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**Antitrust Policy and Hospital Mergers:  
Recommendations for a New Approach**

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## Antitrust Policy and Hospital Mergers: Recommendations for a New Approach

### I. Introduction

During the 1990s, there were over 900 hospital mergers and acquisitions, many involving hospitals in the same metropolitan areas.<sup>1</sup> These transactions consolidated the hospital industry, dramatically concentrating the supply of hospital services. In principle, several purposes motivated this consolidation. First, consolidation might have facilitated the elimination of excessive beds and services. By the end of the 1980s, the average hospital capacity utilization rate had fallen to 60 percent.<sup>2</sup> Indeed, eliminating excess capacity<sup>3</sup> or duplicative services was a stated goal of many hospital mergers.<sup>4</sup> This consolidation also appears to be a direct response to the simultaneous growth of managed care<sup>5</sup> and the shift to outpatient care in the 1980s and 1990s.

Merging hospitals rarely mention a second plausible motive, namely, to enhance market power with respect to managed care organizations (MCOs). MCOs obtain discounts from hospitals' stated charges by threatening to steer patients to alternative hospitals offering more favorable pricing. To make this threat credible, Preferred Provider Organizations (PPOs) generally charge enrollees higher co-payments if they visit a non-contracting hospital, while Health Maintenance Organizations (HMOs) usually provide no coverage at all for non-emergency care at non-contracting providers. This threat enables MCOs to play hospitals against each other to extract larger discounts. By consolidating, hospitals can limit the ability of MCOs to steer patients, and thereby resist MCO demands for discounts.

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<sup>1</sup> Irving Levin Associates, a health care research company that tracks hospital mergers, reports 1,042 hospital mergers and acquisitions between 1/1/1993 and 1/1/2001. 944 of these transactions were valued at over \$10 million. Note, however, that the 1,042 transactions include hospitals involved in multiple transactions. See <http://www.levinassociates.com/>.

<sup>2</sup> *Statement of the American Hospital Association Submitted to the Federal Trade Commission*, March 25, 1996 at 11.

<sup>3</sup> "Hospitals are searching for ways to reduce excess capacity, operate more efficiently, and realign the services they provide to their communities. Frequently, this involves mergers or other joint activity between competitors," *Id.* at 12.

<sup>4</sup> Hospital administrators found it difficult to actually eliminate duplicative services. See Greene, Jay, *Do Mergers Work?*, *Modern Healthcare*, Mar. 19, 1990, at 24-36.

<sup>5</sup> See Dranove, D., Simon, C. and W. White, *Did Managed Care Lead to Increased Provider Consolidation?*, *Health Serv. Res.* (forthcoming).

Despite the potential for consolidation to enhance market power, the Federal Trade Commission (FTC) and Department of Justice (DOJ) have challenged only a handful of hospital mergers.<sup>6</sup> In the 1980s, the government prevailed in all but one case, in Roanoke, VA.<sup>7</sup> This situation dramatically reversed in the 1990s. After winning an injunction on appeal in Circuit court in Augusta, GA,<sup>8</sup> the FTC and DOJ lost six successive cases. These losses accumulated in District Court, Circuit Court, and in one instance, before an FTC administrative law judge. In all but one case, the definition of the relevant geographic market played a key role in the outcome. The various courts began accepting hospitals' claims that the relevant geographic market was quite large. In one case, hospitals over 80 miles away were ruled to be in the relevant market.

Hospitals justified the inclusion of distant hospitals in their geographic markets through analyses of patient flow data. Using an approach for geographic market definition first advocated in Elzinga & Hogarty,<sup>9</sup> merging hospitals presented evidence that a non-trivial proportion of local residents— usually in excess of 25 percent -- traveled to distant hospitals. The courts reasoned that if many local patients traveled prior to a merger, then even more patients would travel if the merged hospitals raised prices. Thus, the courts surmised that merging hospitals could not profitably raise prices.

There are well-known problems inherent in using patient flows to define geographic markets. Generally, there is no theoretical link between patient flows and the presence or absence of market power.<sup>10</sup> But the courts have not always found these doubts persuasive. More to the point, the court

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<sup>6</sup> For the period from 1981 to 1993, the DOJ and FTC jointly challenged 4 percent of 397 mergers; see Magleby, J., *Hospital Mergers and Antitrust Policy: Arguments Against a Modification of Current Antitrust Law*, 41 Antitrust Bull., 137-201 (1996) at 146 n. 50.

<sup>7</sup> *United States v. Carilion Health System et al.* 707 F.Supp. 840 (W.D. Va. 1989), *aff'd*, 892 F.2d 1042 (4<sup>th</sup> Cir. 1989).

<sup>8</sup> *FTC v. University Health, Inc.*, 115 F.T.C. 880 (1992) (consent order); 1991-1 trade Cases 69,400 (S.D.Ga.) and 1991-1 Trade Cases 69,444 (S.D. Ga.), *rev'd*, 938 F.2d 1206 (11<sup>th</sup> Cir. 1991).

<sup>9</sup> Elzinga, K. & Hogarty, T., *The Demand for Beer*, 54 Rev. Econ. and Stat., 195-198 (1972).

<sup>10</sup> In particular, see Werden, G., *The Use and Misuse of Shipments Data in Defining Geographic Markets* 26 Antitrust Bulletin 719-737 (1981) and Werden, G., *The Limited Relevance of Patient Migration Data in Market Delineation for Hospital Merger Cases*, 8 J. Health Econ. 363-376 (1989).

decisions of the last decade indicate a lack of sympathy with the doubters, presuming instead that significant patient flows preclude the presence of market power. It is this presumption—heretofore untested on any data—that we question.

The basis for our critique is simple in principle: patient flow data does not come close to approximating generally accepted criteria for determining market boundaries. Both the standard merger guidelines<sup>11</sup> and the hospital-specific guidelines<sup>12</sup> advocate using the *small but significant non-transitory increase in price* (SSNIP) criterion.<sup>13</sup> Under this standard, a narrow market definition is initially proposed. If the hospitals in the narrowly defined market could, by acting as a joint monopolist, implement a SSNIP, then they constitute the relevant set of competitors. If they cannot do so, then it must be because the market is defined so narrowly as to exclude a close substitute. Thus the market definition should be expanded to include the next closest competitor. The process is iterated until the SSNIP question is answered in the affirmative.

Even though SSNIP is theoretically appealing, patient flow analysis remains the main tool for defining geographic markets for hospital mergers. In part, this is due to historical precedent. By the time of the release of the hospital merger guidelines, there were at least a half dozen hospital merger cases in which courts had based geographic market definition on flow data, including two cases decided by appellate courts in different circuits. Another reason is the appeal of short cuts. It is easy to obtain and analyze patient flow data. Most states have regulatory agencies that collect patient-level hospitalization data, and most analysts can easily replicate the methods advocated by Elzinga and Hogarty. In contrast, the SSNIP standard is challenging to implement. It requires answering hypothetical questions, which

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<sup>11</sup> U.S. Department of Justice and Federal Trade Commission, *Horizontal Merger Guidelines*, Issued April 2, 1992, Revised April 8, 1997.

<sup>12</sup> U.S. Department of Justice and Federal Trade Commission, *Statements of Antitrust Enforcement Policy in Health Care*, Issued August 28, 1996 at 8-12.

<sup>13</sup> The benchmarks are a 5 percent price increase, and a 1 year duration.

require knowing the entire demand system faced by all hospitals. This is challenging in any market, but is particularly so in hospital markets. The requisite data are often thought to be unavailable for two reasons: negotiated prices, as opposed to list prices, are secrets closely guarded by hospitals, and even where these prices are available, the prices faced by patients are not observed.<sup>14</sup>

We investigated whether inferences using Elzinga-Hogerty flow data are close to the inferences using the ideal SSNIP criteria. We propose three alternative but related methodologies for doing so. Each combines the same data used in patient flow analysis—evidence on the zip codes of patients and hospitals—with readily available data on hospital characteristics.<sup>15</sup> Our methods require no *a priori* definition of the relevant geographic or product market, nor do they require patient-level price data. Yet, the methods provide defensible predictions of the price increase any given merger would generate. The three approaches are

- The *time-elasticity approach*, in which the observed pre-merger travel patterns of actual patients are used to infer post-merger willingness to travel;
- The *competitor share approach*, which hones in on the differentiated product nature of hospital services and patient heterogeneity;
- The *ex-ante approach*, which is slightly more complicated, but is tailor-made for analyzing the effects of hospital mergers in a managed care setting.<sup>16</sup>

All three approaches generate consistent results. They indicate that mergers in markets with significant outflows of patients—30 percent or more—can generate price increases of 10 percent or higher. In other words, mergers that might easily pass muster using flow analysis may easily fail using

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<sup>14</sup> In principle, both prices could be obtained as part of discovery.

