billing clerks to specific procedures or patients. Hospital management strategies that seek to assign such costs to specific “profit centers” appear to rely more on rules of thumb than on precise economic calculations.

**Physicians as Agents.** Because patients cannot always know what they want, physicians must serve as their agents. In most cases, physicians will make a preliminary diagnosis, recommend which specialists will be seen, and determine whether a patient is admitted to a hospital or not. It is true that ethical and professional guidelines stress that physicians must act in the best interests of the patient. Still, physicians may be swayed directly or indirectly by insurers, pharmaceutical companies, hospitals, and peers in ways that might not benefit

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<sup>11</sup> Rabah Amir, “Market Structure, Scale Economies, and Industry Performance,” working paper University of Southern Denmark at Odense, August 2000, available at [<http://www.econ.ku.dk/wpa/pink/2000/0008.pdf>]

<sup>12</sup> *U.S. v. Carilion Health System*, 707 F. Supp. 840 (Western District of Virginia, 1989). For an economic and legal analysis of this case see David Eisenstadt, “Hospital Competition and Costs: The Carilion Case (1989),” in John E. Kwoka and Lawrence J. White, eds., *The Antitrust Revolution: The Role of Economics* (New York: Harper Collins, 1994).

patients. While the vast majority of physicians feel a strong professional compunction to provide the best care possible, they also face pressure to reduce costs to patients or insurance companies. The problem of agents considering their own interests, along with those on whose behalf they act, exists in this market as well as many other markets.<sup>13</sup>

***Patients Pick Physicians and Hospitals Pick Physicians.*** Because patients rely upon physicians as their agents, patients often do not choose which hospital they enter. Rather, patients choose a physician, and the physician's admitting privileges determine where the patient goes. Hospital credentials committees decide which physicians get admissions privileges based on a physician's training, residency program, malpractice record, and other relevant information. Although some physicians have admitting privileges at more than one hospital, the available evidence suggests that most physicians admit the bulk of their patients to one hospital.<sup>14</sup> A patient needing an operation may have some choice of hospital if her physician provides referral to more than one surgeon. While this provides the patient with some choice, the patient rarely has detailed information about cost and quality, and is rarely in a position to make an informed choice.

If a patient wishes to go to a certain hospital, then the patient must select a physician with privileges there. Insurance companies offer physician directories which list hospital affiliations, and hospitals often sponsor "physician-finder" services that feature "their" M.D.s. Therefore, patients may have sufficient information to figure out which physicians they would need to choose in order to go to a particular hospital in the event of some medical condition. (Emergency admissions are generally sent to the nearest hospital with an emergency room or to a hospital which specializes in trauma cases.) In some cases they may have information on quality through studies that rank hospitals. The fact remains, however, that patients are usually in a poor position to choose a hospital which best suits their needs because they lack the right information and because they are shielded from information about cost differences among hospitals.

***Other People's Money Pays for Most Hospital Care.*** Hospitals get slightly less than a third of their revenue from Medicare, another third from private insurers and slightly more than a sixth of their revenue from Medicaid.<sup>15</sup> While public or private insurance protects patients from the financial consequences of a hospital stay, insurance also makes patients insensitive to prices. By the time a patient reaches a hospital deductible, out-of-pocket payment limits for most insurance policies may have been reached for many patients. In particular, for the most complicated episodes (which account for a disproportionate share of hospital costs),

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<sup>13</sup> The principal-agent problem, as it is referred to in economics, occurs in many contexts, including corporate managers acting on the behalf of stockholders and tenants making decisions that affect owners of property.

<sup>14</sup> Douglas R. Wholey and Lawton R. Burns, "Convenience and Independence: Do Physicians Strike a Balance in Admitting Decisions?," *Journal of Health and Social Behavior*, vol. 32, no. 3 (September 1991), pp. 254-272.

<sup>15</sup> Uwe E. Reinhardt, "The Pricing of U.S. Hospital Services: Chaos Behind A Veil of Secrecy," *Health Affairs*, vol. 25, January/February 2006, pp. 57-69.

most patients may be fully covered or fully bankrupt. In either case, price plays little or no role in either choice of treatment or location of treatment.

Patients may indirectly choose their hospital and nature of their care through their choice of insurance plan, and as noted above, through their choice of physician. Many plans using Preferred Provider Organization (PPO) approaches restrict policy holders' choice of hospital, or impose financial penalties for using hospitals outside the PPO network. One plan may be cheaper than another because it is able to drive a harder bargain with hospitals or because it can restrict the cost or amount of care which policy holders receive. While consumers can obtain information about features of different insurance plans, that information arguably is often incomplete and confusing.

***Patients Have Poor Information About Hospital Quality and Costs.***

Patients may also be in a poor position to choose their own hospital because they have little access to information about hospital prices and quality or are not familiar with the information that is available (such as hospital ratings). As with any other good or service, a good decision about hospital selection must be supported with adequate information on costs and quality. Hospitals in most states are not required to make public individual prices for items, and other resources for comparative pricing information are limited. Aetna, for example, has provided price information for physician services in selected areas, but this information is available only to its subscribers.<sup>16</sup>

The impenetrability of hospital bills is legendary. Hospital bills for privately insured patients routinely run for pages and contain hundreds of individual items. Hospital billing and coding have become arcane arts, practiced by highly specialized clerks and consultants. Insurers and government analysts have access to files that can be used to generate meaningful average costs, but this information is not available to patients.

Compounding the problems patients face, they generally have access to little useful information about health care quality. In part this is due to the inherent complexity of medical care and the difficulty of defining and measuring quality. Consumers can quickly judge the quality of most goods they buy on a daily or weekly basis, and make changes in shopping routines accordingly. In some cases, such as obstetrics, word-of-mouth and reputation may lead patients to reasonably well-informed choices among hospitals. In general, however, hospital stays are for most an infrequent event and not many patients have enough experience or connections to compare experiences in a range of different hospitals.

Large corporations, insurance companies, and government agencies have developed extensive databases containing information reflecting the quality of health

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<sup>16</sup> Testimony of Robin Downey, Vice President and Head of Product Development, Aetna, in U.S. Congress, House Committee on Ways and Means, Subcommittee on Health, *Hearing on Price Transparency*, 109<sup>th</sup> Cong., 2<sup>nd</sup> sess., July 18, 2006. The expansion to the Washington area was reported in January W. Payne, "The Secret's Out: Aetna Members Gain Access to Care Price, Quality Data," *Washington Post*, August 22, 2006, pp. F1, F4.

care. The development of large electronic databases has opened the possibility of creating quality indices based on sophisticated statistical methods. Presently, however, these data are largely unavailable to consumers. Traditional approaches to quality monitoring in health care focus on “zero/one” indicators. Physicians are licensed, and others are barred from providing medical care. Hospitals are accredited and providers are certified for Medicare reimbursement. Such measures, however, serve only to set lower bounds.

Providing consumers with more useful data on outcomes may improve health care quality.<sup>17</sup> Of course, outcome data must include risk adjustments, so that statistics reflect the fact that healthier patients will on average have better outcomes. For example, the United Network for Organ Sharing, established by Congress in 1984, collects data on all transplant operations in the United States. Risk-adjusted outcome data for each transplant center are available at [<http://www.unos.org>]. Public availability of risk-adjusted outcome data puts pressure on surgeons and transplant centers to improve performance. New York State has published risk-adjusted average mortality rates for cardiac surgery since 1991. Once New York State started publishing average mortality rates, patients at a top-performing hospital or surgeon reportedly had about half the chance of dying as did those who picked a hospital or surgeon from the bottom-performing 25%.<sup>18</sup> Massachusetts maintains a website with death rates for coronary artery bypass graft (CABG) operations for specific hospitals and surgeons. This site lists the number of procedures performed by specific surgeons for several other types of operations.<sup>19</sup> Pennsylvania published a report on cardiac surgery that listed hospital-specific data on average charges, average payment by commercial insurers and Medicare, and risk-adjusted mortality and readmission rates. This report also listed surgeon-specific data on risk-adjusted mortality and readmission rates for CABG procedures.<sup>20</sup> Data presented in the report showed little connection between average charges and adjusted mortality rates.<sup>21</sup>

## Summary: Special Characteristics of Health Care Markets

If the market satisfies conditions of the model of perfect competition, which imply that consumers are fully informed and can choose the lowest price, prices will converge to the cost of producing the last unit of output and goods will be distributed

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<sup>17</sup> For a more extensive analysis of the potential of giving consumers with useful outcome data see Michael E. Porter and Elizabeth O. Teisberg, *Redefining Health Care: Creating Value-Based Competition on Results* (Allston, Mass: Harvard Business School, May 2006).

<sup>18</sup> Ashish K. Jha and Arnold M. Epstein, “The Predictive Accuracy of The New York State Coronary Artery Bypass Surgery Report-Card System,” *Health Affairs*, vol. 25, no. 3, 2006, pp. 844-855.

<sup>19</sup> These data reports are available at [<http://www.mass.gov/healthcareqc>].

<sup>20</sup> Pennsylvania Health Care Cost Containment Council, “Cardiac Surgery in Pennsylvania 2005,” June 2007.

<sup>21</sup> Reed Abelson, “In Health Care, Cost Isn’t Proof of High Quality,” *New York Times*, June 14, 2007.



efficiently.<sup>22</sup> More generally, the “Law-of-One-Price” asserts that consumers’ ability to choose the most advantageous offer will ensure that the same good will sell for the same price. To the extent that transparent pricing helps markets rapidly converge by bringing prices in line with incremental costs, it promotes economic efficiency.

Many markets do not satisfy conditions of the model of perfect competition. If consumers are poorly informed, or hindered from taking their most advantageous option, prices might not converge to efficient levels, if they converge at all. While such problems can arise in markets for simple goods, the problems are exacerbated for more complex goods and services, such as health care. Several aspects of health markets, including natural differentials in the product due to differences in quality and patient characteristics and the widespread practice of price discrimination, limit the effects of price transparency. In addition, other important characteristics interfere with price signals and competitive pricing outcomes: the product is complicated, physicians rather than consumers tend to determine the product purchased, patients generally do not directly pick hospitals, many costs are covered by third parties, and patients have poor information about costs.

In sum, health care patients often have only a limited and indirect ability to choose which hospital they will be treated in the event of some medical episode. Choosing a different hospital may require a change of physician or of insurance plan. Even if patients could switch among hospitals more easily, their incentives to search for cheaper hospital care are dulled by third-party payment, and patients typically lack price and quality data that would be necessary for them to make a fully informed choice. Much of the difficulty in instituting market-like reforms in the health care sector stems from the nature of health care itself, and from the ways health care institutions have evolved to deal with special features of health care. Improvements, while possible, would probably be neither quick nor easy.

These characteristics, however, all point to some important conclusions. Prices as signals are diluted and muted in the health care market as compared to many other markets. That muting of price signals tends to suggest that improvements in price transparency may be less effective in the health care market than in other markets and that this problem is particularly serious with hospital pricing. At the same time, the lack of understandable price information in the health care market may suggest significant room for improvement. To understand this last issue, it is important to be clear about just how complex and dispersed hospital pricing is, an issue considered in the following section.

## Hospital Pricing

As the previous section suggests, the barriers to direct consumer choice are high for hospitals, and it is for hospitals that many initiatives, discussed below, have been made to improve information and transparency. Hospital costs are also a major

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<sup>22</sup> Efficiency here means no waste in production and that all gains from trade are exhausted.

portion of health care costs, accounting for 31% of the \$2 trillion of costs in 2005.<sup>23</sup> To interpret and apply the evidence on price transparency requires a more specific understanding of how hospitals set prices. This section provides an overview of how hospitals set and administer prices. This section also investigates the variability of hospital prices.

## Nuts and Bolts

Every hospital maintains a “chargemaster,” a document which lists prices for each item and procedure offered by the hospital.<sup>24</sup> A chargemaster may contain about 10,000 to 20,000 separate items. By comparison, the U.S. tariff schedule has about 10,000 separate rate lines, and a regular supermarket sells about 15,000 items.<sup>25</sup> A Lewin Group study of hospital pricing practices found that few hospitals in its sample conducted systematic reviews of their chargemasters.<sup>26</sup> Many hospitals stated that their charges had little relation to costs, although hospitals that were larger, urban, or which conducted substantial amounts of research were more likely to report some link between costs and chargemaster prices. Supplies and pharmaceutical charges appeared to be reviewed more regularly and were more likely to be related to costs. Most hospitals in the Lewin sample charged higher markups on less-expensive items.

Prices listed on the chargemaster bear little resemblance to what is actually paid. On average, insurers and patients paid hospitals about 38% of their “charges” in 2004.<sup>27</sup> Medicaid pays about 17% of total hospital revenues.<sup>28</sup> Medicaid payment arrangements differ by state. All states use a prospective payment system for Medicaid hospital reimbursement, with most either paying a flat fee according to diagnosis related groups (DRGs) or paying a flat per diem rate. All states also make

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<sup>23</sup> Centers for Medicare and Medicaid Service, Office of the Actuary, National Health Statistics Group.

<sup>24</sup> Uwe E. Reinhardt, “The Pricing of U.S. Hospital Services: Chaos Behind A Veil of Secrecy,” op. cit.

<sup>25</sup> U.S. International Trade Commission, *Simplification of the Harmonized Tariff Schedule of the United States*, Investigation No. 332-388, Publication 3318, June 2000; Food Marketing Institute Facts and Figures website, available at [[http://www.fmi.org/facts\\_figs/superfact.htm](http://www.fmi.org/facts_figs/superfact.htm)].

<sup>26</sup> Allen Dobson, Joan DaVanzo, Julia Doherty, and Myra Tanamor, “A Study of Hospital Charge Setting Practices,” Lewin Group report no. 05-4, December 2005, available at [[http://www.medpac.gov/publications/contractor\\_reports/Dec05\\_Charge\\_setting.pdf](http://www.medpac.gov/publications/contractor_reports/Dec05_Charge_setting.pdf)].

<sup>27</sup> Uwe E. Reinhardt, “The Pricing of U.S. Hospital Services: Chaos Behind A Veil of Secrecy,” op. cit., p. 57.

<sup>28</sup> *Ibid.*, p. 61.

special payments to hospitals for unusually high-cost cases, and most make payments to hospitals that serve low-income or medically needy populations.<sup>29</sup>

Medicare pays a flat fee for inpatient care based on the average relative cost of a case within one of about 600 DRGs. A DRG weight, reflecting the relative cost and complexity of a given diagnosis code, is multiplied by a monetary conversion factor. Medicare payments are adjusted to reflect differences in regional labor costs and some other local factors. Other adjustments are made for outliers (extraordinarily complex cases with exceptionally high costs) and “disproportionate share” adjustments made for hospitals that serve a larger than usual portion of indigent patients. DRG weights are recalculated to account for changes in technology, practice patterns, and other trends. Congress typically adjusts the monetary conversion factor each year. From time to time, the Medicare Payment Advisory Commission (MEDPAC) proposes technical changes in the definition of DRGs and in payment and adjustment details.

Private insurers are responsible for about a third of the hospitals’ revenues (hospital revenues were \$612 billion in 2005).<sup>30</sup> Private insurers’ payment arrangements vary: some pay a fixed portion of charges, some pay negotiated per diems or pay flat fees according to DRGs. Private insurers typically use Medicare’s list of DRGs, but may assign their own weights. Medicare’s calculations of DRG weights use claim experiences of Medicare beneficiaries, who are older than the average private health plan policy holder, and so may not reflect relative costs for younger patient populations. Private insurers vary in their ability to extract discounts from hospitals, and arrangements between insurers and hospitals are tightly guarded trade secrets.

According to many analysts familiar with health care finance, Medicare and Medicaid payments on average fall short of the fully allocated costs associated with patients in those programs.<sup>31</sup> Thus hospitals must shift costs to private insurers, increase efficiency, or reduce services to balance their books. As a result, payments for a particular patient’s case will reflect not just the complexity of the case and the resources used, but also depend on the negotiating prowess of the patient’s insurer.

## Price Variation Among Hospitals

Prices for specific items may vary wildly from one hospital to the next, as **Figure 1** and **Figure 2** show. For instance, a comprehensive metabolic panel, which costs \$97 at San Francisco General, costs \$1733 at Doctors Hospital in Modesto,

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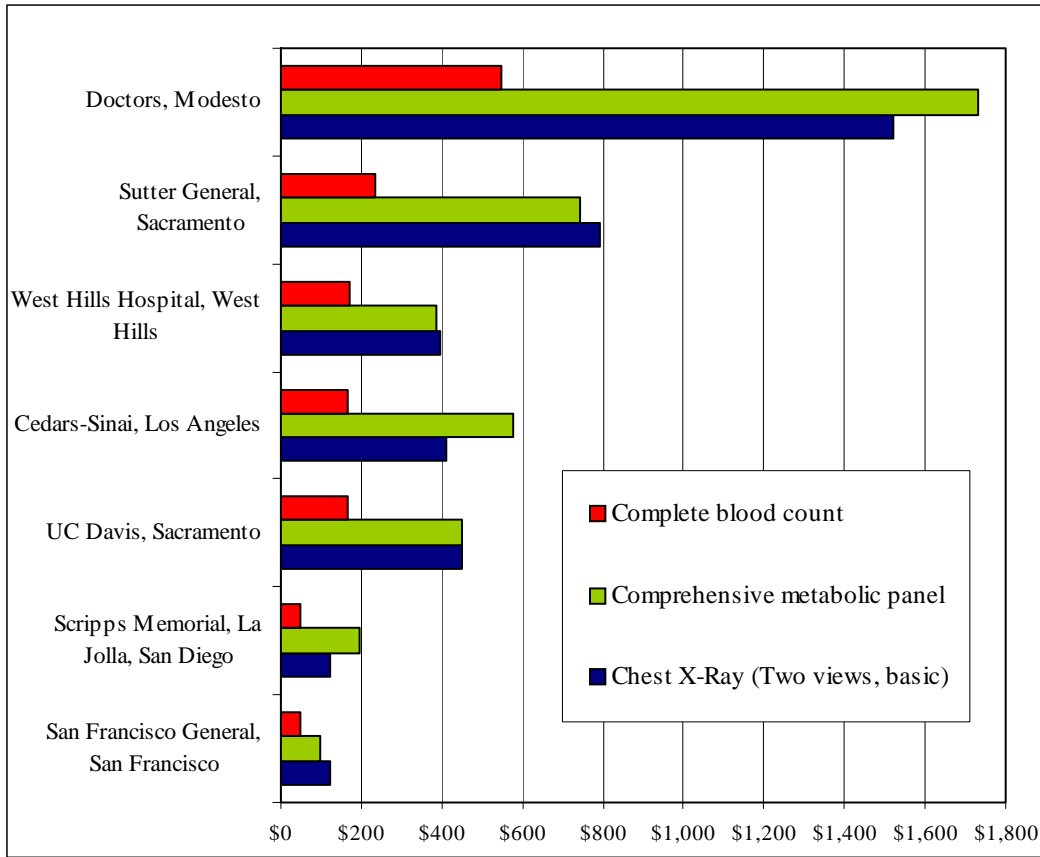
<sup>29</sup> Some specialized hospitals, such as psychiatric hospitals, are often reimbursed differently than general hospitals. For a detailed description of Medicaid hospital reimbursement policy, see CRS Report RL32644, *Medicaid Reimbursement Policy*, by Mark Merlis.

<sup>30</sup> *Ibid.*, for the share. Total hospital costs are from the Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Unit.

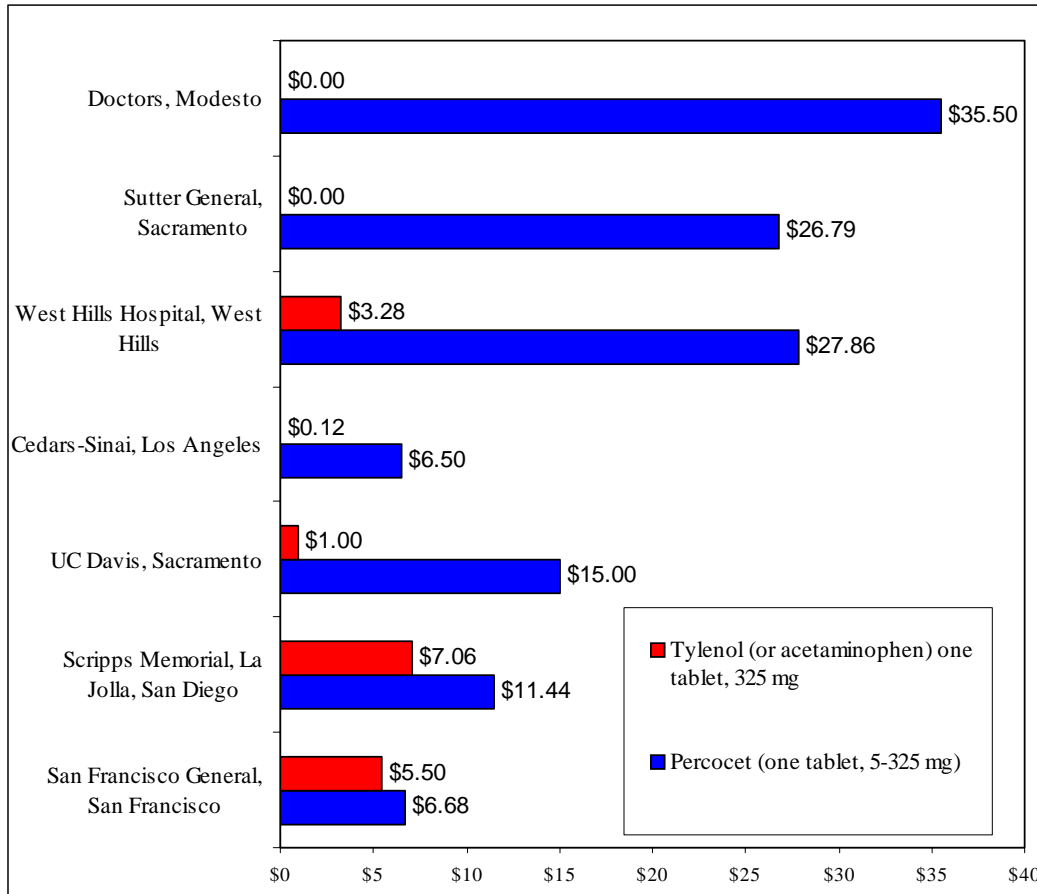
<sup>31</sup> Allen Dobson, Joan DaVanzo, and Namrata Sen, “The Cost-Shift Payment ‘Hydraulic’: Foundation, History, And Implications,” *Health Affairs*, vol. 25, no. 1 (2006), pp. 22-33.

about 18 times more expensive. To some extent disparate prices reflect different markup formulae, which act to allocate hospital overhead costs among items.

**Figure 1. Hospital Charges for Selected Diagnostic Tests**



**Source:** Reproduced from Lucette Lagnado, "California Hospitals Open Books, Showing Huge Price Differences," *Wall Street Journal*, Dec. 27, 2004, p. A1. Data obtained from individual hospitals.

**Figure 2. Hospital Charges for Two Common Analgesics**

**Source:** See source for **Figure 1**.

**Table 1** presents data on average costs and charges by type of payer for three hospitals, all located in urban areas. In each case, the average charges for managed care patients were about 20%-30% above average operating costs as reported to the Centers for Medicare and Medicaid Services (CMS). By contrast, average charges for uninsured patients were substantially higher.

**Table 1. Average Costs and Charges for Selected Hospitals, By Type of Payer**

	O'Connor Hospital San Jose, CA	St. Louise Regional (Catholic) West Gilroy, CA	Palm Beach Gardens Community Hospital (Tenet Healthcare) Palm Beach Gardens, CA
Avg. Operating Cost per Patient per Day	\$1,631	\$1,376	\$1,501
Collected from Managed Care	\$1,940	\$1,773	\$1,774
Billed the Uninsured	\$5,951	\$5,508	\$7,414
Cost-to-Charge Ratio	.258	.289	.205
Collection Rate from the Uninsured	97%	96%	32%

**Source:** Heartland Institute analysis of Centers for Medicare and Medicaid's Medicare Cost Reports data for 2002. Reproduced from Randy Suttles and Merrill Matthews, Jr., "Hospital Pricing: Separate and Unequal," *Health Care News*, September 1, 2003.

**Table 2** presents payment-to-cost ratios by type of payer for community hospitals from 1991 to 2000. The mix of services that each type of payer funds differs, which precludes direct comparisons of payment rates across payers. Nonetheless, these data underline the point that the relationship between costs and payments differs among payers. Average Medicare payments since the mid 1990s nearly match hospital costs, while Medicaid payments, on average, fall short of covering costs. The ratio of payments to costs is highest for private payers (i.e., private insurers and managed care firms), although that ratio fell significantly during the 1990s. The ratio of payments to costs is lowest for uncompensated care, although many hospitals receive subsidies from state and local governments, not reflected in **Table 2**, that serve to defray expenses associated with uncompensated care.

Data in **Table 2** lump all uninsured payers together, although these payers include indigent patients, from whom much smaller payments may be received, and non-indigent patients. We were unable to locate aggregate data that would separate these two groups. However, an illustration based on aggregate California data, provided in testimony by Glenn Melnick, shows the importance of this distinction. The average chargemaster price for an appendectomy in 2002 was \$18,229; the indigent uninsured paid \$1,783, the Medicare payment was \$4,805, the managed care

payment \$6,174, and payments by the non-indigent uninsured was \$8,143.<sup>32</sup> The payment from the non-indigent, indeed, did fall below the list price, and may reflect both ad hoc discounts and failure to collect the payment. Even so, the uninsured non-indigent paid a third more than the managed care patients and 70% more than Medicare patients for this procedure. Melnick also points out that the list price remains important not only because some uninsured patients are charged the list price, but also because of stop-loss provisions in contracts (where list is paid above a threshold), lack of contracts with all third party providers, and out-of-network use. He also points out that increasing revenues is an incentive to charge a high list price.

**Table 2. Hospital Payment-To-Cost Ratios By Type of Payer, 1991-2000**

Year	Medicare	Medicaid	Uncompensated Care	Private Payers
1991	88.4%	81.6%	19.6%	129.7%
1992	88.8	90.9	18.9	131.3
1993	89.4	93.1	19.5	129.3
1994	96.9	93.7	19.3	124.4
1995	99.3	93.8	18.0	123.9
1996	102.4	94.8	17.3	121.5
1997	103.6	95.9	14.1	117.6
1998	102.6	97.9	13.2	113.6
1999	101.1	96.7	13.2	112.3
2000	100.2	96.1	12.1	112.5

**Source:** MEDPAC analysis of American Hospital Association data. Reproduced from Table B-11 in Medicare Payment Advisory Commission, Report to the Congress: Medicare Payment Policy, March 2002. Data for years 2001 and after are unavailable.

Some hospitals have been strongly criticized for charging uninsured patients, who typically have less ability to pay for care than insured patients, far higher prices. In some apparently isolated circumstances, news stories detailing some hospitals' attempts to use aggressive collection methods against uninsured patients purportedly caused those hospitals to cancel those debts.<sup>33</sup>

<sup>32</sup> Testimony of Glenn Melnick, in U.S. Congress, House Committee on Ways and Means, Subcommittee on Health, March 9, 2004.

<sup>33</sup> Randy Suttles and Merrill Matthews, Jr., "Hospital Pricing: Separate and Unequal," *Health Care News*, September 1, 2003, available at [http://www.heartland.org/Article.cfm?artId=12775].