<sup>15</sup> For example, annual hospital data collected by the *American Hospital Association* contain the requisite information.

<sup>16</sup> The first two are detailed in Capps, C., Dranove, D., Greenstein, S., & Satterthwaite, M., *The Silent Majority Fallacy of the Elzinga/Hogarty Criterion: A Critique And New Approach To Analyzing Hospital Mergers*, Manuscript, Northwestern University (2001a); the latter is detailed in Capps, C., Dranove, D., & Satterthwaite, M., *Competition and Market Power in Option Demand Markets*, Manuscript, Northwestern University (2001b).

the SSNIP criterion. We surmise that, for a wide range of plausible situations, patient flow data provide a highly inaccurate view of the appropriate market boundaries. It is only reliable in extreme situations, when flows are very large or nearly non-existent—that is, flows very near zero likely support exclusion of an area from a proposed market and flows near 100 percent support inclusion. Unfortunately, such extreme situations do not present especially interesting problems for courts. Hence, we advocate eliminating the use of flow data and E/H criteria in any situation where their inferences are ambiguous, which is, practically speaking, all courtroom proceedings.

This paper summarizes these new approaches. Before doing so, however, we first discuss several illustrative merger cases, highlighting the divergence between the reasoning of the courts and the policy outlined in the *Guidelines*. Section II discusses these cases; Section III discusses empirical evidence on mergers, including the inconsistent evidence on merger efficiencies. Section IV describes our new approaches and the results thereof, and Section V concludes.

## II. Illustrative Cases

Two cases that illustrate the thinking of the courts in hospital merger cases both occurred in Missouri, the first in Joplin<sup>17</sup> and the second in Poplar Bluffs.<sup>18</sup> In the *Freeman* case, the second and third largest hospitals in Joplin proposed a merger in 1995. In a harshly worded ruling denying a temporary restraining order, the district judge ruled in favor of the defendants, stating “I don’t see how the Federal Trade Commission can claim there is lack of competition when there [are] four or five hospitals in the area, and reducing it by one is not going to wipe out competition.”<sup>19</sup> On remand,<sup>20</sup> the

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<sup>17</sup> FTC v. Freeman Hospital 911 F.Supp. 1213 (W.D. MO. 1995), *aff’d* 69 F.3d 260 (8<sup>th</sup> Cir. 1995).

<sup>18</sup> FTC, et al., vs. Tenet Healthcare Corp., et al. 17 F.Supp. 2d 937 (E.D. Mo. 1998), *rev’d* 186 F.3d 1045 (8<sup>th</sup> Cir. 1999).

<sup>19</sup> Temp. Restraining Order Hrg. Tr. at 27-29 (Feb. 22, 1995), cited in 69 F.3d at 263, *supra* note 17.

district court faced conflicting testimony regarding the size of the relevant geographic market. The FTC expert testified that the relevant market was roughly a 54-mile diameter circle around the merging hospitals while the defendant's expert argued that the relevant market was a 13 county area, roughly 100 miles in diameter, and included 17 hospitals.<sup>21</sup> Under the latter scenario, which the court found more compelling, the merger would have only a small effect on concentration in the purported market. The hospital's expert used Elzinga/Hogarty patient flow analysis to arrive at this conclusion.<sup>22</sup>

Under the Elzinga/Hogarty criterion, the geographic market is expanded until two criteria are satisfied: *Little Out from the Inside (LOFI)*, and *Little in From the Outside (LIFO)*. This process defines a market by determining the smallest geographic such that (i) the portion of patients who leave the proposed market for care (LOFI) and (ii) the proportion of patients from outside the boundaries who receive care within the market (LIFO), are both below a critical threshold—in this case, the defendants' expert used 10 percent. As discussed in detail in Section IV, when applied to hospital markets this approach generally leads to very large geographic markets.

In finding for the merging hospitals, the district court accepted their E/H style approach to market definition. The court further criticized the FTC on the grounds that their evidence only presented a static picture of the market; it failed to address the key counterfactual question of whether patients could bypass the merging hospitals if they raised prices post-merger.<sup>23</sup> Exacerbating the FTC's troubles

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<sup>20</sup> On appeal, the 8<sup>th</sup> circuit ruled that the district court had not adequately weighed the evidence before denying the TRO and remanded to the district court for further consideration (*Id.* at 263-64). A full preliminary injunction hearing followed and the district court affirmed its earlier ruling, 911 F. Supp at 1216, *supra* note 17.

<sup>21</sup> 911 F. Supp at 1218-19, *supra* note 17.

<sup>22</sup> Elzinga & Hogarty, *supra* note 9.

<sup>23</sup> In affirming the district court ruling, the Eighth Circuit stated that “the Elzinga-Hogarty analysis presented...did not, by itself, address the decisive question of where consumers could practicably go for alternative sources of acute care inpatient hospital services”, 69 F.3d at 269, *supra* note 17.

was testimony from local insurance payors, who stated that they could steer patients to outlying hospitals in response to significant price increases.<sup>24</sup>

On appeal, the Eight Circuit affirmed the majority of the district court's finding, going so far as to cite competition from Kansas City, St. Louis, and Tulsa—cities all 70 miles or more from Joplin.<sup>25</sup> In the same year, the Department of Justice also lost a case in Dubuque, IO on nearly identical grounds.<sup>26</sup> In particular, the court noted that doctors did send patients beyond the borders of the market proposed by the DOJ. The court further noted the need to answer not just the question of where patients go, but where they would go in response to a price increase,<sup>27</sup> offering the opinion that patients would travel in response to such increases.<sup>28</sup> Previewing an upcoming case, the court did state that, had the government prevailed on market definition, neither of the alternative defenses offered by the hospitals were compelling. The first alternative defense was an efficiencies argument, which the court dismissed as highly speculative and likely overstated by the defendants.<sup>29</sup> The second rejected defense was that, even if they had market power, the hospitals would not increase price because both hospitals are non-profits.<sup>30</sup>

In the second Missouri Case, *FTC v. Tenet*, the commission prevailed in district court. The Court accepted the FTC's proposed geographic market, stating that "at some point, a hospital ceases to become a practical alternative for general acute care because of distance."<sup>31</sup> Again, using the LOFI and LIFO criteria with a 10 percent threshold, the defendants argued instead for a much larger geographic market,

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<sup>24</sup> 911 F.Supp. at 1223-1224, *supra* note 17.

<sup>25</sup> 69 F.3d at 262 and 271, *supra* note 17.

<sup>26</sup> *United States v. Mercy Health Services et al.*, 902 F.Supp. 968 (N.D. Iowa 1995), *vacating as moot*, 107 F.3d 632 (8th Cir. 1997). By 1997, the hospitals had abandoned their merger.

<sup>27</sup> 902 F.Supp. at 978-979, *Id.*

<sup>28</sup> *Id.* at 982-983.

<sup>29</sup> *Id.* at 987-988.

<sup>30</sup> *Id.* at 989. One year later, a different set of defendants would prevail on exactly these two grounds in *FTC v. Butterworth Health Corp.*, 946 F.Supp. 1285 (W.D. Mich. 1996), *aff'd per curiam*, No. 96-2440 (6th Cir. July 8, 1997) (unpublished). In *Butterworth*, the court granted that the FTC had established a *prima facie* case of market power but nevertheless ruled in favor of the defendants, citing potential efficiencies and expert testimony to the effect "that market concentration among nonprofit hospitals is not correlated with higher prices, but with lower prices." (946 F.Supp. at 1297). This position is quite controversial, however. See discussion *infra* notes 50-52.

<sup>31</sup> 17 F.Supp. 2d at 943, *supra* note 18.



including areas as distant as 95 miles. On appeal, the hospitals once again prevailed, with the Circuit Court accepting the defendants' proposed market and further citing the court's belief that if the merging hospitals raised prices, patients would travel to hospitals beyond the FTC's proposed market radius of 50 miles.<sup>32</sup>

Similar debates about market definition and predicting price effects surfaced as key issues in two more cases lost by the antitrust agencies, *U.S. v. Carilion Health Systems*<sup>33</sup> and *U.S. v. Long Island Jewish Medical Center*.<sup>34</sup> In each of these cases the rulings, at least in part, relied upon E/H analysis.

In spite of these rulings there is a growing body of evidence, both formal and anecdotal, that these and other unchallenged mergers are indeed leading to significant price increases. For example, following a three to two merger in Waukegan, IL, the new entity reportedly raised prices to insurers by 30 percent. A similar increase apparently followed the Long Island Merger.<sup>35</sup> Recently in California, two systems with substantial market shares in narrow geographic areas, Sutter Health and Adventist Health, threatened to cancel their contracts with Blue Cross if they did not receive significant reimbursement increases—press reports indicate the hospitals were seeking increases of 20 percent-30 percent.<sup>36</sup> In an October 3, 2001 press release, Tenet Health Care reported that “it continues to obtain good price increases in its managed care negotiations, with typical increases of 6 percent and higher. Management is confident that reimbursement trends will remain positive throughout fiscal 2002 and into fiscal 2003.”<sup>37</sup> In 1993, Massachusetts General Hospital joined forces with the teaching hospitals associated with Harvard University, including Brigham and Women's Hospital, to form the Partners

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<sup>32</sup> 186 F.3d at 1052-1054, *supra* note 18.

<sup>33</sup> *Supra* note 7.

<sup>34</sup> *U.S. v. Long Island Jewish Medical Center*, 983 F.Supp. 121 (E.D.N.Y. 1997).

<sup>35</sup> Insurance companies do not generally reveal the prices they negotiate with hospital systems; these figures come from conversations between the authors' and insurance executives.

<sup>36</sup> See *Sutter flexes its muscle on Blue Cross*, Sacramento Business Journal, January 5, 2001 and *Adventist is latest to test Blue Cross*, Sacramento Business Journal, March 28, 2001.

<sup>37</sup> *Tenet Reports First Quarter EPS from Operations up 40 percent*, <http://www.tenethealth.com/News>.

Health Care System. John McArthur, who was the Dean of the Harvard Business School and chairman of the Brigham and Women's board, felt that the combination would increase their market power.<sup>38</sup> Indeed, Partners used its newfound power to extract price increases from MCOs that had previously negotiated discounts.<sup>39</sup>

This anecdotal evidence suggests that merging hospitals in seemingly competitive markets anticipate that they can enhance market power, and profitably increase prices. If true, the traditional E/H approach to market definition permits mergers in far less competitive markets than it ought to. It may be generating misleading conclusions about hospital market power. Before turning to our recommended approaches, we next summarize the economic literature regarding the price and cost effects of mergers.

### **III. Empirical Evidence on Hospital Mergers, Costs, and Prices**

Studies of hospital mergers can be neatly divided into two categories: studies of horizontal integration and costs, and studies of horizontal integration and pricing. Prior to discussing these literatures, it is useful to draw a distinction between hospital systems and hospital mergers. In most segments of the economy, we would say that two firms have merged whenever they join together under common ownership. When two hospitals share ownership, however, they may do so either through a system or a merger. In a system, such as Columbia/HCA or the Northwestern Healthcare Network, member hospitals share a common owner, but retain their individual licenses for regulatory purposes. In contrast to systems, mergers involve combining separate facility licenses into a single license. Merged hospitals report a single set of financial and utilization statistics, and are regulated as a single entity.

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<sup>38</sup> Blumenthal, D. and Edwards, N., *The Tale of Two Systems: The Changing Academic Health Center*, 19 Health Affairs, 87-101 (2000).

<sup>39</sup> For example, see *Harvard Pilgrim to succumb to Partners' power?*, Boston Bus. J., Dec. 22, 2000: "until about a year ago, insurers were in the driver's seat. Now, the big hospital networks, especially Partners, have been calling the shots. The likely outcome, say experts: significantly higher premiums for Bay State employers."

Because of this distinction between systems and mergers, we refer to them collectively as hospital integration.

Dranove and Shanley describe how hospitals might reduce costs through integration.<sup>40</sup> They argue that integrated hospitals might achieve savings by eliminating duplicative equipment, reducing administrative costs, and efficiently managing labor and supply inventories. They add that hospitals might also realize economies of scale if they are effectively able to combine clinical and support activities in a single facility. Of course, hospitals may fail to realize these theoretical sources of savings if they are unable to achieve effective clinical integration. Thus, the question of whether mergers reduce costs is an empirical matter.

Prior to the 1990s, most hospital integration involved national systems, such as the Hospital Corporation of America and Humana, that acquired hospitals scattered throughout the United States. These systems might be able to generate savings through managerial expertise, purchasing power, and enhanced access to capital. However, they would be unlikely to reap savings through local integration of clinical and support services. Empirical studies of national systems failed to find evidence of savings. Levitz and Brooke<sup>41</sup> and Pattison and Katz<sup>42</sup> found that system hospitals had higher costs than their independent counterparts, and Shortell et al.<sup>43</sup> found that system membership had no effect on costs.

During the 1990s, many national systems floundered, while integration of hospitals within the same local areas flourished. As a result, empirical studies of mergers focused on local integration.

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<sup>40</sup> Dranove, D. and Shanley, M., *Cost Reductions or Reputation Enhancement as Motives for Mergers: Evidence from Multihospital Systems*, 16 Strategic Management J., 55-74 (1995).

<sup>41</sup> Levitz G., and Brooke, P., *Independent versus System-affiliated Hospitals: A Comparative Analysis of Financial Performance, Cost, and Productivity*, 20 Health Serv. Res., 315-340 (1985).

<sup>42</sup> Pattison, R. and Katz, H., *Investor Owned and Not-for-Profit Hospitals: An Analysis Based on California Hospitals*, 309 New England J. Medicine, 347-353 (1983).

<sup>43</sup> Shortell, S., Morrison, E., and Friedman, B., Strategic Choices for America's Hospitals, Jossey Bass, San Francisco, Ca (1990).

Several recent empirical studies suggest that any savings from local integration may depend on whether hospitals are part of systems or mergers.

Examining two different cross-sections, Dranove and Shanley<sup>44</sup> and Dranove, Shanley and Durkac<sup>45</sup> compare the performance of thirteen local systems in California with the performance of “pseudosystems”—aggregations of independent hospitals matched to the actual systems. They find virtually no differences in costs between actual and pseudo systems.<sup>46</sup> Connor and colleagues (CFD) study local hospital mergers across the entire United States over a period of nine years. They regress changes in average hospital costs and prices against a variety of predictors, including whether the hospital has recently merged. They find that hospitals that have recently merged experience smaller cost increases than those that have not. They also find that the magnitude of the cost increase depends on characteristics of the merging hospitals and their markets. For example, hospitals whose merger partners have many overlapping services tend to experience slower relative cost increases than do hospitals whose merger partners have few overlapping services.

Most recently, Dranove and Lindrooth<sup>47</sup> attempted to reconcile the apparently conflicting findings of Dranove and Shanley and those of Conner et al. Using a unified methodology, they apply the “before and after” approach of Conner et al. to a comparison between integrating hospitals and matched “pseudo-integrators.” They find that costs decrease in mergers that result in the closure of one of the merging hospitals. There are no significant savings when two hospitals merge and both remain open or when two hospitals form a system.

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<sup>44</sup> *Supra* note 40.

<sup>45</sup> Dranove, D., Shanley, M. and Durkac, A., *Are Multihospital Systems More Efficient?*, 15 *Health Affairs*, 100-104 (1996).

<sup>46</sup> Menke examines a cross-section of over 2000 hospitals in 1990 to determine whether hospitals in both local and national systems had lower costs than did independent hospitals. She finds that the typical system hospital had lower average costs than did the typical independent hospital, after controlling for case-mix, patient severity, and local wages. However, her findings are very sensitive to functional form. Menke, Terri, *The Effect of Chain Membership on Hospital Costs*, 32 *Health Serv. Res.*, 177-96 (1997).

<sup>47</sup> Dranove, D. and R. Lindrooth, *Hospital Consolidation and Costs: Another Look at the Evidence*, Manuscript, Northwestern University (2001).