Although some hospitals and hospital associations have argued that some federal regulations prohibit hospitals from offering discounts and fee waivers on a case-by-case basis,<sup>34</sup> the Centers for Medicare and Medicaid Services (CMS) contends that no federal law prevents hospitals from reducing or waiving charges for an indigent uninsured patient so long as such reductions or waivers conform to the hospital's indigency policy. Moreover, the CMS Inspector General has stated that it is "highly unlikely" that hospitals that waived charges to indigent uninsured patients would run afoul of the federal anti-kickback statute.<sup>35</sup>

More detailed analysis of hospital charge and cost data shows that uninsured and self-pay patients are charged, when confronted with the full list price, on average, about 2½ times more than what insurers pay hospitals, and about three times Medicare-allowable costs.<sup>36</sup> The gap between what uninsured and self-pay patients pay and what insurers pay hospitals appears to have widened since the mid 1980s.

## How Does Hospital Price Dispersion Compare To Other Markets?

Chargemaster prices charged by different hospitals for the same procedure can vary wildly, as noted in **Figure 1** and **Figure 2**. Actual charges for specific procedures, which are generally lower than chargemaster prices, also vary widely, although information on them is unavailable. Chargemaster prices are nevertheless important, because they are prices billed to uninsured patients who do not have discounts, and are the starting point for discounted prices.

**Figure 3** shows the distribution of average charges per stay for normal vaginal birth for California hospitals in 2004, which aside from newborn care is the most common DRG.<sup>37</sup> (The discrete data are converted into a smoothed curve using a technique called kernel density estimation.) Average charges at the mode of the smoothed distribution lie between \$5,000 and \$10,000. The distribution has a fat right-hand tail, indicating more variation on the high side of charges than on the low side.

**Figure 4** shows average charges per stay by hospital for heart failure and shock in 2004. Unlike the conditions which occur at birth, heart attack victims have

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<sup>34</sup> Metropolitan Chicago Healthcare Council, Report of the Task Force on Charity Care and Collection Practices of the Illinois Hospitals Association and the Metropolitan Chicago Healthcare Council, September 11, 2003, available at [<http://www.pfho.org/HousingInitiatives03/charity%20care-hospitals.pdf>].

<sup>35</sup> Centers for Medicare and Medicaid Services, "Questions On Charges For The Uninsured," available at [[http://www.cms.hhs.gov/AcuteInpatientPPS/downloads/FAQ\\_Uninsured.pdf](http://www.cms.hhs.gov/AcuteInpatientPPS/downloads/FAQ_Uninsured.pdf)].

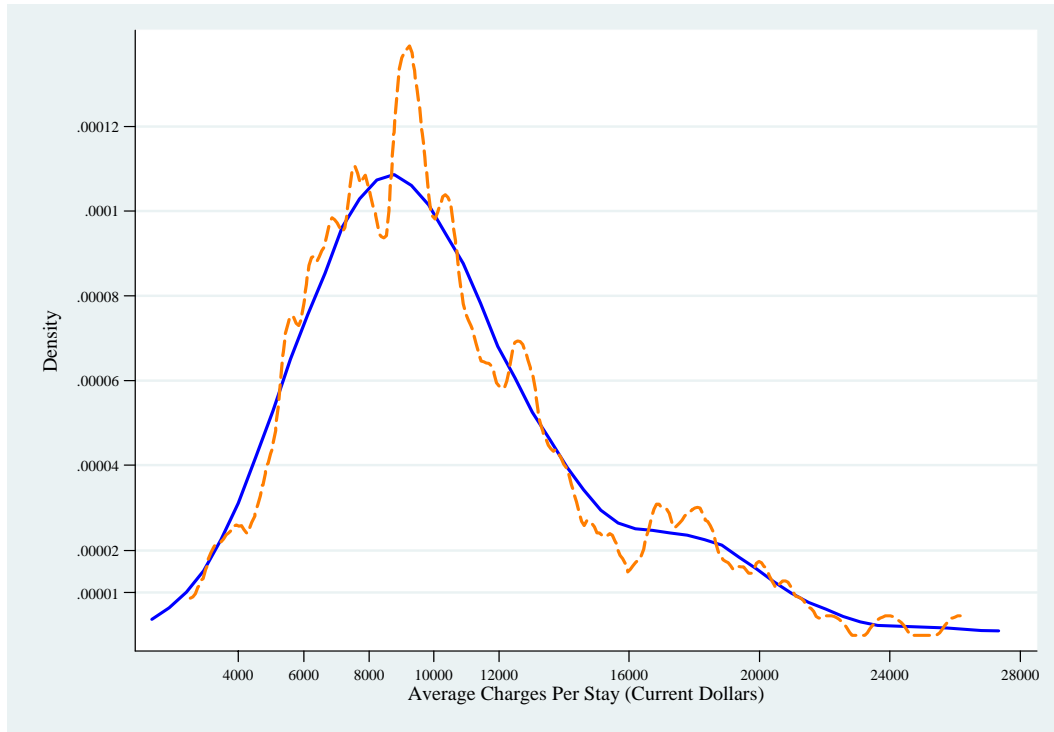
<sup>36</sup> Gerard F. Anderson, "From 'Soak The Rich' To 'Soak The Poor': Recent Trends In Hospital Pricing," *Health Affairs*, vol. 26, no. 3 (May/June 2007), pp. 780-789.

<sup>37</sup> Details of the California price transparency initiative are discussed below. Because of the way Kaiser-Permanente health plans are structured, Kaiser hospitals did not report charges and are therefore excluded from the analysis.



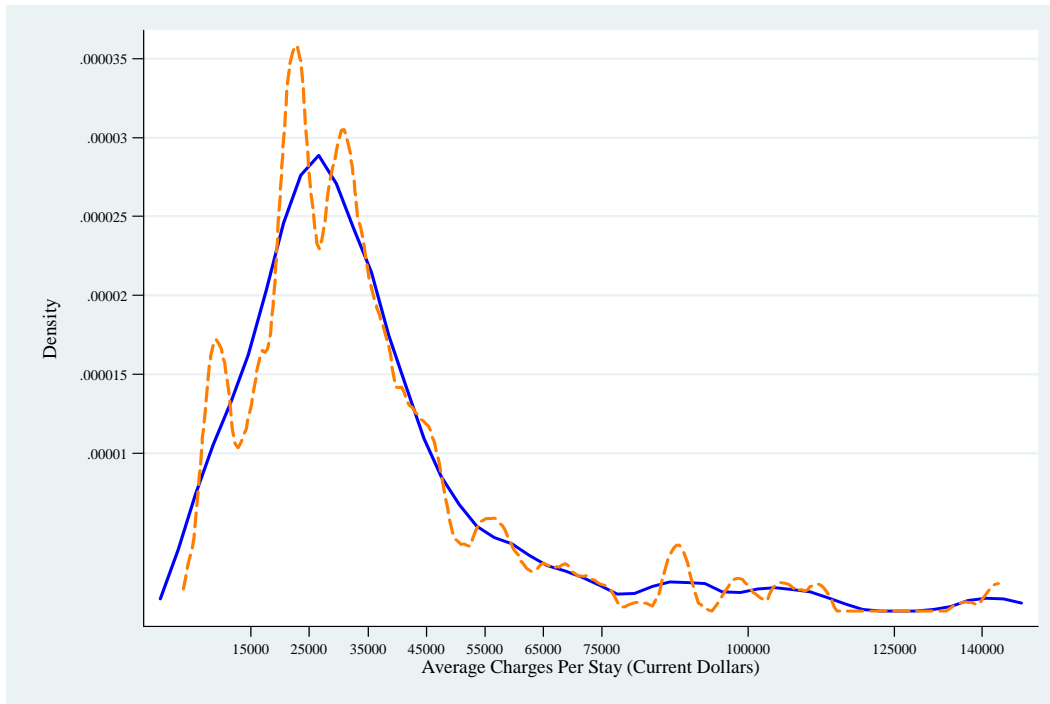
substantially less time to plan their hospital stay. Indeed, the typical heart attack victim has no time to select a hospital or to consult with his physician about treatment options. Further, because of variation in the time spent in hospitals, the variation of total charges per episode is much greater in the case of heart attacks, with a handful of hospitals having average charges above \$500,000.

**Figure 3. Distribution of Average Charges Per Stay for Normal Vaginal Birth**



**Source:** State of California, Office of Statewide Health Planning and Development, Healthcare Information Division. Data are smoothed using two related methods, one yielding the jagged line and the other the smooth line. Both lines represent kernel density estimates. For the jagged line the kernel halfwidth is set at \$300. For the smooth line the kernel halfwidth is set to minimize mean square error for Gaussian distributions. Unit of observation is the hospital.

**Figure 4. Distribution of Average Charges Per Stay for Heart Failure**



**Source:** See source for **Figure 3**. Dotted line represents kernel density estimator with halfwidth of \$1,500.

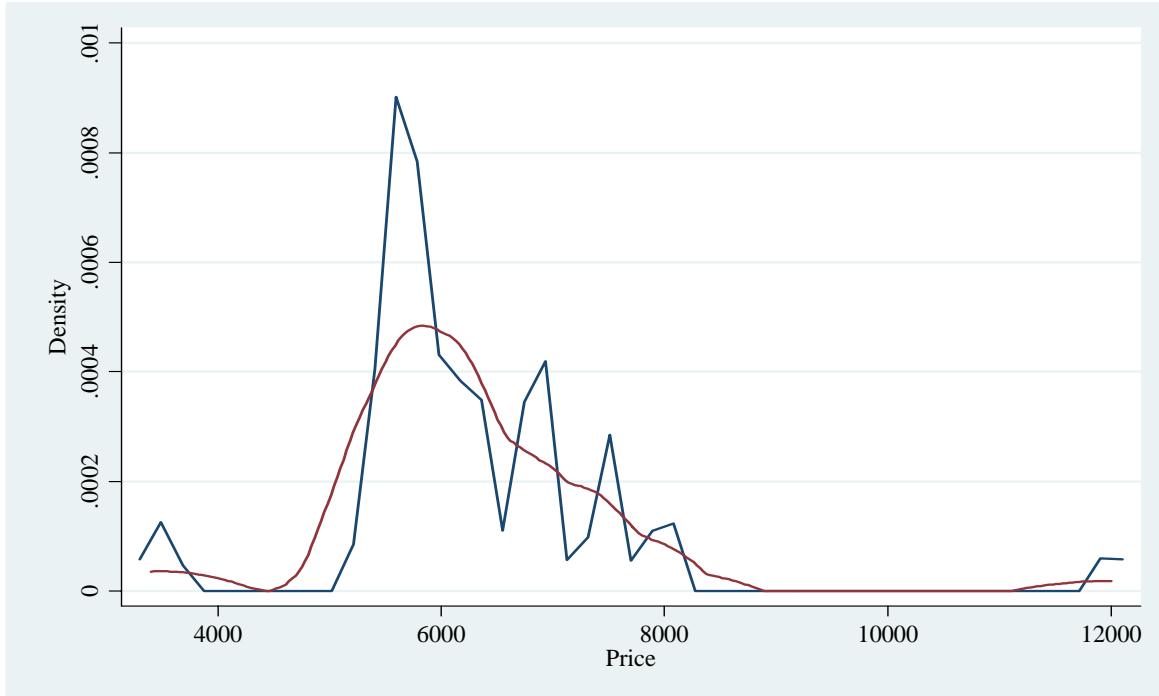
## Implications of Hospital Price Dispersion

Does evidence on the effects of price transparency in other markets, which by and large supports the view that better information on pricing reduces prices, imply that greater price transparency would affect health markets in the same way, despite the specific structures and characteristics of the health care market? Of course, how the examples are applied depends on how pricing information is provided. For example, allowing the public to examine charge books and data on actual average charges at a hospital's finance office provides more limited access than posting that information on the Internet. Additional information could be conveyed by providing information on the pricing of complete, but typical, procedures as well. (Selective reporting could provide opportunities for hospitals to game the system by lowering costs on the reported procedures and raising costs on others.) Even more information could be conveyed by also reporting prices for the different categories of patients (Medicare, Medicaid, uninsured, or insured by specific health plans).

One caution is that prices of goods commonly sold on the Internet also show substantial price variation, although the degree of price dispersion may be less than for average daily hospital charges. For example, **Figure 5** shows prices for a Samsung HP-R6372 high definition television found using two common Internet price search engines, Froogle.com and Pricescan.com. The mode of the smoothed distribution is slightly less than \$6,000, which is slightly less than the mode for daily average charges for normal vaginal birth. However, the right-hand tail of the distribution of TV prices is not nearly as fat as the distribution of average daily

charges for normal vaginal birth. (Note: horizontal scales differ for each figure.) Only one seller listed a price for the Samsung TV above \$8,000, and 37 of 47 sellers posted prices between \$5,500 and \$7,500. By contrast, 10 of 251 California hospitals charged more than \$9,000 per day and 33 charged less than \$3,000 per day.

**Figure 5. Price Distribution for a Samsung HP-R6372 HDTV**



**Source:** Searches conducted at [<http://www.froogle.com>] and [<http://www.pricescan.com>] on August 9, 2006. Price distributions smoothed using same methods as described in **Figure 3**.

A formal way of comparing variability of distributions with different averages is to compute coefficients of variation. **Table 3** presents statistical estimates of price variability for two of the most common types of hospital episode as well as for a similarly expensive consumer good, namely, a particular HDTV. The coefficient of variation is a dimension-free measure, and thus is an appropriate tool for comparing different distributions.<sup>38</sup> As expected, the coefficients of variation for average hospital charges for normal birth and for heart attacks are substantially greater than for the Samsung television.

The comparison of HDTV prices advertised by retailers and average charges per day for a given DRG is not an “apples-to-apples” comparison. Prices advertised by retailers do not necessarily represent actual sales prices. Posted prices on the Internet may vary considerably, even if prices at those websites that make most of the sales

<sup>38</sup> The coefficient of variation is the standard deviation divided by the mean (average). Among hospitals that reported charges for both procedures the coefficient of variation for charges per stay for Heart Failure and Shock (DRG 127) was 0.678 and 0.420 for Vaginal Delivery w/o Complicating Diagnoses (DRG 373).

vary less.<sup>39</sup> To the extent that most units are sold by sellers with prices near the minimum posted price, sales-weighted measures of price variability will be less than unweighted measures.

**Table 3. Variability of Average Hospital Charges and Samsung HDTV Prices**

		Average	Standard Deviation	Coefficient of Variation	N
Vaginal Delivery w/o Complicating Diagnoses	per day	\$5,280	\$1,933	0.366	242
	per stay	\$10,350	\$4,286	0.414	
Heart Failure and Shock	per day	\$5,696	\$3,451	0.606	393
	per stay	\$36,840	\$31,273	0.849	
Samsung HP-R6372 HDTV		\$6,254	\$1,253	0.200	47

**Source:** See preceding figures. Data are for 2005.

We checked whether combined average daily charges for mother and baby varied less than average charges for normal vaginal birth alone, which could occur if different hospitals allocated charges to mother and baby differently. The coefficient of variation for the sum of average daily charges for normal newborn and normal vaginal birth, however, was about the same (.356) as for normal birth alone (.366). The coefficient of variation for average stay charges for the sum of normal birth and normal newborn care (.416) was nearly the same as for normal birth alone (.414).

These illustrations are just examples of pricing variability and do not constitute a statistically valid universe. Nevertheless, they do indicate considerably more price variability for medical procedures than for an expensive consumer durable that might be expected to show much more variation than more frequently purchased commodities. They also show much more variation for an unanticipated procedure (heart failure) than for an anticipated one (birth). They are suggestive, therefore, of a considerable amount of price variability in hospital costs.

## Price Transparency Initiatives of Governments, Insurers, and Interest Groups

Several states have enacted regulations intended to enhance price transparency in the health sector in general, and hospital pricing in particular. Several private insurers also allow policyholders access to online tools that allow some price

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<sup>39</sup> Erik Brynjolfsson and Michael D. Smith, "Frictionless Commerce? A Comparison of Internet and Conventional Retailers," *Management Science*, vol. 46, April 2000, pp. 563-585.

comparisons for medical procedures.<sup>40</sup> California has required hospitals to provide a variety of pricing data to the public, discussed in more detail below. Average hospital charges per day and per stay for selected DRGs are available on state government websites sponsored by Arizona, California, Florida, Maryland, and Massachusetts.<sup>41</sup> Other states, such as Iowa, New Hampshire, and Wisconsin, in cooperation with state hospital associations, provide some pricing information.

Aetna has published price information for physicians and hospitals in the Cincinnati area, and recently extended this program to other parts of the country. Other insurers, including Cigna, Humana, United HealthCare, and Wellpoint have created websites that provide price comparison data for certain procedures.<sup>42</sup>

Hospitals also submit data to the Centers for Medicare and Medicaid Services (CMS), which compiles annual Medicare Cost Reports (MCR). The MCRs contain extensive information about hospitals' cost structures and finances. These reports, which are quite large and complex, are available for download on the CMS website. The website HospitalVictims.com provides cost data for individual hospitals derived from Medicare Cost Reports, suggesting that hospitals with high charge-to-cost ratios be avoided, or that the patient negotiate for a discount.<sup>43</sup> It suggests that a high charge-to-cost ratio is evidence of a significant amount of price discrimination and a likelihood that the uninsured patient will be charged a high price.

Initiatives to impose price transparency requirements on hospitals, such as allowing the public to inspect chargemaster data or have access to average daily charges data, were motivated in part by a desire to allow consumers to make informed choices about selecting hospitals. Better information on prices, according to this view, would increase competitive pressure on hospitals, slowing the growth of hospital prices and reducing price variability. These initiatives are relatively new and do not yet appear to have had significant effects on the level and dispersion of medical costs.

In August 2006, Executive Order 13410 called for greater transparency of quality and price information and for more widespread use of information technology in federal health care programs using compatible data standards.<sup>44</sup> The executive order also directed federal agencies to develop health care quality measurement

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<sup>40</sup> National Conference of State Legislatures, "State Legislation Relating to Disclosure of Hospital and Health Charges," April 2007, available at [<http://www.ncsl.org/programs/health/Transparency.htm#Table1>].

<sup>41</sup> The National Conference of State Legislatures has links to the state websites, along with many private insurers' websites: [<http://www.ncsl.org/programs/health/Transparency.htm>].

<sup>42</sup> Ibid.

<sup>43</sup> See [<http://www.hospitalvictims.com/>].

<sup>44</sup> Executive Order 13410, "*Promoting Quality and Efficient Health Care in Federal Government Administered or Sponsored Health Care Programs*," August 22, 2006. Additional information is available at the Department of Health and Human Services's "Value-Driven Health Care" website: [<http://www.hhs.gov/transparency/fourcornerstones/index.html>].

programs. The National Coordinator for Health Information Technology within the U.S. Department of Health and Human Services oversees these initiatives, although other offices also have major responsibilities.

The executive order directed federal agencies to “make available ... to the beneficiaries or enrollees of a Federal health care program (and at the option of the agency, to the public) the prices that it, its health insurance issuers, or its health insurance plans pay for procedures to providers.” It was reported that the Bush administration earlier in 2006 declined to release Medicare claims data to the Business Roundtable, which had requested them.<sup>45</sup> The Business Roundtable is an association of chief executives of very large corporations. Whether the order signifies a change in policy or there was another reason for not releasing these data remains unclear.

The effects of the executive order on pricing information are unknown, including how widely available the information is, since the implementation of the order is in its early stages. But it is an example of another government initiative to provide more information about pricing.

In some areas, the initiatives outlined by the Executive Order parallel ongoing efforts. Several federal agencies have already taken some measures to provide federal health care users with better price and quality information. For example, the Federal Employees Health Benefit Program (FEHBP) provides a website that compares premiums, plan details, and customer satisfaction measures for all plans.<sup>46</sup> Changes made in response to the order appear minor.<sup>47</sup> CMS (Centers for Medicare and Medicaid Services) now publishes summarized inpatient price data for the 30 most common elective DRGs for individual hospitals. These data are taken from Medicare Provider Analysis and Review (MEDPAR) data, which has been collected since 1991. However, locating this information on the CMS website may be difficult for consumers since the website covers a range of material.<sup>48</sup>

Medicare’s “Hospital Compare” website, accessed via the Medicare.gov site, allows beneficiaries to see data that compares how closely different health care providers follow accepted treatment protocols.<sup>49</sup> Whether such initiatives give consumers enough relevant information in an easily accessible way, whether patients and their families would be able to locate such information, and whether such information would motivate patients to make major changes in their treatment plans is unclear. One consulting firm concluded that while a previous version of the Hospital Compare website “does an average job of presenting the quality information, it lacks the robust data found in commercially available products and

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<sup>45</sup> Robert Pear, “Employers Push White House to Disclose Medicare Data,” *New York Times*, April 11, 2006.

<sup>46</sup> [<http://www.opm.gov/insure/health/>]

<sup>47</sup> The Office of Personnel Management’s efforts to implement these initiatives are described on its website, available at [<http://www.opm.gov/insure/health/executiveorder.asp>].

<sup>48</sup> [[http://www.cms.hhs.gov/HealthCareConInit/02\\_Hospital.asp#TopOfPage](http://www.cms.hhs.gov/HealthCareConInit/02_Hospital.asp#TopOfPage)]

<sup>49</sup> [[http://www.cms.hhs.gov/HospitalQualityInits/25\\_HospitalCompare.asp](http://www.cms.hhs.gov/HospitalQualityInits/25_HospitalCompare.asp)]

leaves consumers fumbling with insufficient help.”<sup>50</sup> In June 2007 a redesigned HospitalCompare website was launched that allows limited comparisons of hospital mortality rates for heart failure and heart attacks with national mortality rates.<sup>51</sup> However, nearly all hospitals were judged to have mortality rates “no different than the U.S. national rate.” Out of almost 4,500 hospitals, only 17 were recognized as “above average” in treating heart attacks and only seven were rated “below average.”<sup>52</sup>

On the other hand, more information about health care provider quality and pricing is becoming available on the Internet, and these sources will continue to evolve. A major review of information available on websites that provide hospital price and quality information expressed concern that some consumers might be confused rather than enlightened by the reported data, but also noted that momentum continues to build for making health care data more easily available to consumers.<sup>53</sup>

The following section of this report presents an analysis of the California price transparency initiative’s effect on the dispersion of hospital prices.

## Does Price Transparency Reduce Price Variability? Some Preliminary Results

The California hospital price transparency initiative, according to analysis of available data, has had negligible or no observable effect on hospital prices.

In September 2003, California legislators passed Assembly Bill 1627,<sup>54</sup> which required hospitals (except for certain small and rural hospitals) to make chargemaster data public by July 1, 2004, either in electronic form or by allowing onsite inspection.<sup>55</sup> Sponsors of this bill contended that these reporting requirements would

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<sup>50</sup> Katy Henrickson, Hospital Comparison Tools Scorecard Summary: Centers For Medicare And Medicaid Services: Key Findings From “The Forrester Wave: Hospital Comparison Tools, Q4 2005,” October 13, 2005, available at [<http://www.forrester.com/Research/Document/Excerpt/0,7211,37929,00.html>].

<sup>51</sup> Hospital Quality Alliance, “HQA Adds Enhanced Hospital Quality Information to ‘Hospital Compare’ Web Site,” June 22, 2007, available at [[http://www.fah.org/issues/quality\\_initiative/HQA%20Adds%20Enhanced%20Hospital%20Quality%20Information%20to%20Hospital%20Compare%20Web%20Site.pdf](http://www.fah.org/issues/quality_initiative/HQA%20Adds%20Enhanced%20Hospital%20Quality%20Information%20to%20Hospital%20Compare%20Web%20Site.pdf)].

<sup>52</sup> Michael S. Gerber, “Hospitals Are Beyond Compare: Data on Cardiac Care Show Almost No Differences Nationwide,” *Washington Post*, July 3, 2007.

<sup>53</sup> Delmarva Foundation, *The State-of-the-Art of Online Hospital Public Reporting: A Review of Fifty-One Websites*, Report Prepared for the CMS Hospital Three State Pilot Project, July 2005. Available at [[http://www.delmarvafoundation.org/newsAndPublications/pressReleases/2005/08\\_18\\_05.pdf](http://www.delmarvafoundation.org/newsAndPublications/pressReleases/2005/08_18_05.pdf)].

<sup>54</sup> Helen Sanderson, “Cost of Care: New Law Lets Patients Examine Hospital Price Lists,” *North Coast Weekly*, August 11, 2005, available at [<http://www.northcoastjournal.com/081105/cover0811.html>].

<sup>55</sup> The *Wall Street Journal* article, referenced in **Figure 1** above, was based on these (continued...)

prevent hospitals from “gouging” customers and would make patients into better-informed consumers.<sup>56</sup> In July 2005, hospitals had to begin submitting chargemaster data to the Office of Statewide Health Planning and Development Healthcare Quality & Analysis Division (OSHQP). In 2004 and 2005, hospitals also had to list charges for 25 common services or procedures. In 2006, hospitals were required to submit data on average charges for 25 common diagnosis-related groups (DRGs). The state of California makes these data available online.

If patients became better-informed customers, most economists would expect that hospitals that raised their prices more would lose patients, unless there were offsetting increases in the quality of medical care or level of amenity.<sup>57</sup> That is, if customers are sensitive to and aware of prices, increases in hospital prices would be negatively related to changes in hospital admissions, other things equal.

If consumers were becoming more sensitive to price as a result of greater price transparency, then one might expect to see stronger effects for procedures for which patients can plan ahead. Expectant mothers planning for a normal vaginal birth can compare what various hospitals have to offer and their prices, unlike victims of sudden medical emergencies. **Figure 6** shows the distribution of average daily charges (adjusted for general inflation) for normal vaginal birth at California hospitals in 2003, 2004, 2005, and 2006. Over this time period, the modal (i.e., most frequent) nominal price drifts upwards because average daily charges have been rising faster than the general price level. The distribution of prices shows no signs of convergence.<sup>58</sup>

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<sup>55</sup> (...continued)

chargemaster data. For further details on these requirements, see the State of California’s Office of Statewide Health Planning and Development Healthcare Information Division’s website at [<http://www.oshpd.ca.gov/HID/Products/Hospitals/Chrgmstr/FAQ.html#Q2>].