Overall, the evidence suggests that system integration generates few if any savings. Mergers are also unlikely to lead to significant savings, unless one of the merged hospitals closes. However, most mergers do not lead to closures. If integration generally does not reduce costs, then even modest increases in market power will be harmful to consumers.

There is a substantial literature on the relationship between hospital market power and hospital prices. Most of this research consists of traditional studies of the relationship between price and concentration. The dependent variable in the typical study is some measure of price, such as price per admission or price for a market basket of hospital services. The main predictor of interest is a measure of concentration in a local market, such as the Herfindahl. There is ample reason to believe that hospital competition is confined to local markets. Many studies show that hospital patients have a distaste for travel.<sup>48</sup> These studies also suggest that aversion to travel is related to the severity or complexity of the illness – severely ill patients are more willing to bypass their local hospital and seek care at a distant (and presumably better) hospital.

While it is commonly accepted that hospitals compete in local markets, researchers use a variety of techniques to define markets and measure concentration. Some studies define markets to be counties, or metropolitan areas. Others define unique markets for each hospital, and compute the Herfindahl based on the competition for patients in each of these markets. Finally, some researchers study the average prices that hospitals receive from all of their privately insured patients, whereas others examine prices for specific insurance contracts.

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<sup>48</sup> See, for example, Adams, E. et al, *Predicting hospital choice for rural Medicare beneficiaries: The role of severity of illness*, 26 Health Serv. Res., 583-612 (1991); Adams, E. and G. Wright, *Hospital choice of Medicare beneficiaries in a rural market: Why not the closest?*, 7 J Rural Health, 134-52 (1991); Welch, H., E. Larson, and W. Welch, *Could distance be a proxy for severity of illness? A comparison of hospital costs in distant and local patients*, 28 Health Serv. Res., 441-58 (1993).

Although their methods differ, Noether, Staten et al., Melnick et al., Dranove, Shanley, and White, and Gruber all find that hospital prices are positively correlated with market concentration.<sup>49</sup> Lynk suggests that this result is only true in the case of for-profit hospitals.<sup>50</sup> However, Dranove and Ludwick and Keeler et al. present evidence that, they argue, refutes Lynk's findings.<sup>51</sup> While not the central focus of the current work, we briefly address this issue below—where relevant, defendants invariably cited their non-profit status at trial; indeed, it was largely dispositive in *FTC v. Butterworth*.<sup>52</sup>

#### **IV. New Approaches to Predicting the Price Effects of Hospital Mergers**

The reluctance of the antitrust agencies to challenge hospital mergers, and their lack of success when they do, begs for further analysis. If the courts continue relying on patient flow analysis, then they will continue to approve virtually all mergers, even those between geographically proximate hospitals. Using flows to define geographic hospital markets leads to large markets because a fraction of patients bypass local hospitals and travel significant distances to receive care for idiosyncratic reasons—both before and after a merger.

Our starting point is that the mere existence of travelers is not grounds for approving mergers. The observation that *some* patients travel yields no information regarding the effects of increases in concentration on pricing power. Suppose that 15 percent of patients in an area travel significant

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<sup>49</sup> Noether, Monica, *Competition Among Hospitals*, 7 *J of Health Econ.*, 259-84 (1988); Staten, M., Umbeck, J., and Dunkelberg, W., *Market share/market power revisited: A new test for an old theory*, 7 *J Health Econ.*, 73-83 (1988); Melnick, G. et al., *The effects of market structure and bargaining position on hospital prices*, 11 *J Health Econ.*, 217-233 (1992); Dranove, D., Shanley, M., and White, W., *Price and concentration in hospital markets: The switch from patient-driven to payer-driven competition*, 24 *J Law Econ* 179-204 (1993); Gruber, Jonathan, *The effect of price shopping in medical markets: Hospital responses to PPOs in California*, NBER Working Paper 4190 (1992).

<sup>50</sup> Lynk, William, *Nonprofit Hospital Mergers And The Exercise Of Market Power*, *J Law Econ*, 38 October, 437-461 (1995).

<sup>51</sup> Dranove, D. and Ludwick, R., *Competition and pricing by nonprofit hospitals: a reassessment of Lynk's analysis*, 18 *J Health Econ*, 87-98 (1999); Keeler, E., Melnick, G., and Zwanziger, J., *The Changing Effects Of Competition On Nonprofit And For-Profit Hospital Pricing Behavior*, 18 *J Health Econ*, 69-86 (1999).

<sup>52</sup> *FTC v. Butterworth*, *supra* note 30. There, the government prevailed on its *prima facie* case of market power, but the court found that the hospitals' non-profit status and community commitment sufficiently ameliorated the risk of competitive harm. Note that this court found that the reasoning in the Rockford case did not apply (*United States v. Rockford Mem. Corp.*, 898 F.2d 1278 (7th Cir.), *cert. denied*, 498 U.S. 920 (1990)).

distances to receive care; this does not in any way indicate that the remaining 85 percent would be willing to similarly travel in response to a price increase—the assumption implicit in using Elzinga/Hogarty criteria to define market boundaries. Rather, it is an empirical question whether patients travel in response to price increases or quality decreases.

That said, analysis of price effects is complicated by the existence of three distinct types of payment: Medicare, in which prices are set by the federal government; Fee-For-Service (FFS), in which prices for various services are set on a cost-plus basis; and Managed Care, in which hospitals and Managed Care Organizations negotiate payments up-front, often on a per-member-per-month basis.<sup>53</sup> For antitrust purposes, the latter two types of insurance—involving private companies that are unable to dictate prices by fiat—are the primary focus. Each of these involve distinct but related conceptual issues. Under the FFS model, each hospital service has a price that differs across hospitals and, moreover, differs across insurers within a hospital. Thus, the overall price effects of a merger must be computed on a service-by-service basis and then aggregated.

Under managed care, MCOs selectively contract with area hospitals. In return for access to an MCO's patients, hospitals negotiate discounts with these insurers. If a hospital, or hospital system, decides that the offered rate is too low, it can withdraw from the MCO network. In this setting, prices will be determined by patients' willingness-to-pay (WTP) to have a particular hospital included in the network of covered providers. For example, suppose that an MCO has 100,000 patients who, on average, are willing to pay the MCO an additional premium of \$5.00 per month to have a particular hospital included in their network. By threatening to leave the network that hospital can lower the MCO's revenue by \$6 million per year.<sup>54</sup> The effect of a merger in this setting is clear: after a merger,

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<sup>53</sup> That is, the amount the hospital receives is largely independent of the actual illnesses the MCO's patients realize; there are usually contractual exceptions for extremely costly cases.

<sup>54</sup> Note that this leaves the MCOs costs roughly unchanged as it is still obligated to pay for its members' health care.

two physically distinct but jointly controlled hospitals can threaten to *simultaneously* withdraw from a network, potentially decreasing the WTP of an MCO's members much more than would a unilateral withdrawal.

We now turn to our three new empirical approaches to predicting the effects of hospital mergers on prices, the *Time-Elasticity Approach*, the *Competitor Share Approach*, and the *Option Demand Approach*. The first two specifically analyze “direct purchase market”, in which consumers directly select their sellers. This is consistent with applications of patient flow analysis in the courts. With the advent of managed care, patient choices are often limited by MCOs, giving rise to the option demand approach. The critical distinction between option demand and traditional demand is that in the option demand case, patients commit to a restricted set of providers before they become ill. That is, such patients are committing to a specific set of providers (options) when they purchase managed care coverage. We describe each approach below.

### *The Time-Elasticity Approach*

The familiar inverse-elasticity pricing rule states that price-cost margins increase as demand elasticity decreases.<sup>55</sup> This suggests a classic approach to predicting the effects of hospital mergers: a researcher simply estimates the change in the demand elasticity faced by each hospital resulting from a reduction in the number of competitors and maps that change in elasticity into a price prediction. Unfortunately, direct application of this approach is confounded by the difficulty of reliably estimating

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<sup>55</sup> Demand elasticity, commonly denoted by  $\epsilon$ , gives the percent change in quantity stemming from a given percent change in price, formally defined as  $\epsilon_p = \frac{\% \Delta Q}{\% \Delta P}$ . For example if  $\epsilon$  equals -2, then a 10 percent increase in price would lead to a 20 percent decrease in quantity. The inverse-elasticity rule states that to maximize profit, a firm will choose price such that  $\frac{(P - C)}{P} = -\frac{1}{\epsilon_p}$ ; thus, price-cost margins are higher as elasticity is smaller in absolute value.



demand for health care. List prices for hospital services are generally available, but few insurers actually pay them. Even if negotiated prices were observed, these prices do not directly determine the price-elasticity of demand, which instead depends upon the amount paid by the relevant decision maker, the patient.