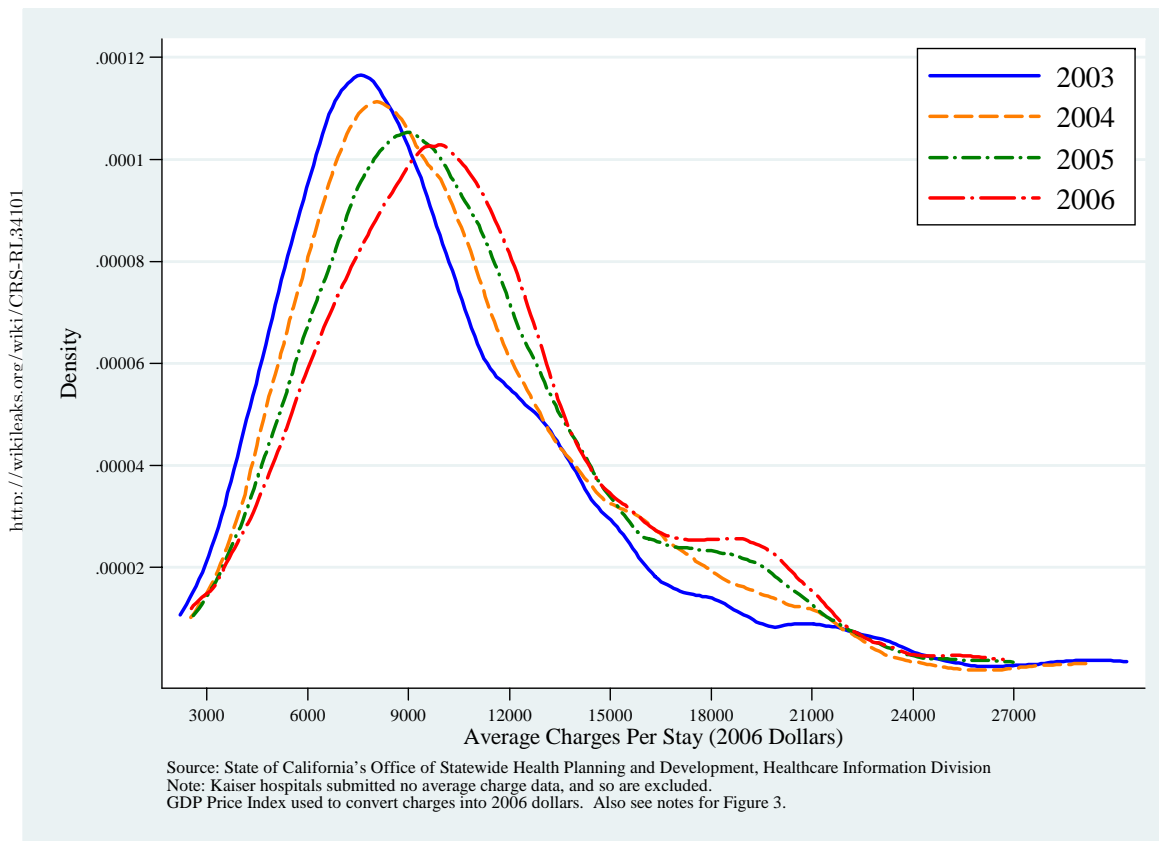
<sup>56</sup> California State Assembly, “Bill Analysis for Assembly Bill 1627,” available at [[http://info.sen.ca.gov/pub/03-04/bill/asm/ab\\_1601-1650/ab\\_1627\\_cfa\\_20030527\\_173625\\_asm\\_floor.html](http://info.sen.ca.gov/pub/03-04/bill/asm/ab_1601-1650/ab_1627_cfa_20030527_173625_asm_floor.html)]

<sup>57</sup> This also presumes that demand factors, such as demographics and income, were held constant. Changes in these factors over the period analyzed here are likely small relative to changes in hospital prices.

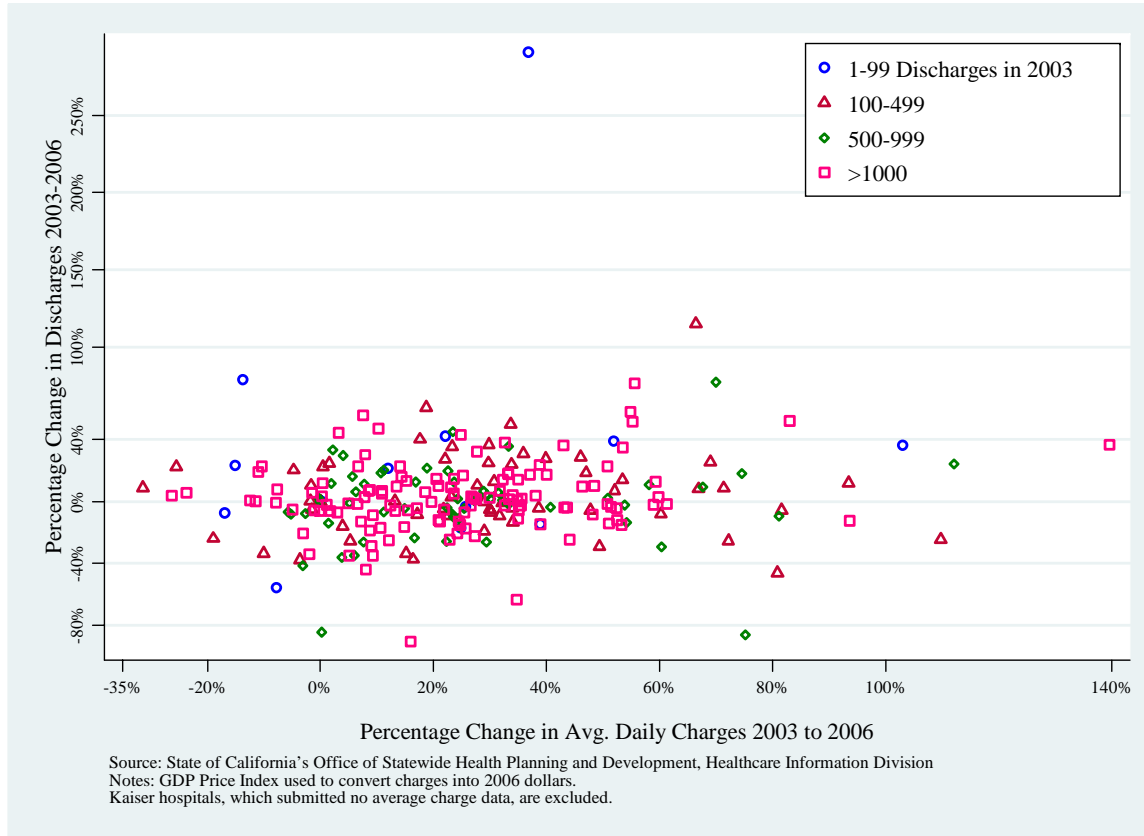
<sup>58</sup> The same analysis was performed for average charges per stay, rather than average daily charges. The results were nearly identical.



**Figure 6. Distribution of Average Charges Per Stay For Normal Birth, 2003-2006**



**Figure 7. Scatter Plot for Changes in Avg. Daily Charges and Discharges for Normal Birth (DRG 373)**



**Source:** State of California's Office of Statewide Health Planning and Development, Healthcare Information Division.

Hospitals that had increased average daily charges for normal vaginal birth, on average, did not lose patients. **Figure 7** (above) presents a scatter plot with percentage change in hospital discharges on the vertical axis and percentage change in average daily charges on the horizontal axis. Different plotting symbols divide hospitals into four categories defined by the number of (normal) births in 2003. If expectant mothers avoided hospitals that raised their prices, then a downward-sloping relationship would be evident between the two variables. Regression analysis shows a statistically significant, albeit small, positive relationship between changes in average charges and changes in hospital volume for normal births over the 2003-2006 period.<sup>59</sup>

Several explanations are possible for the lack of a discernable relationship between changes in average charges and changes in hospital volume. Differences in perceived quality or care or amenity levels may matter more than price for many patients, especially if insurance coverage insulates them from prices. Patients' relationships with their physicians and those physicians' relationships with hospitals might reduce patients' sensitivity to hospital prices. Alternatively, patients may care about prices, but might be unable, unwilling, or disinclined to examine online price data. Finally, changes in prices might correlate to offsetting changes in quality or amenity levels. Distinguishing among these explanations would require more sophisticated data. However, the available evidence, while preliminary, suggests that the California price transparency initiative so far has had little observable effect where it might have been expected to have the greatest effect.

## How Would Greater Price Transparency Affect the Health Care Sector?

The experience of the Danish Competition Authority, noted above (in the section titled Empirical Evidence on the Effects of Price Transparency), suggests that imposing price transparency in negotiations between sellers and buyers of intermediate goods does not necessarily lead to sharpened competition or lower prices. At the same time, some evidence suggests that information about the process of setting prices, including practices of price discrimination, may produce a change in pricing, as in the NASDAQ and Amazon cases. Much of the remaining evidence also suggests that transparency lowers prices and makes them more uniform.

The evidence cited on price transparency involves two types of effects: a response through publicity effects and a response through normal market mechanisms. The price discrimination that occurs in hospitals — brought about partly by government policies with respect to Medicare and Medicaid, partly due to bargaining power of insurance companies (and the desire to set high list prices to

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<sup>59</sup> One outlier was excluded. An indicator variable for Tenet Healthcare hospitals, which Bill 1627's sponsors claimed had aggressively sought to increase hospital prices, was statistically insignificant. Regression results available upon request.

leave room for discounting),<sup>60</sup> and partly through providing free care for the indigent — leads to potentially high prices for a small segment of uninsured individuals. As more of these pricing differences are revealed and spotlighted, public opinion might force a reduction in cross subsidies (charging some patients higher prices to cover the costs not fully applied to other patients).<sup>61</sup> Indeed, such a response has already occurred. An example is the case of the state of Minnesota, which entered into a voluntary agreement with most of its hospitals to limit the charges for uninsured patients. Under the agreement, uninsured patients with \$125,000 or less in annual income would pay no more than the amount paid for the procedure by the private insurance company that provided the greatest amount of the hospital's revenue.<sup>62</sup>

The Minnesota example suggests that publicity can affect pricing. What about the effects through normal market mechanisms? The survey of evidence included cases where price transparency did not affect prices, or in some instances, led to higher prices. In addition, many of the studies analyzed goods that lack the special characteristics of health care. These shortcomings do not, however, necessarily mean that price transparency in the health sector would not be beneficial.

First, the ready-mix concrete example, in which price information resulted in higher prices also involved for-profit businesses, which presumably were attempting to maximize profits. This example may not apply to many hospitals that are non-profit and may have different behavioral responses.<sup>63</sup>

Second, the evidence from the advertising studies includes not only simple uniform goods such as alcoholic beverages and gasoline, but complex differentiated products such as vision exams, where quality matters. And while insurance pays

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<sup>60</sup> See the discussion in Lucette Lagnado, "California Hospitals Open Books, Showing Huge Price Differences," *Wall Street Journal*, December 27, 2004, p. A1.

<sup>61</sup> Cross subsidies are intra-firm transfers that support some activities or lines of business using net revenues earned in other activities or lines of business.

<sup>62</sup> Minnesota Hospital Association and Office of Minnesota Attorney General Mike Hatch, "Hospitals Step Forward to Sign Voluntary Agreement with Attorney General's Office on Billing and Collection Practices," June 2, 2005.

<sup>63</sup> Objectives of not-for-profit hospitals are an important area of research in health economics, and although there has been a presumption that any surplus might be used for charitable care, evidence on that issue is mixed. While providing a complete review is beyond the scope of this report, see for example, Richard G. Frank and David S. Salkever, "The Supply of Charitable Services by Nonprofit Hospitals: Motives and Market Structure," *RAND Journal of Economics*, vol. 22, autumn 1991, pp. 430-440; and Edward C. Norton and Douglas O. Staiger, "How Hospital Ownership Affects Access to Care for the Uninsured," *RAND Journal of Economics*, vol. 25, spring 1994, pp. 171-185. Mark Pauly once described hospitals as "doctors' workshops," whose decisions were made with an eye to maximizing the welfare of physicians. Since that time hospital administrators reportedly have become more professional and more powerful. See Mark Pauly, *Doctors and Their Workshops: Economic Models of Physician Behavior*, (Chicago: Univ. of Chicago Press, 1980). In any case, non-profits' objectives may differ from those of for-profit firms. Some evidence suggests that non-profits maximize output or revenues; e.g., Richard Steinberg, "The Revealed Objective Functions of Non Profit Firms," *RAND Journal of Economics*, vol. 17, winter 1986, pp. 508-526.

much of the cost of medical care, the studies summarized above also included examples of price reductions for prescription drugs after direct advertising to consumers, whose prices are also subject to third party payment.<sup>64</sup> In these cases as well, the evidence suggests that prices fell after advertising was permitted, without deterioration in quality.

Third, evidence from the Internet suggested that price comparison sites may help reduce commodity prices, including differentiated commodities that are subject to bargaining (automobiles). Over time, price comparison websites have become more sophisticated and are playing an increasingly important role in consumer behavior in many markets.

## Internet Price Comparison Sites

The Internet has begun to affect the availability of price information in the health care sector, although this does not appear to have influenced a large proportion of consumers. According to the *New York Times*, 32 states require hospitals to publish price information.<sup>65</sup> Some new websites provide consumers with data on health care costs. For example, Vimo [<http://www.vimo.com>] provides information on average list prices and average negotiated prices charged by hospitals for specific procedures. One company, My Medical Control, provides a negotiation service for consumers through its website [<http://www.mymedicalcontrol.com>]. A consumer forwards a bill, via the website, to a claims adjuster who negotiates a reduced rate with the provider. This company then deducts a 35% fee and returns the remainder to the consumer. At present, such websites have little observable effect on health care markets. In the future, however, such sites could have large effects.

The Carol.com website allows consumers to compare prices and offerings of health providers in the Twin Cities region of Minnesota, and in addition it allows them to book services. The intention of the website's creators is to follow the example of web-based booking services such as Expedia.com, which have transformed the travel industry in the past decade. Many state governments have opened their own sites that allow consumers to compare prices or provider characteristics.<sup>66</sup>

The effect of information on quality is much more difficult to obtain, and it is hard to make a judgment based on the available evidence. As noted above, the United Network for Organ Sharing publishes risk-adjusted outcome data on its website [<http://www.unos.org>]. Some other organizations, also noted above, also publish some data reflecting quality of health care.

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<sup>64</sup> John F. Cady, "An Estimate of the Price Effects of Restrictions on Drug Advertising," *Economic Inquiry*, vol. 44, December 1976, pp. 493-510; Steven W. Kopp, "Direct-To-Consumer Advertising and Consumer Prescription Prices," *Drug Information Journal*, vol. 30, 1996, pp. 59-65.

<sup>65</sup> Michael Mason, "Bargaining Down That CT Scan Is Suddenly Possible," *New York Times*, February 27, 2007.

<sup>66</sup> Many of the state government health comparison and information sites are listed at [[http://www.healthtransformation.net/cs/leading\\_examples](http://www.healthtransformation.net/cs/leading_examples)].

## Will the Health Sector Change Like Other Industries?

One of the most important differences between hospital care and other commodities is that typically patients pick physicians and physicians pick hospitals. Although this characteristic means that direct consumer pressure to hold down prices (or at least have a sensible pricing system) is more difficult, it does not mean that physicians would not become more sensitive to differences in costs among various hospitals on behalf of their patients, particularly if their patients raise questions about these costs. Not everyone in a market is required to be attentive to price for pressure to be exerted at the margin. Moreover, publicity about price differentials may result in voluntary compliance by hospitals. Nevertheless, this aspect of the delivery of hospital services makes it more difficult to apply evidence from other markets to the expected outcome of introducing more price transparency in health care markets.

Changes in the airline industry might provide some insight into how increased price transparency and competition could affect the hospital industry. While the air travel and hospital industries have important structural differences, airlines, like hospitals, have high fixed costs and offer a non-storable product. Before the Airline Deregulation Act of 1978 (P.L. 95-504), airlines competed largely on the basis of amenity levels rather than on price. The Airline Deregulation Act restricted the Civil Aviation Board's price administration powers, and led to the abolition of the board in 1984. After deregulation, several new airlines entered the market, while several major airlines went bankrupt and exited the market. Increasing competitive pressure led airline companies to cut back amenities to passengers and led to contentious negotiations with labor unions that resulted in sharply reduced wages in many cases.<sup>67</sup> Employees with highly specialized skills, such as pilots and mechanics, appeared to fare better in resisting wage and salary reductions compared to other employees. Air service to some small cities, supported by implicit cross subsidies, ceased, while service to some other small cities expanded, in part because some airlines found ways to serve such markets at lower cost. Lower fares (in real terms) led to an enormous expansion in air travel and increases in air travel employment. Some relatively new airlines, such as Southwest Airlines, prospered and expanded, while other airlines struggled, including several major carriers that declared bankruptcy.

Were price transparency to improve, and if consumer choice in health care were to become more sensitive to price differentials, then economic analysis would suggest that these effects would increase pressure on hospitals to become more productively efficient, that is, to use fewer inputs to produce the same or greater output. Cost-cutting measures would put pressure on health sector salaries and wages, which some occupational groups would resist more successfully than others. Services, such as indigent care, now in part supported by implicit cross subsidies, could face cutbacks unless direct subsidies to support such services were increased. Innovative providers, however, may find ways to expand access to health care by the indigent using more efficient and cheaper methods. Some prices might fall, along with amenity levels. Lower prices, in turn, could expand access to health care, and

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<sup>67</sup> U.S. Government Accountability Office, *Airline Deregulation: Reregulating the Airline Industry Would Likely Reverse Consumer Benefits and Not Save Airline Pensions*, GAO-06-630, June 2006.

to the extent that demand for medical procedures is sensitive to price, could expand the volume of medical services provided. Some existing health care providers, especially those unable to change their cost structures and operating procedures quickly, would be at a comparative disadvantage to more nimble providers. Such changes would produce both winners and losers, just as airline deregulation produced winners and losers. Increased price transparency, however, to the extent that it allowed health care markets to function more efficiently, would be expected to generate more gains than losses.

## Appendix: Review of Empirical Studies on Price Transparency

### Pricing Reforms in Financial Markets

The effects of price transparency on how financial markets function depend on how those markets are set up. Financial exchanges are structured as auction markets or dealer markets.<sup>68</sup> In an auction market, such as the New York Stock Exchange (NYSE), investors send orders to a specialist, who coordinates trading for a particular stock. Investors can send market orders, which are to be executed immediately for the best possible price, or limit orders, which instruct a broker to buy a stock at a set price or to sell a stock at a set price. The specialist executes market orders by matching them with orders from the other side of the market, or by buying or selling on his own account. Limit orders that are not executed are entered into the specialist's order book. In a dealer market, such as NASDAQ, orders for a particular stock flow to market makers who then post bids (i.e., prices at which buyers are willing to trade) with asks (i.e., prices at which sellers are willing to trade) via an electronic market. In NASDAQ each stock must have at least two market makers, and for major stocks there may be 30 or more market makers.

Price transparency can mean several things in financial markets. The most basic form of price transparency is the timely reporting of executed trades. A second form of transparency is information about outstanding limit orders listed in a specialist's order book. Order book information can signal impending price movements, and a trader with special knowledge about outstanding orders can make profits. For example, an order book with many buy orders just above the market price and very few sell orders may signal that the market price is about to rise, and a specialist who buys before that rise occurs will reap profits. A third form of transparency concerns information about how dealers or specialists handle orders. A dealer often has some discretion in how and when orders are executed and may sometimes exploit that discretion to earn profits at the expense of the investor who placed the order.

Past NASDAQ pricing practices illustrate the importance of the third form of price transparency. In 1994, William Christie and Paul Schultz, two Vanderbilt University financial economists, noticed that NASDAQ dealers almost never quoted prices using odd eighths (i.e.,  $1/8$ ,  $3/8$ ,  $5/8$ , and  $7/8$ ) for many high-volume stocks of companies such as Microsoft, Intel, and Apple. This practice effectively created a quarter dollar minimum spread between sellers' asks and buyers' bids, which increased the trading profits of dealers. The day after these economists issued a press release about their findings the practice was abandoned, and spreads for several major stocks fell by about half.<sup>69</sup>

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<sup>68</sup> For a more detailed description of the structure of modern financial markets, see Hans R. Stoll, "Electronic Trading in Stock Markets," *Journal of Economic Perspectives*, vol. 20, no. 1 (winter 2006), pp. 153-174.

<sup>69</sup> William H. Christie and Paul H. Schultz, "Did NASDAQ Market Makers Implicitly Collude?," *Journal of Economic Perspectives*, vol. 9, summer 1995, pp. 199-208. The U.S.

(continued...)



Economists often argued that collusion is difficult or impossible with large numbers of traders. A more careful argument is that collusion depends on the ability to make explicit or implicit agreements, and maintaining agreements may be more difficult for larger groups. Should a large group of sellers collude, each seller has strong incentive to increase his or her market share by making small reductions in price. If a seller can reduce its price and increase sales without other sellers noticing, then it will reap extra profits. For example, many members of the Organization of Petroleum Exporting Countries (OPEC) have been suspected of making hidden side deals which allow them to sell more oil than their OPEC quotas specify, which may have led to softened oil prices.

In the case of NASDAQ, it appears that a very simple rule — no trading on odd eighths — created artificially high trading spreads, which allowed dealers to reap higher profits. Young traders reportedly were cautioned not to narrow inside spreads by using odd-eighths, and traders who violated the no-odd-eighths convention may have been subject to intimidation or isolation. In addition, securities dealers rely on trades with other dealers to rebalance their inventories of stocks in order to minimize financial risks associated with sudden price movements. If other dealers refused to trade with a dealer who violated the pricing convention, then that dealer would be exposed to higher levels of financial risk. Furthermore, the practice of “preferencing” among NASDAQ dealers, which involves guaranteeing flows of orders to preferred dealers or dealer subsidiaries, meant that order flows were less sensitive to spreads. A dealer who violated the pricing convention in order to attract order flow would therefore gain little additional market share because of existing “preferencing” arrangements, which in turn reduced incentives for dealers to compete by narrowing spreads.

While no evidence was found that this pricing convention was the result of an explicit collusive agreement, that convention enhanced traders’ profits for many years.<sup>70</sup> While investors and regulators were not aware this pricing convention existed, transparency of dealers’ prices, which were visible on trading monitors, made enforcement of the pricing convention possible. All other dealers could immediately observe if any dealer violated the no-odd-eighths convention.

While prices of stocks and other equities are publicly published, bond prices are less transparent, which has put small investors at a distinct disadvantage relative to large trading institutions. Trading of stocks is highly centralized, but except for U.S.

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<sup>69</sup> (...continued)

Department of Justice (DOJ) concluded that the even-eighths convention was “vigorously enforced through industry-wide peer pressure, and intimidating telephone calls to, and refusals to deal with, market makers who did not quote bid and ask prices in conformance with the convention.” See the DOJ “Competitive Impact Statement,” *U.S. v. Alex Brown & Sons Inc., et al.*, U.S. District Court for the Southern District of New York, pp. 16-17. Also see U.S. General Accounting Office, *Security Market Operations: The Effects of SOES on the Nasdaq Market*, GAO/GGD-98-194, August 1998.

<sup>70</sup> *Ibid.*

Treasury securities, most bond trading occurs “over the counter.”<sup>71</sup> In the past decade transparency of bond prices has improved. In particular, the Trade Reporting and Compliance Engine (TRACE), which was launched by the National Association of Security Dealers (NASD) in July 2002, reports bond trades within 15 minutes, and covers a large portion of the fixed income and bond market.<sup>72</sup> Before the introduction of TRACE, some argued that improved transparency of prices would come at the cost of reduced market liquidity, meaning that some large bondholders or dealers would trade less frequently in order to protect proprietary pricing information. However, the expansion of trading volume has improved or maintained market liquidity.<sup>73</sup>

Because large traders may gain some proprietary advantage from keeping the traded prices of bonds hidden, the advance of bond price transparency has been slow. The European Union’s “Markets in Financial Instruments Directive,” which comes into force November 1, 2007, requires traders to provide real-time trading data for a wide range of financial instruments and markets.

Finance researchers contributing to the new “market microstructure” literature have taken several approaches to analyzing the effects of price transparency. The market microstructure approach looks at how individual traders act in financial markets.<sup>74</sup> In addition to the well-known Christie and Schultz work on NASDAQ, other research has found other ways to examine the effects of price transparency. An electronic communications network named Island discontinued displaying limit order data in three exchange-traded funds (ETFs) in which it played a dominant role from September 2002 to the end of October 2003 rather than comply with a regulatory mandate. During this time period ETF prices adjusted less quickly and trading costs rose. When Island resumed displaying limit order data, trading costs fell.<sup>75</sup> Another study compared trades before, during, and after the regular trading day to examine the effects of price transparency. Trades made during the regular trading day are immediately reported and available to all investors. Much less information is available about trades that occur before or after regular hours, and because trade

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<sup>71</sup> Testimony of Vanguard Group Principal Christopher M. Ryon, in U.S. Congress, Senate Committee on Banking, Housing, and Urban Affairs, “An Overview of the Regulation of the Bond Markets,” hearings, 108<sup>th</sup> Cong., 2<sup>nd</sup> sess., June 17, 2004.

<sup>72</sup> Annette L. Nazareth, SEC Commissioner, “Remarks Before the TBMA Legal and Compliance Conference,” U.S. Securities and Exchange Commission, New York, New York, February 7, 2006.

<sup>73</sup> M. Goldstein, E. Hotchkiss, and E. Sirri, “Transparency and Liquidity: A Controlled Experiment on Corporate Bonds,” Babson College working paper, 2005, available at [[http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=686324](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=686324)].

<sup>74</sup> For surveys of the market microstructure literature, see Bruno Biais, Larry Glosten, and Chester Spatt, “The Microstructure of Stock Markets,” Institut d’Économie Industrielle (IDEI) working paper #253, Toulouse, France, May 28, 2004; and Ananth Madhavan, “Market Microstructure: A Survey,” *Journal of Financial Markets*, vol. 3, no. 3, August 2000, pp. 205-258.

<sup>75</sup> Terrence Hendershott and Charles M. Jones, “Island Goes Dark: Transparency, Fragmentation, and Regulation,” *Review of Financial Studies*, vol. 18, no. 3, 2005, pp. 743-793.

volumes are much smaller, there are fewer prices to report. Barclay and Hendershott found that prices are more volatile after hours, suggesting that pre-open and after-close markets are less efficient than markets during regular trading hours.<sup>76</sup>

In some cases existing firms have beat back efforts to improve transparency in order to keep a strategic advantage over would-be entrants. For instance, following Mexico's 1994 financial crisis the World Bank sought to create a credit registry, which would list all assets pledged as collateral by borrowers.<sup>77</sup> A credit registry allows any lender to see what a loan applicant has already pledged in collateral, thus giving potential lenders a better opportunity to price risk. Incumbent banks strongly opposed creation of the registry because they could already obtain information about lenders, while less established lenders could not. Although a credit registry would have expanded and strengthened Mexico's financial system, it was thwarted by banks who feared a more competitive environment.

### **“Dynamic Pricing” at Amazon.com**

The Internet seller Amazon.com's “dynamic pricing” experiment illustrates how marketing strategies can affect prices and create a consumer backlash. Dynamic pricing is a term that has come to be used to refer to a particular type of price discrimination. Price discrimination usually takes the form of sorting customers into groups with different price sensitivity based on their purchasing behavior.<sup>78</sup> For instance, for airline fares a Saturday night stay-over requirement separates price-insensitive business travelers from price-sensitive tourists. Price discrimination typically raises prices for some groups and lowers them for others. In 2000, two episodes of differential pricing by Amazon were publicized; the second episode involved the sale of DVDs. Amazon, according to reports, used characteristics gathered about individual customers from the Internet itself (such as whether a customer was new to the site, what browser the customer was using and past purchases, etc.) to charge different prices to different individuals.

Amazon stated that it was simply conducting tests, but nevertheless apologized and promised not to do it again.<sup>79</sup> The same availability of information that permits individualized pricing also makes it much easier to expose such price differentials, as occurred with the Amazon case. Once this strategy was publicized, the protests

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<sup>76</sup> Michael J. Barclay and Terrence Hendershott, “Price Discovery and Trading After Hours,” *Review of Financial Studies*, vol. 16, winter 2003, pp. 1041-1073.

<sup>77</sup> Raghuram G. Rajan and Luigi Zingales, “The Road to Prosperity: Saving Capitalism from Capitalists,” *World Bank Transition Newsletter* vol. 14, July/August/September 2003, pp. 1-3.

<sup>78</sup> The Robinson-Patman Act (15 U.S.C. §13) prohibits some forms of price discrimination for the purpose of destroying competition. Many lawyers, however, consider it difficult to win cases based on this act. The U.S. Supreme Court (*FTC v. Ruberoid Co.*, 343 U.S. 470, 72 S. Ct. 800, 96 L. Ed. 1081 [1952]) contended that the language of the act was “complicated and vague in itself and even more so in its context.”