Thus, the challenge is to determine the effect of a merger on firms' demand elasticities when the price-sensitivity of demand cannot be estimated reliably. The time-elasticity approach sidesteps this challenge by positing a time-value of money—that is, patients are willing to travel further in exchange for paying less out of pocket. This approach is motivated by a pragmatic consideration; namely, it is much easier to obtain data on patient travel times than it is to obtain data on prices. Thus, it is possible to estimate time-elasticities of demand. Fortunately, it is not necessary to know the dollar value of time to use time-elasticities as a basis for predicting price changes from a merger.

Using data on San Diego patients and hospitals, we estimated a logit model of the probability that a particular patient chooses a given hospital.<sup>56</sup> This probability is determined by the patient's characteristics, such as severity of ailment, expected length of stay, and demographic variables; hospital characteristics, such as teaching status, profit/nonprofit status, staffing per capita, and equipment per capita; and by characteristics specific to a given patient-hospital combination, the most important of which is travel time to the hospital. For example, these estimates allow us to predict the probabilities of each hospital being chosen by an individual who is 60-years-old, black, requires gallbladder surgery, and resides in a zip code where the average income is \$16,000. These predicted probabilities account for the time it would take for the patient to travel to each hospital. Further, these estimates allow us to

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<sup>56</sup> In the logit demand model, which is a standard econometric model of consumer choice among a set of discrete alternatives, the utility that a consumer enjoys by patronizing a particular seller is a function of the consumer and seller's attributes as well as an idiosyncratic noise term. The consumer is assumed to select the seller offering the highest level of utility.

predict how patients will substitute among different hospitals in response to changes in the characteristics of one or more of those hospitals.

Thus, the core of this approach is to focus explicitly on the substitutability of hospitals. In general, mergers are of greatest concern when the merging parties produce highly substitutable products and there are few alternatives to which consumers may turn. This is a familiar element of merger analysis: substitutability is generally measured by looking at how one firm's quantity depends on its own price (the own-price elasticity) and other firms' prices (the cross-price elasticity). But examining price effects is just one way to address the recurring and essential question: if a firm's output becomes less attractive, *for any reason*, will its customers switch to another firm? A firm can do many things to make it less attractive—raise price, reduce quality, reduce convenience, and so forth. All of these will affect output and the effects will be greater when the firm has many substitutes. The response of quantity to all such changes can be measured by the appropriate elasticities. Hence, even though we lack the data required to estimate price-elasticities for hospitals, we do have data that allow us to estimate time-elasticities, which in this approach is sufficient.

To measure each hospital's time-elasticity, we estimate how a variety of hospital attributes, including quality and travel time, affect choice probabilities. We use the parameters of our estimated model to simulate the effects of artificially raising the travel time from every patient to a particular hospital by 10 percent. This allows us to answer two questions: first, how many patients does the hospital lose as a result of this hypothetical increase and second, where do they go? If the hospital loses few patients, we infer that there are no close substitutes. If there are close substitutes, they are the hospitals that gain the most patients as a result of this exercise. The hypothetical exercise is directly analogous to the traditional question posited in terms of price changes.

To assess the effects of a merger, we conduct the same experiment of increasing travel time by 10 percent, but for two hospitals simultaneously. Suppose that, under the preceding exercise, when hospital A's travel time is unilaterally increased many of its patients switch to hospital B, and vice-versa. Then the important question for merger analysis is whether patients will switch to a third hospital when the travel times to A and B are *jointly* increased. If so, then the merger is less likely to be anticompetitive. The process is directly analogous to experiments based on price that ask whether firms A and B are the only firms that restrain each other's pricing. The final step is to translate statements about isolated and joint time-elasticities into price predictions.

Under the simplifying assumption that consumers are willing to trade time for money at a constant rate,<sup>57</sup> Capps et al. show that price-elasticities are directly proportional to time elasticities.<sup>58</sup> In conjunction with the inverse-elasticity pricing rule, this implies that margin increases from a merger are directly proportional to reductions in time-elasticity under joint travel time increases *vis-à-vis* individual time increases.<sup>59</sup>

To illustrate and assess the reasoning used by the courts in ruling against the antitrust agencies, we simulated the effect of various mergers of San Diego hospitals. We were particularly interested in two suburbs, Chula Vista and La Jolla, each with two geographically close hospitals. Chula Vista is located approximately ten miles south of downtown and in 1991 had two hospitals, Scripps Chula Vista and

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<sup>57</sup> That is, if they are willing to travel five more minutes for \$100, then they will travel 20 more minutes for \$400. In assessing the time-money tradeoff for hospital admissions, note that patients likely factor in the travel costs of their visitors as well.

<sup>58</sup> That is, using subscripts *t* and *p* to distinguish time and price elasticities,  $\epsilon_t = K \epsilon_p$ , where K is a constant. Capps et al. (2001a), *supra* note 16 at 20.

<sup>59</sup> Formally, this follow from applying the inverse-elasticity rule to the pre-merger and post-merger demands for the two

firms and using the formula in *supra* note 55: 
$$\frac{(P^{pre} - MC)}{P^{pre}} = \frac{\epsilon_p^{post}}{\epsilon_p^{pre}} = \frac{K \epsilon_t^{post}}{K \epsilon_t^{pre}} = \frac{\epsilon_t^{post}}{\epsilon_t^{pre}}$$
. Note that K cancels; thus we do not

need to know the exact time-money tradeoff to predict the effects on margins.

Community Hospital of Chula Vista (CHCV). Additionally, Paradise Valley Hospital (PVH) is located roughly midway between Chula Vista and San Diego. Over 30 percent of the residents of Chula Vista bypass the three hospitals when receiving care (LOFI=30 percent), so mergers among these hospitals would likely be allowed under prevailing court opinion. La Jolla is roughly 10 miles north of downtown San Diego and exhibits similar outflows.

To simulate merger effects, we first look at where patients go if the travel time to Scripps is increased by 10 percent. Under this scenario, Scripps would lose 15 percent of its patients—a time elasticity of 1.5—and the main beneficiaries of this would be CHCV and PVH. If Scripps and CHCV both have 10 percent higher travel times, then Scripps only loses 13.5 percent of its patients. Thus, the predicted effect of a merger on margins is an increase of 11 percent.<sup>60</sup> To translate changes in margins, (P-MC), into changes in price, we use hospitals average operating costs to approximate marginal cost, which indicates that prices would increase by 5.96 percent at CHCV and 6.4 percent at Scripps. Table 1 shows these calculations for all possible Chula Vista area mergers, including a 3-way merger. The merger with the smallest predicted effect involves PVH and CHCV; not surprisingly, Scripps lies directly between these two hospitals.

#### **TABLE 1 ABOUT HERE**

Many of these price increases appear to be above the level generally acceptable to policy makers. These calculations assume that costs do not decrease as a result of these mergers, an assumption generally verified in most of the studies cited in Section III. Overall, the results indicate a significant potential for anticompetitive harm, shifting the affirmative burden of demonstrating cognizable and merger-specific efficiencies to the defendants. Moreover, under the SSNIP criterion in the *Horizontal Merger Guidelines*, Chula Vista is clearly the relevant market—these three firms could indeed profitably

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<sup>60</sup> That is, the ratio of post to pre merger elasticities is  $15/13.5=1.11$ , corresponding to an 11 percent increase in (P-C)/P.

implement a significant and non-transitory increase in price, in spite of outflows to San Diego of 30 percent. The remaining 70 percent are not equally willing to travel. In the same work, we also simulated the effects of a merger in La Jolla, CA and find predicted price increases of roughly 4 percent.<sup>61</sup>

Finally, using an entirely separate data set on the Chicago area market, we conducted a similar analysis for a merger of the only two general acute-care hospitals in Waukegan, IL. We find predicted price increases of roughly 11 percent.<sup>62</sup>

### *The Competitor Share Approach*

The name of our next approach derives from the fact that within a logit demand framework, it is possible to derive an exact expression for a firm's price elasticity that, up to a multiplicative constant, is a function of the market shares of other firms competing for the same customers.<sup>63</sup> The crucial implication is that the decrease in elasticity (and, therefore, increase in price) two firms can obtain via a merger depends on the degree of overlap in the patients they treat. Because patients' needs and insurance coverage are highly heterogeneous, aggregate market shares based on simple counts of patients are not useful for analyzing overlap. Rather, the dispositive issue is whether two hospitals' have significant overlap over a range of sub-markets. As an extreme example, envision a market with three hospitals, each admitting the same number of patients; further, suppose there are only two types of medical care patients could need, 1 and 2. Then the competitive effects of a merger between any two hospitals will hinge not upon their aggregate market shares (33.3 percent each), but rather their market

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<sup>61</sup> Capps et al. (2001a), *supra* note 16 at 49.

<sup>62</sup> Waukegan is 34 miles north of Chicago, Elzinga/Hogarty analysis would clearly include Chicago and Waukegan in the same market. In this case, two large insurers indicated to the authors that the actual price increases were well over 11 percent. Capps et al. (2001a), *Id.* at 24-27.

<sup>63</sup> In the logit model the price elasticity of demand that a particular hospital  $j$  faces in a specific submarket is  $e_j = k f(s_1, \dots, s_j, \dots, s_n)$  where  $k$  is an unknown constant and  $f$  is a function whose arguments are the market shares  $s_i$  of the  $n$  hospitals that compete in the submarket. Then, exactly as in *supra* note 59, the ratio of the pre- and post-merger price-cost margins is determined because the unknown constant  $k$  cancels out.

shares in the sub-markets 1 and 2, as well as the sizes of each sub-market. A merger would not be anticompetitive if one hospital treats only type 1 conditions and the other only type 2; alternatively, if the hospitals only overlap in type 1 patients, and type 1 patients are rare then the aggregate price effects a merger may be negligible.

In actual hospital markets there are a large number of services, and most hospitals offer many but not all services. The empirical challenge, therefore, is to quantify the extent of sub-market overlap between a pair of hospitals and then to map that into predicted effects of a merger. To implement this, we define a sub-market as a unique insurer-DRG (diagnosis related group) pair, for each of the 490 DRGs and 5 classes of insurance (Medicare, MediCal, BCBS, FFS, HMO),<sup>64</sup> yielding 1,957 unique sub-markets.<sup>65</sup> Each hospital sets a different price for each sub-market in which it operates—the price for the same service will generally differ by type of insurance.

Note that there are patient dimensions other than insurance and diagnosis along which a hospital would like to be able to price discriminate but is unable to, for either legal or practical reasons. These characteristics include age, gender, race, income, and location. In setting prices, however, hospitals are able to use information about the frequency of these characteristics in the relevant population. If a hospital knows that elderly patients have very inelastic demand for a service while younger patients have very elastic demand, then the price will be higher as the fraction of the population that is elderly increases, even though all ages pay the same price. Thus, realized prices are just weighted averages of the prices a hospital would like to charge if it were able to price discriminate over all patient characteristics. While this complicates the computation of elasticities, the intuitive structure is straightforward.

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<sup>64</sup> Currently, Medicare prices are set by the federal government, and would not change if hospitals merged. However, we examine Medicare “prices” to illustrate what would happen if Medicare prices were determined in the market. Since we compute price effects separately for each type of insurance, the results for private insurance are not affected by including Medicare.

<sup>65</sup> There are not 2,450 sub-markets because some DRGs are not relevant for some types of insurance. For example, none of the DRGs related to Labor and Delivery correspond to Medicare.

Finally, to assess the effects of a merger, we again consider the difference in demand elasticity that two hospitals face when pricing jointly as opposed to unilateral pricing. Generally, the elasticity reduction—and therefore the price increase—will be greater as the overlap between two hospitals in the various sub-markets is greater. More specifically, the elasticity reduction for a given sub-market will be greater as the product of two merging hospital's market shares in that sub-market increases.<sup>66</sup>

Several notes on this approach are in order. All results in this section assume that merging hospitals equalize their prices post-merger; this was not the case under the time elasticity approach. As in the time elasticity approach, we work in ratios of post-merger to pre-merger margins to circumvent the issue of unobserved prices.<sup>67</sup> Because we compute an unwieldy number of prices (1,957), they must be aggregated in some fashion; results below show them aggregated by payer type and by major disease category (MDC).

We again consider hypothetical mergers between hospitals in and near Chula Vista, California: Community Hospital of Chula Vista (CHCV), Scripps Memorial Hospital of Chula Vista, and Paradise Valley Hospital (PVH). Recall that over 30 percent of the residents of Chula Vista travel elsewhere, primarily San Diego proper, for care. Thus, an analysis based on traditional Elzinga/Hogarty patient flows would not deem a merger between any two of these hospitals anti-competitive.

Table 2 gives the percent increases in margins—that is, margin increases averaged over DRGs within each payer type—for the three potential Chula Vista Mergers. Mergers between the two hospitals in Chula Vista proper have the greatest effect, around 10 percent overall for both hospitals. Qualitatively, the results are similar to those derived using the time-elasticity approach. A merger of

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<sup>66</sup> Capps et al. (2001a), *supra* note 16 at 16. Consider the market for service 1, and let  $s_j(1)$  and  $s_k(1)$  denote the shares in market 1 of hospitals  $j$  and  $k$ . Then for the product,  $s_j(1)s_k(1)$ , to be large—that is for the merger to lead to a substantial price increase in market 1—both shares must be large.

<sup>67</sup> Capps et al. (2001a), *Id.* at 17. As before, the unestimated price coefficient appears in both the numerator and denominator and therefore cancels.

either Chula Vista hospital with PVH yields the asymmetric but intuitively plausible pricing result that PVH, located in between Chula Vista and San Diego, garners a lesser reduction in its demand elasticity.

There is no *a priori* expectation for how margin changes should vary by payer, but from a policy perspective these results are cause for some concern. The largest price effects are consistently found for Medicare, Medi-Cal (Medicaid), and HMO payer types.<sup>68</sup> Mergers not accompanied by significant cost-savings could lead to a significant increase in government health care expenditures, in addition to the already high overall rate of increase.

## **TABLE 2 ABOUT HERE**

Aggregating price changes by service categories (Table 3) highlights the important mediating role of overlap in sub-markets. Diseases of the Nervous System are relatively rare, and the treatments are more specialized. Thus, these patients represent a segment of the Chula Vista market that disproportionately receives treatment in San Diego; all Chula Vista hospitals have small market shares in this segment and accordingly a Chula Vista merger would have a smaller effect on these patients. For Diseases of the Circulatory System, comprised largely of non-acute cardiac procedures, the effects are larger—precisely because CHCV and Scripps compete in this service. This highlights the spuriousness of relying on patient flows: outflows of neurological patients are irrelevant to the increased pricing power a merged CHCV and Scripps would have with respect to this market segment. Pregnancy and Childbirth services appear to be a particularly localized. It is also apparent that PVH and Scripps are strong rivals in labor and delivery; without the other, neither hospital will be able to profitably increase post-merger prices for Pregnancy and Childbirth.

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<sup>68</sup> The Medicare figures represent increases that would have been realized if Medicare prices were set in the market, rather than by fiat.



### TABLE 3 ABOUT HERE

#### *The Option Demand Approach*

The first two approaches assume that patients directly select their hospitals. These approaches may or may not accurately describe markets in which MCOs contract with hospitals. In contrast, managed care is an example of an *option demand market*, in which prior to knowing his needs fully, the consumer commits to a potentially restricted network of sellers.<sup>69</sup> The value that a consumer places on a given network depends on his expectation of how well the network's members will be able to meet his needs once they are realized. A seller adds substantial value to a network to the extent that there are many consumers who highly value that seller and are unable to find another seller who offers comparable value. Again using the logit demand framework, we derive an exact expression for the value a seller adds to a given network. This value depends on its own market shares and the market shares of other firms competing in the same submarkets. To fit our model to insurance networks we assume that, once sellers are included in a network, consumers pay the same price regardless of which network seller they select. Thus, when and if care is needed, the choice among network providers depends only on non-price attributes.