<sup>79</sup> This event has been discussed in many articles; see, for example, David Streitfeld, “On the Web, Price Tags Blur,” *Washington Post*, September 27, 2000, p. A01.

led Amazon to cease the pricing variations and apologize. This example illustrates that a consumer backlash against differential pricing affected pricing behavior and provides evidence that people generally disapprove of price discrimination based on individual characteristics.<sup>80</sup>

### **Ready-Mixed Concrete: Intermediate Markets May Run Differently**

Antitrust authorities and consumer groups have often advocated price transparency on the grounds that consumers could more easily make comparisons among sellers, which would sharpen competition among sellers. Competition generally leads to greater efficiency and lower prices. Price transparency, however, can change the workings of markets in unexpected ways, which can lead to higher prices. For example, in 1993, the Danish Competition Authority required that all ready-mixed concrete contracts be made public, which it hoped would stimulate greater competition. Instead, average prices rose by 15%-20% and other factors such as changing demand conditions played no discernable effect.<sup>81</sup>

There are two possible explanations for this unexpected increase in prices. First, public prices make collusion among sellers easier. Rivals can observe sellers who undercut their competitors, who may be able to mete out punishments in various ways. Second, price transparency may alter the strategic incentives of sellers, inducing them to become tougher bargainers. Hviid and Møllgaard, motivated by the Danish concrete case, developed a model in which different buyers negotiate with a seller of an intermediate good.<sup>82</sup> Some buyers are better informed than others, which makes them tougher bargainers. If less-informed buyers can observe prices negotiated by more-informed buyers, then the seller will become less willing to offer lower prices to the informed buyers. This happens because the seller understands that by offering an informed buyer a better price creates an obligation to offer less-informed buyers a better price. Thus, in this model greater price transparency, in the sense that less-informed buyers are allowed to see prices negotiated by informed buyers, can actually increase *average* prices. The underlying logic resembles that of price discrimination, where different prices are charged to different groups of consumers, with lower prices for those who are more sensitive to price. In this model buyers differ in their bargaining power, whereas in standard price discrimination models consumers differ in price sensitivity. Bargaining power and high price sensitivity are related because both depend on the availability of good alternatives.

More generally, some competition experts argue that some exchanges of information about production costs or prices among sellers often have anti-competitive effects. In particular, flows of information among firms can make

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<sup>80</sup> This may depend on how price differences are described. For instance, although senior-citizen discounts are common and uncontroversial, a surcharge for children and working age adults, which would have the same effect, might be a controversial pricing policy.

<sup>81</sup> Svend Albaek, Peter Møllgaard, and Per. B. Overgaard, "Government Assisted Oligopoly Coordination? A Concrete Case," *Journal of Law and Economics*, vol. 45, December 1997, pp. 429-443.

<sup>82</sup> Morten Hviid and H. Peter Møllgaard, "Countervailing Power and Price Transparency," CIE discussion papers 2000-01, University of Copenhagen, Department of Economics, 2000.

coordination or collusion easier, as the cases of the Danish ready-mix concrete and the NASDAQ odd-eighths pricing convention suggest. On the other hand, flows of information to buyers make price comparisons among sellers easier and thus make consumers more sensitive to prices. Therefore, in general giving firms better price or cost information about other firms may harm competition, but giving consumers better price or cost information may enhance competition.<sup>83</sup>

The Hviid and Møllgaard model in some ways resembles the negotiations between hospitals and insurers. Hospitals engage in negotiations with private insurers, which make about one-third of hospital payments. Some insurers are in a stronger bargaining position than others due to better data analysis, larger size, or managerial talent. The Hviid and Møllgaard model and the Danish experience with price transparency in the concrete market suggest that it is not inevitable that greater price transparency in hospital markets would lead to lower average prices. Most of the evidence discussed below, however, suggests that for a variety of markets more information on prices leads to lower overall prices.

## Restrictions on Advertising

In determining the effects of greater price transparency, restrictions on advertising which vary across jurisdictions or across time can provide evidence on the effects, as advertising can make price comparisons easier. Advertising has sometimes been banned for some goods and services. For example, many states prohibited lawyers and other professionals from advertising prices. In general, most studies that examined prices across jurisdictions that restricted or permitted advertising found lower prices in those jurisdictions that permitted advertising. Some studies also examined changes over time, involving a control group, which allows a simple method of controlling for other variables. The findings of this body of evidence may provide important insights about how improving price information for consumers in the health sector, where price-oriented advertising is uncommon and basic information about prices is often unavailable or difficult to obtain, might affect the level and dispersion of prices.

An important consideration is distinguishing between voluntary advertising and restrictions by a third party. Also, for some types of commodities, it is possible that low prices signal inferior quality. The clearest test of the effect of advertising occurs when a third party (usually the government) prevents advertising. Note that many of the studies discussed below are older because most advertising bans no longer exist, although their findings remain relevant.

**Vision Exams and Eyeglasses.** Several of the studies that compared effects across jurisdictions focused on optometry and the pricing of vision exams and

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<sup>83</sup> Per Baltzer Overgaard, “*Market Transparency, Information Exchange and Competition*,” presented at the workshop on Competition Strategies and Competition Law hosted by the Center for International Economic Law and Department of Economics, Swedish School of Economics and Business Administration, Helsinki, October 14, 2003, available at [http://www.econ.au.dk/vip\_hm/povergaard/pbohome/webpapers/transpcomphelsinki.pdf]

eyeglasses, as past rules restricting advertising varied across states. Benham<sup>84</sup> examined the effects of advertising on eyeglasses by comparing prices paid in states with and without advertising restrictions in 1963. He first pointed out that the effect of advertising is theoretically ambiguous, as it may increase demand as well as competition. Subsequently, he separated the sample into states that permitted no advertising, that permitted advertising but not price advertising, or that permitted any type of advertising. He found the lowest prices in states with no restrictions, but also some benefit from advertising without price advertising. Overall, complete advertising restrictions caused prices to be higher by 25% or more. In two subsequent studies Feldman and Begun compared prices for vision examinations, controlling for quality (using length of exam and office equipment).<sup>85</sup> In the first study they found that state bans on price advertising by either opticians or optometrists had an insignificant effect on prices, but prices were higher by 16% when advertising was banned for *both*. In the second study they found that prices were higher by 11% when state governments and state optometry boards imposed bans. This study also indicated that the variance of prices increased with advertising restrictions. Maurizi and Moore found that eyeglasses and contact lenses are less expensive “if the optician or optometrist provides price information by telephone and advertises outside the telephone book.”<sup>86</sup>

Bond, Kwoka, Phelan, and Whitten<sup>87</sup> report the results of an experiment where survey interviewers were sent to report on both the prices and characteristics of vision exams and eyeglasses and outcomes measured by an examination of the quality of the eyeglasses and evaluation of prescriptions. The study found that prices were lower in cities where advertising was restricted and chain firms did not operate; quality was about the same. Kwoka<sup>88</sup> studied exams by optometrists, dividing the observations into cities where advertising was not allowed, and cities where it was, which included non-advertisers who practice in professional-looking offices, those who do not advertise but have prominent signs in storefronts, small firms who are affiliated with firms that do advertise, and those who advertise heavily. This study found that advertisers offered lower prices than non-advertisers and also that non-

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<sup>84</sup> Lee Benham, “The Effect of Advertising on the Price of Eyeglasses,” *The Journal of Law and Economics*, vol. 25, October 1972, pp. 337-352.

<sup>85</sup> Roger D. Feldman and James W. Begun, “The Effects of Advertising Restrictions: Lessons from Optometry,” *Journal of Human Resources*, vol. 13, 1978, pp. 247-262; “Does Advertising of Prices Reduce the Mean and Variance of Prices?” *Economic Inquiry*, vol. 18, July 1980, pp. 487-492.

<sup>86</sup> Alex R. Maurizi and Ruth L. Moore, “The Impact of Price Advertising: The California Eyewear Market After One Year,” *Journal of Consumer Affairs*, vol. 15, no. 2, 1981, pp. 290-300.

<sup>87</sup> Ronald S. Bond, John E. Kwoka, Jr., John J. Phelan, and Ira Taylor Whitten, *Effects of Restrictions on Advertising and Commercial Practice in the Professions: The Case of Optometry*, Federal Trade Commission Staff Report, Washington, DC, U.S. Government Printing Office, September 1980.

<sup>88</sup> John E. Kwoka, “Advertising and the Price and Quality of Optometric Services,” *American Economic Review*, vol. 74, March 1984, pp. 211-216.

advertisers in non-restricted markets offered lower prices than firms in restricted markets, but the differences were not nearly as large.

Time spent in the exam provides a proxy measure for quality. Optometrists that advertised spent less time in exams, but non-advertisers in markets in which advertising was allowed spent more time in exams than those in markets with advertising restrictions. These findings suggest that high quality service is not endangered by advertising. Overall, the analysis found quality was higher and price lower when advertising was permitted. Haas-Wilson<sup>89</sup> explored other restrictions on optometrists, but found media advertising reduced average prices and no effect on quality. Haas-Wilson and Savoca,<sup>90</sup> who analyzed survey data collected by the Federal Trade Commission, found that advertising restrictions on optometrists had no effect on the quality of contact lens outcomes.

**Prescription Drugs.** Restrictions on advertising prescription drugs, according to some research, also lead to higher prices. In 1976, Cady<sup>91</sup> found that prescription drug prices were 4.3% higher on average in states restricting advertising of prices than in states allowing such advertising. The restrictions examined included limitations on outdoor signs with information identifying the products and prices offered by the pharmacy, prohibitions on implying the pharmacy has discount drugs, prohibitions on price advertising, and prohibitions of promotional schemes such as senior citizens' discount. He also found that the quantity of prescription drugs bought was unaffected. Cady found no evidence that advertising or lower prices would increase the consumption of drugs, as supporters of advertising restrictions had contended. (This result would not necessarily apply to drug manufacturers' current advertising to consumers that promotes potential benefits of drugs, but does not advertise prices.) Kopp analyzed how the initiation of direct-to-consumer advertising affected retail drug prices from 1986 through 1992. He found that average retail margins of 13 drugs that were advertised fell on average by 40% after the introduction of direct-to-consumer advertising, while the change in average price for 120 drugs that were not advertised did not fall.<sup>92</sup>

**Gasoline.** The final set of cross section studies related to restrictions on posting gasoline prices. In 1972, Maurizi<sup>93</sup> compared prices in cities with ordinances against posting large signs advertising price at gasoline stations and found that ordinances against the signs increased the variation in prices, but reduced the average

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<sup>89</sup> Deborah Haas-Wilson, "The Effect of Commercial Practice Restrictions: The Case of Optometry," *Journal of Law and Economics*, vol. 29, April 1986, pp. 165-186.

<sup>90</sup> Deborah Haas-Wilson and Elizabeth Savoca, "Quality and Provider Choice: A Multinomial Logit-Least-Squares Model with Selectivity," *Health Services Research*, vol. 25, February 1990, pp. 791-809.

<sup>91</sup> John F. Cady, "An Estimate of the Price Effects of Restrictions on Drug Advertising," *Economic Inquiry*, vol. 44, December 1976, pp. 493-510.

<sup>92</sup> Steven W. Kopp, "Direct-To-Consumer Advertising and Consumer Prescription Prices," *Drug Information Journal*, vol. 30, 1996, pp. 59-65.

<sup>93</sup> Alex R. Maurizi, "The Effect of Laws Against Price Advertising: The Price of Retail Gasoline," *Western Economic Journal*, vol. 10, October 1972, pp. 321-329.

price. He considered the price differences unimportant because he was unable to completely control for discounts in wholesale prices in areas subject to price wars, but did consider the variation evidence that restrictions on signs reduce competition. A subsequent critique by Marvel<sup>94</sup> argued that Maurizi's results were not valid because of a statistical issue, except for premium gasoline. A subsequent study by Maurizi and Kelly,<sup>95</sup> with access to a more extensive database, indicated that posting prices reduced prices.

**Alcoholic Beverages.** Two studies analyzed changes in restrictions on advertising and alcoholic beverages. Luksetich and Lofgreen<sup>96</sup> examined the effect of an accidental repeal of liquor advertising restrictions in Minnesota, which led to an ability to post prices and distribute price lists. The result was a decline in price and slightly more variability in price. This latter effect was not predicted by the simple theory; however, the authors suspect it arose from abandoning wide usage of the manufacturer's suggested retail price. Milyo and Waldfogel<sup>97</sup> found that when restrictions on advertising in Rhode Island were eliminated, advertising stores cut prices on products they advertised and on products advertised by rivals. Non-advertising stores did not change prices, and advertising stores did not change prices of items not advertised. Also stores with the initial lower prices were more likely to advertise, and advertising stores drew more consumers.

**Availability of Consumer Price Information.** Some studies were also done on changes in information. Two studies related to food prices. Glazer<sup>98</sup> used the 1978 newspaper strike in New York City to examine the pattern of price movements compared to neighboring jurisdictions on several commodities whose prices could easily be altered, such as produce and meat. He found that prices went up in stores that normally advertised in the newspapers, relative to stores in other jurisdictions and to stores that did not advertise. He found the effects relatively small and that they declined over time, speculating that individuals may have found other sources of information on prices, such as radio. Grant and Devine<sup>99</sup> used an experiment in two Canadian cities where, in one city, price lists for a market basket of supermarket goods were provided via newspaper advertising and by direct mail to a sample of consumers, while this information was not provided in the other city.

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<sup>94</sup> Howard P. Marvel, "Gasoline Price Signs and Price Behavior: Comment," *Economic Inquiry*, vol. 7, January 1979, pp. 146-149.

<sup>95</sup> Alex R. Maurizi and Thom Kelley, *Prices and Consumer Information*, American Enterprise Institute, Washington, DC, 1978.

<sup>96</sup> William Luksetich and Harold Lofgreen, "Price Advertising and Liquor Prices," *Industrial Organization Review*, vol. 4, 1976, pp. 13-25.

<sup>97</sup> Jeffrey Milyo and Joel Waldfogel, "The Effect of Price Advertising on Prices: Evidence in the Wake of 44 Liquormart," *American Economic Review*, vol. 89, December 1999, pp. 1081-1096.

<sup>98</sup> Amihai Glazer, "Advertising, Information and Prices — a Case Study," *Economic Inquiry*, vol. 19, October 1981, pp. 661-671.

<sup>99</sup> D. Grant Devine and Bruce W. Marion, "The Influence of Consumer Price Information on Retail Pricing and Consumer Behavior," *American Journal of Agricultural Economics*, vol. 62, May 1979, pp. 228-237.