Our analysis of option demand markets proceeds in several steps. First, we estimate patients' aggregate Willingness-To-Pay (or WTP) for the inclusion of a given hospital in the choice set using the formula implied by the logit demand model. The WTP depends on the market shares of each of the hospitals in all of the different submarkets. These market shares in turn depend on the characteristics of

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<sup>69</sup> This approach, presented in detail in Capps et al (2001b), *supra* note 16, is closely related to the method in Town, R. & Vistnes, G., *Hospital Competition in HMO Networks*, 20 J Health Econ., 733-753 (2001). That paper, however, contains a technical error in their calculation of consumers' WTP. Also see Vistnes, G., *Hospitals, Mergers, and Two-Stage Competition*, 67 Antitrust Law J., 671-692 (2000).

the patient population and the ability of each hospital to meet the health care needs (based on service offerings, geographic proximity, quality, etc.) of the consumers in each of the submarkets. The WTP numbers that we compute represents the surplus available to be split between the hospital and the insurer, in proportions determined through negotiations. To determine the proportion of WTP that is actually retained by the hospitals, we regress hospitals' variable profits from private-pay inpatient services on our measure of WTP.<sup>70</sup> Finally, we simulate mergers by calculating the additional bargaining power two hospitals have when jointly entering or withdrawing a network.

In this setting, pricing is determined in up-front negotiations between hospitals and MCOs. Hospitals will be able to extract higher prices from MCOs in proportion to the degree to which their withdrawal from the network would decrease the MCOs members' WTP for the resulting network. Once again, the underlying issue is substitutability. If hospitals A and B are viewed as close substitutes by most of an MCOs members and both are in the network then, acting alone, neither hospital has significant leverage. However, if these hospitals merge and threaten to jointly leave the network, their leverage may be substantially greater.

The following example illustrates our methodology. Suppose consumer  $i$ , a young adult apparently in good health, is evaluating a MCO that offers him access for the next year to a network of hospitals that includes hospital  $j$ . Hospital  $j$  is located far from his home and he can only conceive of one circumstance in which he would choose  $j$  for his care: congestive heart failure requiring a heart transplant. That is, hospital  $j$  is commonly thought to be the best heart transplant hospital in the region. Therefore, looking ahead, consumer  $i$  imagines that should he be diagnosed with congestive heart

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<sup>70</sup> Our WTP measure is only identified up to an unknown multiplicative constant. The regression identifies the product of this constant and the proportion of the surplus that the hospitals capture.

failure, his WTP to have access to hospital j would be high, say \$60,000.<sup>71</sup> We call this the *interim* WTP—it is the WTP conditional on the patient knowing his condition. In other words, given that during the next year he learns that he has congestive heart failure but has not yet decided at which hospital he will take treatment, he would pay up to \$60,000 to have hospital j included in his network. By contrast, if consumer i should tear a ligament in his knee, then his interim WTP to have access to hospital j would be low, say \$10, because there are several closer, more convenient hospitals that could provide at least as good care as j. Finally if he remains healthy, then hospital j is of no use, and his interim WTP for access to j is \$0.

We can now translate interim WTP into *ex ante* WTP, that is, the patient's WTP prior to knowing his condition. Consumer i understands, happily, that his probability of remaining healthy for the next year is high (89.995 percent), of injuring a knee ligament is low (10 percent), and developing congestive heart failure is negligible (.005 percent). Therefore his *ex ante* WTP to have j included in the network is only \$4. That is, it is calculated as his interim WTP across all possible diagnoses (including healthy) weighted by the probability of each diagnosis.<sup>72</sup> If most of an MCO's enrollees are like consumer i, then the MCO will not pay hospital j a premium price for its services because it does not add premium value. If, however, there are many enrollees in the MCO's plan for whom congestive heart failure is more likely, or there are many enrollees who live close to hospital j, then the aggregate *ex ante* WTP across all enrollees may be quite high. In principle, hospital j would use this as a bargaining lever to secure higher than usual rates from the MCO and thereby capture more of the value it creates for consumers.

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<sup>71</sup> This \$60,000 represents the difference between the dollar value of receiving the transplant at hospital j versus the next best provider in the network, not the value of the transplant itself, which would be higher.

<sup>72</sup> The weighted sum for hospital j is  $.00005(\$60,000) + .1(\$10) + .89995(0) = \$4$ .

In practice, computing this WTP involves accounting for two dimensions of heterogeneity. As illustrated above, one of those dimensions is the relative valuation of each hospital for different conditions. Second, for patients with differing demographic characteristics, the probabilities of realizing the various conditions also vary.

These two dimensions do not present barriers to the analysis. Fortunately, the same choice model used in the previous two approaches identifies the relative values of each hospital, conditional upon a patient's realized ailment, i.e., the interim value. Thus, we can estimate the value of having a given San Diego hospital in the choice set in the event that a San Diego resident needs an appendectomy, or a baby delivered, or hip replacement surgery, and so on.<sup>73</sup> The data also permit us to compute the *ex ante* probability that a patient with given demographic characteristics will be admitted within each Diagnostic Related Group (DRG).<sup>74</sup> After calculating this for each patient and summing over patients, we arrive at aggregate WTP for the inclusion of hospital *j* in the network.

At this point, we can express WTP in units of utility, and compare WTP across hospitals. To measure WTP in dollars, we regress WTP on hospital profits and find that in San Diego each unit of WTP corresponds to \$5,932 of profit from inpatient hospital services. Thus, we predict any change that increased the aggregate WTP for inclusion of a hospital in a network by 100 units would, on average, increase that hospital's profit by \$593,200. Mergers are precisely such a change. Figure 1 graphs the relationship between profits from private-pay inpatient services and WTP for San Diego hospitals and demonstrates a clear and positive relationship. Note that no difference is apparent between for-profit and nonprofit hospitals. Further, the same positive relationship between profits and WTP hold true even if

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<sup>73</sup> The exact calculation is beyond the scope of this work; for details, see Capps et al. (2001b) *supra* note 16 at 10-16.

<sup>74</sup> DRGs partition all reasons for a hospital admission into roughly 490 distinct categories. Our demographic variables are income, race, and an indicator variable for age>60. Thus, we compute the probability of an elderly white male in the highest income group needing a pacemaker as the number of pacemaker implantations among patients in that group divided by the total number of patients in that group. We have data on nearly 80,000 patients, so these probabilities are well defined.

we perform a multivariate regression controlling for hospital size. In other words, our WTP captures the true underlying attractiveness of a hospital to managed care payers.

## **FIGURE 1 ABOUT HERE**

When most patients view two hospitals as close substitutes in a network, neither will have significant leverage with MCOs and neither will have a large WTP. Should those same hospitals merge, however, then they may gain the upper hand on MCOs. When they negotiate together, the MCO's patients have no longer have the other hospital as an alternative. Their joint power will depend on the MCOs' WTP for inclusion of *both* hospitals in the network, relative to the alternative of having neither. If there is no third hospital that is viewed as closely substitutable for these two hospitals, then WTP for the pair can significantly exceed the sum of WTP for each individual hospital. Conversely, if the network includes a variety of substitutable hospitals, or if the merging hospitals are not substitutable in the first place, the joint WTP will be nearly equal to the sum of individual WTP.

To assess the potential for pairwise mergers in San Diego to increase WTP, we compute the difference between a merging pair's joint WTP and the sum of their individual WTPs. Multiplying these differences by the dollar value of a unit of WTP (\$5,932) gives the predicted profit increases for each potential merger. Recall that in an option demand market, patients pay their MCO in advance and, at the time of hospital admission, patients pay the same price at all network hospitals. Thus, we do not expect quantities to change. Therefore, the profit increase can be translated into a price increase by dividing the increased profit at the merging hospitals by their combined number of patients.

We again illustrate by focusing on possible mergers of Chula Vista hospitals. Again, we find that this suburb is a relevant geographic market in the sense advocated in the *Guidelines* and that mergers

would lead to significant price increases (Table 4). Pairwise mergers among the three hospitals would lead to price increases of 4.3 percent to 31 percent and a 3-way merger would increase prices by 37.6 percent. Although these increases are generally in line with those computed using the first two approaches, the high-end estimates are larger under the option demand approach.

#### **TABLE 4 ABOUT HERE**

Results of repeating the same exercise for other possible mergers are in Table 5. The simulated merger of the other suburban pair of hospitals, in La Jolla, shows a predicted price increase of 15 percent. This table also highlights the interplay between service overlap, geography, and competition. Both Sharp Memorial and University of California, San Diego (UCSD) are near downtown San Diego and both are high-tech hospitals offering labor and delivery services. Due to proximity and service overlap, a merger of these two hospitals is predicted to lead to significant price increases. San Miguel and Mercy are also located near downtown and are even closer to each other than Sharp and UCSD, yet a merger of these two hospitals would have a small effect. The difference arises because San Miguel and Mercy do not have significant services overlap and there are also multiple nearby hospitals offering similar services, including, Sharp and UCSD. Mergers of hospitals that are far apart and lack service overlap, for example Scripps Chula Vista and Mission Bay, have essentially no predicted effect.

#### **TABLE 5 ABOUT HERE**

### **V. Conclusion**

We began this article with several related questions of practical significance for antitrust analysis of hospital mergers. Does substantial patient flow data indicate the absence of market power? Do

mergers that easily pass muster using flow analysis fail or pass using the SSNIP criterion? Do patient flow data provide an accurate view of the appropriate market boundaries? We conclude that patient flow data have little relationship to the SSNIP criteria over a wide range of situations in which patient flow data indicates a competitive market is present. In other words, merger analysis using patient flow data incorrectly indicates that there is no problem when more structured approaches indicate that there may indeed be a risk of competitive harm.

We advocate replacing the use of flow data in courtroom proceedings with formal demand analysis. We derive three related methods based on logit demand to identify the ability of sellers to raise prices in differentiated goods markets. Two models apply when consumers make direct purchases, and one applies in option demand markets. The models yield very consistent results – mergers that are anticompetitive using one approach tend to be anticompetitive using the others. This is not surprising, given the common underlying logit demand structure. In logit demand, sellers who are attractive to a large number of consumers yet have no obvious competitors are able to raise prices. This is a powerful and satisfying intuition that is borne out in our empirical analyses.

Our results show that, at best, flow data can only be used accurately in extreme situations, when flows are extraordinarily large or non-existent, situations of little interest to courtroom proceedings. At any intermediate level, aggregate patient flow data are simply uncorrelated with the SSNIP criteria and are unrelated to market power and, therefore, not useful for settling market boundary issues in court.

The approach we advocate is more cautious. Courts should begin with the presumption that hospital markets are local. That is, consistency with the SSNIP would lead to narrow definitions of market boundaries. Specifically, suburban hospitals can be a market under the SSNIP criteria, even when there are significant outflows of patients from the suburban hospitals. Based on our analysis of San Diego hospitals, we find that this is equally true for non-profit and for-profit hospitals. We further

conjecture that had such analysis been used in recent cases, rural towns such as Joplin, Missouri, Ukiah, California, and Dubuque, Iowa would have been treated as distinct markets. The implications of such an analysis for the Long Island, New York merger remain an open empirical question.

Related, we see further need to scrutinize hospital mergers in spite of recent losses in the courts. The key factor in these losses was the use of E/H or related criteria. Looking back, we see a need to alter the arguments used against E/H analysis. Of the many potential problems with E/H, one particularly stands out in hospital mergers—what we have elsewhere labeled the “silent majority fallacy.” To wit, the presence of a small percentage of shoppers does not discipline firms from using market power. Non-traveling customers are a silent majority, left with fewer choices after a merger. Said another way, in markets with heterogeneous tastes for different services, the presence of some travelers with one set of needs does not necessarily influence the pricing of services for non-traveling patients with other sets of needs. Hence, price increases are certainly feasible even in the presence of significant patient outflows from traveling patients.

The use of flow data is even more questionable in a managed care setting where the *ex ante* nature of pricing renders the connection between consumer flows and pricing power more tenuous: *ex post*, at the interim stage, some unlucky patients may suffer an ailment for which they are willing to travel a great distance to receive care. This in no way indicates that they did not, at the time of choosing their insurance, place a high value on having one or more local hospitals in their network.

Insurance companies often directly pay the price of increases in market power resulting from mergers. Hence, we expect insurance companies could use these findings as a basis for opposition to some mergers. This could manifest in one of two ways. First, each merger has a 30 day period for comment, one setting where such objections can be raised. Second, if and when enough money is at stake, we might even see private suits in opposition to proposed mergers.



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<b>Table 1. Price Effects of Chula Vista Mergers Time-Elasticity Approach</b>				
	w/Scripps	w/Paradise	w/Community	All Three
Scripps	n/a	8.86%	6.40%	18.18%
Paradise	3.62%	n/a	2.86%	7.34%
Community	5.96%	7.05%	n/a	15.71%

<b>Table 2: Average Margin Increase, by Merger and Payer Type, Competitor Share Approach</b>								
Merger	Hospital	Margin Increase (%), by Payer						Price Increase from Time Elasticity Approach
		Medi- care	Medi- Cal	BCBS	FFS	HMO	Over all	
CHCV and Scripps	CHCV	11.4%	14.4%	7.7%	4.2%	11.1%	10.0%	13.3%
	Scripps	16.4%	6.5%	11.5%	3.5%	11.0%	9.6%	11.1%
Scripps and Paradise	Scripps	13.9%	13.3%	6.2%	6.8%	10.5%	10.5%	15.4%
	Paradise	9.2%	13.2%	6.0%	3.9%	9.7%	8.6%	6.9%
CHCV and Paradise	CHCV	11.1%	12.3%	6.4%	6.5%	9.3%	9.4%	15.7%
	Paradise	10.8%	4.4%	9.6%	2.9%	8.2%	6.9%	5.4%

<b>Table 3: Average Margin Increase (%), by Merger and Major Diagnostic Category</b> <i>Competitor Share Approach</i>						
Merger	Hospital	Diseases of the Nervous System	Diseases of the Circulatory System	Diseases of the Skin, Subcutaneous Tissue and Breast	Pregnancy and Childbirth	Infectious and Parasitic Diseases
CHCV and Scripps	CHCV	7.7%	12.9%	10.1%	15.6%	11.3%
	SCRIPPS	7.6%	15.3%	9.9%	3.1%	8.8%
Scripps and Paradise	SCRIPPS	9.3%	11.5%	9.9%	15.4%	11.8%
	Paradise	6.9%	11.0%	8.1%	16.2%	9.6%
CHCV and Paradise	CHCV	8.6%	9.5%	8.9%	13.8%	10.5%
	Paradise	5.9%	11.1%	6.7%	2.2%	5.9%

<b>Table 4: Merger Simulations for Chula Vista</b> <i>Option Demand Approach</i>				
<b>Percent Increases in Joint Profits</b>				
	w/Scripps	w/Paradise	w/CHCV	All Three
Scripps	**	31.24%	7.33%	37.60%
Paradise		**	4.33%	37.60%
CHCV			**	37.60%
<b>Percent Price Increase Relative to Patient-Weighted Pre-Merger Average Price</b>				
	w/Scripps	w/Paradise	w/CHCV	All Three
Scripps	**	43.65%	7.36%	39.91%
Paradise		**	3.37%	39.91%
CHCV			**	39.91%

**Table 5: Other Potential San Diego Mergers**  
*Option Demand Approach*

Merging Hospitals	Percent Increase Profit	Pre-Merger Price	Post-Merger Price	Percent Increase Price	Miles (Minutes)	# Teaching	# Trans-plant	# Delivery
Sharp Memorial and UCSD <sup>1</sup>	24.01%	\$3,274	\$3,612	10.33%	5.2 (10)	1	2	2
Scripps La Jolla And HCA <sup>2</sup>	27.47%	\$3,223	\$3,705	14.98%	1.5 (3)	1	1	1
San Miguel And Mercy <sup>3</sup>	4.78%	\$3,033	\$3,120	2.86%	1.2 (3)	2	0	1
Paradise And HCA <sup>4</sup>	2.90%	\$3102	\$3182	2.67%	19.6 (26)	1	2	1
Villa View and Coronado <sup>5</sup>	2.93%	\$2,070	\$2,228	7.63%	9.9 (22)	0	1	1
Scripps Chula Vista and Mission Bay <sup>6</sup>	0.94%	\$1,641	\$1,655	0.81%	16.4 (23)	0	0	1

1. Sharp Memorial and UCSD are near downtown San Diego.
2. Scripps La Jolla and HCA are a northern satellite-pair.
3. San Miguel and Mercy are both near downtown San Diego
4. Paradise and HCA are on opposite sides of downtown San Diego.
5. Villa View is in Northeast San Diego and Coronado is near Downtown.
6. Scripps and Mission Bay are on opposite sides of downtown San Diego.

Figure 1: DHS Profit (Private-Pay Patients) & WTP (MCO Patients)