The study found that supermarket prices fell in the city with the advertising and mail data compared to the city without it. Food prices eventually declined by 7%, and the variation also declined. Prices began to rise when the public information program was ended.

**Product Quality Information.** Examining the effect of information on product quality is difficult. We summarize two related studies. Mathios<sup>100</sup> examined the effect of mandatory nutrition labeling on salad dressings. Low fat products advertised fat content on a voluntary basis, but high fat products (which varied in fat content) did not. Following the mandatory labeling, sales in the highest fat products declined significantly, suggesting that consumers used the information to make more desirable choices. Jin and Leslie<sup>101</sup> studied hygiene report cards for restaurants. In 1997, a Los Angeles television program showed unsanitary conditions in some restaurants. Los Angeles County officials responded by requiring restaurants to post hygiene quality grade cards. Incorporated cities in the county, however, retained the power to pass their own regulations. In cities that delayed requiring restaurants to post report cards, restaurants could display voluntarily hygiene report cards once an inspection occurred. The authors, by analyzing variations in the timing of implementation of the report card requirement, found evidence that the displaying cards increased hygiene scores, but were concerned that this may have reflected “grade inflation.” However, they also found an increase in revenues and a decrease in food-borne illnesses in the areas posting hygiene scores, compared to other areas.

## Search Costs and the Internet

In some markets consumers obtain price information with difficulty or at high cost. For example, car buyers traditionally have had to negotiate with car dealers in person. Obtaining a price quote from a dealer can therefore require several hours of effort, from identifying local dealers, traveling to the dealer’s lot, and negotiating with salesmen and finance specialists. When obtaining price information is costly, a consumer may settle for a given firm’s price, even though further search might have identified a firm with lower prices. The economic theory of search describes a consumer’s optimal strategy when obtaining price quotes is costly. A consumer gets a price quote, then either decides to search further or to settle for one of the price quotes he has in hand. An optimal search rule balances the cost of obtaining an additional price quote against the expected gains of further search.<sup>102</sup> If a consumer has previous experience in the market, and knows something about the distribution of prices, then computing an optimal stopping rule for a search is straightforward. If the distribution of prices is unknown, then no known optimal stopping rule exists.

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<sup>100</sup> Alan D. Mathios, “The Impact of Mandatory Disclosure Laws on Product Choices: An Analysis of the Salad Dressing Market,” *Journal of Law and Economics*, vol. 48, October 2000, pp. 651-676.

<sup>101</sup> Ginger Zhe Jin and Philip Leslie, “The Effect of Information on Product Quality: Evidence From Restaurant Hygiene Cards,” *Quarterly Journal of Economics*, vol. 118, no. 2, 2003, pp. 409-451.

<sup>102</sup> Search theory was initiated by George Stigler’s article, “The Economics of Information,” *Journal of Political Economy*, vol. 69, June 1961, pp. 213-25.

In search theory models, firms cannot price discriminate, but consumers still pay different prices. On average, consumers who search more pay lower prices. Because consumers have different costs of search, different firms will offer different prices. Firms with higher prices earn higher markups on a smaller number of sales, while firms with lower prices have smaller markups but a higher number of sales. If search costs for consumers fall, then both average prices and price dispersion fall.

**Prices and the Internet.** Many economists expected that the Internet, which enabled the emergence of cheap and efficient price searching mechanisms, would lead to lower prices. Some studies, conducted when the Internet use had just started to spread to the general public, found higher prices online, although later studies tended to show some price reductions. Pricing and marketing techniques have changed as the Internet has evolved, often in different ways for different markets. In addition, studies of Internet pricing have become more sophisticated over time. In general, later studies, and studies of comparison sites, tend to find lower prices as a result of the Internet.

**Cars.** Lee<sup>103</sup> studied an electronic automobile auction network in Japan and found that prices can be higher than in more traditional markets, even after controlling for quality. This effect might be attributable to the reduction in transaction costs and the better matching of desired car type. In two papers, Settlemeyer, Morton, and Silva-Risso<sup>104</sup> examined the effect of the Internet on car prices and found that prices were lower for direct Internet buying. Buyers referred to offline dealerships also paid lower prices, apparently because additional information increases bargaining power and because of the referral service.

**Books and CDs.** Bailey,<sup>105</sup> in one early Internet pricing study, found that prices for books, CDs, and software in 1996 and 1997 were higher online than in conventional outlets. Brynjolfsson and Smith,<sup>106</sup> however, studying a later period and using a more sophisticated methodology, found prices for books and CDs on the Internet were 9% — 16% lower than prices in conventional outlets. Although posted Internet prices showed considerable dispersion, so that an unweighted measure of price variation for Internet sellers exceeded that for conventional sellers, prices weighted by market share varied less than conventional sellers' prices. This effect occurred because sales at a few Internet booksellers, whose prices were relatively

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<sup>103</sup> H.G. Lee, "Do Electronic Marketplaces Lower the Price of Goods?" *Communications of the ACM*, vol. 41, January 1998, pp. 73-80. (Based on a review on the ACM website by S. Srinivasan at [<http://portal.acm.org/citation.cfm?id=268122&coll=portal&dl=ACM>].)

<sup>104</sup> Florence Settlemeyer, Fiona Scott Morton, and Jorge Silva-Risso, "Cowboys or Cowards: Why are Internet Car Prices Lower?" mimeo, November 2005 (also appeared as National Bureau of Economic Research Working Paper 8667, December 2001); and "How the Internet Lowers Prices: Evidence from Matched Survey and Auto Transaction Data," National Bureau of Economic Research Working Paper 11515, August 2005.

<sup>105</sup> Joseph Bailey, *Electronic Commerce: Prices and Consumer Issues for Three Products: Books, Compact Discs, and Software* (Paris: OECD, 1998).

<sup>106</sup> Erik Brynjolfsson and Michael D. Smith, "Frictionless Commerce? A Comparison of Internet and Conventional Retailers," *Management Science*, vol. 46, April 2000, pp. 563-585.

close to one another, comprised a large proportion of book sales. Clay, Krishman, Wolff, and Fernandes,<sup>107</sup> in 2001, found that book prices were no lower on the Web than at physical booksellers. They also found evidence of product differentiation, given the higher prices charged by Amazon, compared to both Barnes & Noble online and Borders online. Goolsbee and Chevalier<sup>108</sup> found significant price variability for books on the Internet. Waldfogel and Chen<sup>109</sup> found that those who used price comparison sites reduce their shopping at branded retailers, such as Amazon, by a tenth if performing price comparison, and by a fifth if comparing both price and quality. Price comparison site users reduced purchases from Amazon and from offline chains.

**Airline Travel.** Verlinda and Lane<sup>110</sup> found an increase in unrestricted airline fares relative to restricted fares as Internet price searches increased, but this difference was statistically insignificant. Over the time period of this study the share of restricted tickets decreased substantially. This trend, on which the authors did not focus, could be interpreted as an increase in quality, as it allows more travelers flexibility in their travel plans. In addition, airline fares had long been subject to comparison through travel agents, which means the increase in information may not have been as great for this product as for other products. Clemons, Hann, and Hitt found similar tickets on different sites in 1997 varied on average by 18%.<sup>111</sup> By 2002, Chen found these differences had narrowed to 0.3%-2.2% for fares available at multiple travel websites.<sup>112</sup> This convergence appears to stem from several major changes in the air travel market. First, the launch of several online ticket agencies and airlines' efforts to promote their own direct ticketing websites have substantially changed the online travel market. Between 1997 and 2002, use of online travel agencies increased elevenfold. Second, more consumers buy air tickets on the Internet. According to one recent estimate, 60% of travelers buy tickets on-line.<sup>113</sup>

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<sup>107</sup> Karen Clay, Ramayya Krishman, Eric Wolff, and Danny Fernandes, "Retail Strategies on the Web: Price and Non Price Competition in the Online Book Industry," *Journal of Industrial Economics*, vol. 49, December 2001, pp. 521-540.

<sup>108</sup> Austan Goolsbee and Judith Chevalier, "Measuring Prices and Price Competition Online: Amazon and Barnes & Noble," National Bureau of Economic Research working paper 9085, July 2002.

<sup>109</sup> Joel Waldfogel and Lu Chen, "Does Information Undermine Brand? Information Intermediary Use and Preference for Branded Web Retailers," National Bureau of Economic Research working paper 9942, September 2003.

<sup>110</sup> Jeremy A. Verlinda and Leonard Lane, "The Effect of the Internet on Pricing in the Airline Industry," working paper, November 2004, available at [<http://www.ags.uci.edu/~verlinda/papers/verlinda-lane-final.pdf>].

<sup>111</sup> E.K. Clemons, I. Hann, and L.M. Hitt, "Price Dispersion and Differentiation in Online Travel: An Empirical Investigation," *Management Science*, vol. 48, no. 4, 2001, pp. 521-39.

<sup>112</sup> Jihui Chen, "Difference in Average Prices on the Internet: Evidence from the Online Market for Air Travel," *Economic Inquiry*, vol. 44, no. 4, October 2006, pp. 656-670.

<sup>113</sup> *Ibid.*, p.656.

**Life Insurance.** Brown and Goolsbee<sup>114</sup> found that the appearance of Internet sites which allowed for comparisons among term life insurance policies led to significant decreases in prices. This study found that an increase in the share of individuals using the Internet comparisons of 10% led to a 5% decrease in price.

**Summary of Internet Studies.** The evidence from Internet studies is mixed, and it is, of course, possible that Internet purchasers are willing to pay higher prices to purchase on the Internet because of the reduction in transactions cost or other advantages.

The characteristics of the Internet as it evolves have complex effects on marketing and pricing strategies. The Internet is well suited to increasingly sophisticated price comparison tools, which tend to reduce prices and price dispersion for those who use them. The evidence on the use of comparison sites (as opposed to direct sales on the Internet), which may be most relevant to the question at hand, seems to suggest that having access to direct price comparisons reduces prices when consumers use price comparison sites. Baye and Morgan contend that prices reached via price comparison sites are lower than prices obtained directly from a vendor's website.<sup>115</sup>

On the other hand, some Internet characteristics make entry of new firms difficult. Internet traffic patterns show strong winner-take-all features: a small number of websites account for a large proportion of total traffic. Designing, building, and maintaining a major retail website are expensive tasks. Some Internet sellers have been able to establish strong brand identification that permits higher prices. Because of these characteristics, in some product markets a few dominant firms may be able to maintain substantial market power in the Internet Age. Highly visible firms, however, can be vulnerable to public pressure, as the case of Amazon's dynamic pricing experiment illustrates.

## Empirical Research on Price Transparency: Conclusions

Most research suggests that when better price information is available prices for goods sold to consumers fall. The largest and most straightforward body of evidence relates to the effect of advertising, where nearly all research indicates advertising prices is associated with lower prices. This reduction in prices suggests that advertising's increased information on prices and increases in competition outweigh any tendency to increase prices through increasing demand and brand identification. Evidence on price comparison sites on the Internet also seems to support this view. (Again, this conclusion may not apply to current manufacturers' drug advertising that does not include price information.)

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<sup>114</sup> Jeffrey R. Brown and Austan Goolsbee, "Does the Internet Make Markets More Competitive? Evidence from the Life Insurance Industry," *Journal of Political Economy*, vol. 110, June 2002, pp. 481-507.

<sup>115</sup> Michael R. Baye and John Morgan, "Information Gatekeepers and Price Discrimination on the Internet," *Economic Letters*, vol. 76, no. 1 (June), pp. 47-51.

Evidence for markets in intermediate goods is more complicated. When middlemen are involved the effects of price transparency depend on the particulars of market structure. Price transparency gives buyers and sellers important information about the true economic value of goods, services, or assets, but may also enable traders to observe deviations from collusive practices. Allowing weaker bargainers to see prices negotiated by stronger bargainers will change incentives facing buyers and sellers, and can lead to price increases. In financial markets dealers need to trade with other dealers on a frequent basis to rebalance portfolios and take actions to maintain liquidity, which leads to a complex relationship among price transparency, trading costs, and market efficiency. Studies in experimental financial economics suggest that price transparency can either increase or decrease prices.<sup>116</sup> In short, how price transparency affects intermediate goods markets is an active area of research, and settled conclusions have not yet been reached.

In traditional economic theory consumers react to price differences because lower prices mean that consumers can buy more goods and services. The unwillingness of consumers to pay higher prices imposes market discipline upon firms. Other mechanisms, however, may act to discipline firms as well. Firms that charge unusually high prices may face political or legal pressure. For example, sellers of gasoline may face complaints of price gouging with sharp price increases, as happened in some states following Katrina.<sup>117</sup> Also consumers are willing to punish firms by not doing business with them, even if this action reduces the welfare of consumers. For example, many consumers reported that they had resolved not to buy from Amazon.com after experiencing “dynamic pricing,” even if this meant that they would pass up advantageous offers in the future.<sup>118</sup> NASDAQ spreads narrowed not because of consumer pressure, but because NASDAQ administrators feared adverse media coverage and lawsuits filed by investors and regulators. Thus, price transparency may impose discipline upon firms, even if this occurs through non-market mechanisms.

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<sup>116</sup> For instance, Glosten notes that one experimental study found that “transparency involves lower spreads and more ‘efficient’ prices,” while another study found that “transparency involves lower spreads and *less* ‘efficient’ prices (emphasis added).” See Lawrence R. Glosten, “Introductory Comments: Bloomfield and O’Hara, and Flood, Juisman, Koedijk, and Mahieu,” *Review of Financial Studies*, vol. 12, no. 1, 1999, pp. 1-3.

<sup>117</sup> James McPherson, “Retail Gas Prices Jump, Deliveries Falter as Katrina’s Energy Effects Spread,” September 1, 2005, available at [<http://www.signonsandiego.com/news/nation/20050901-0605-katrina-gasprices.html>].

<sup>118</sup> David Streitfeld, “On the Web, Price Tags Blur,” *Washington Post*, September 27, 2000, p. A1.