Do Nonprofit Hospitals Exercise Market Power?

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Abstract

Several theories of nonprofit hospital behavior predict that nonprofit hospitals behave in the consumer interest and thus do not exercise market power. If these theories are correct, then antitrust enforcement of hospital mergers should be restricted only to those markets in which a nonprofit hospital cannot offset anticompetitive behavior by for-profit hospitals. In this paper, we measure a hospital's market power using two alternative measures. The first is the HHI for a county; the second is the distance from a hospital to its closest competitor. For both measures, we find that nonprofit hospitals set higher prices when they have more market power.

I. Introduction

Hospital mergers can lead to higher prices and lower quality for consumers by reducing competition. Hospital mergers can also enable hospitals to achieve scale and scope economies that may ultimately benefit consumers. Balancing these two opposing effects involves identifying the set of hospitals that currently or soon will compete with the merging hospitals, predicting the post-merger behavior of the merging hospitals and their competitors, and assessing whether scale and scope economies likely outweigh the harm from any possible loss of competition. This paper considers one question that relates to the second issue: Do nonprofit hospitals, which are barred from paying out any surplus as profit, exercise market power? If nonprofit hospitals exercise market power, then antitrust enforcement should challenge hospital mergers that create market power without creating offsetting efficiency benefits. However, if nonprofit hospitals choose not to exercise market power, then antitrust enforcement of hospital mergers should be restricted to those markets in which a nonprofit hospital can not offset anticompetitive behavior by for-profit hospitals.

Several theories seek to explain the behavior of nonprofit hospitals. While all of these theories assume that some constituency controls the nonprofit hospital and uses this control to pursue some objective, the theories differ in the identity of the controlling constituency and the objective pursued. One theory argues that independent, nonprofit hospitals behave as consumer cooperatives.[1] According to this theory, community representation on a nonprofit hospital's board of directors ensures that the nonprofit hospital will set competitive prices even when the nonprofit hospital possesses market power.[2]

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[1] See Lynk (1994).

[2] Several recent court cases have considered this argument. While the court accepted this argument in U.S. v. Carilion Health System, 707 F.Supp. 840 (W.D. Vir. 1989) and FTC v. Butterworth Health Corp. and Blodgett Memorial Medical Center, No. 1:96-CV-49 (W.D.MI Sept. 26, 1996), the court rejected this argument in U.S. v. Rockford Memorial Corporation, 717 F.Supp. 1251 (N.D.Ill. 1989), aff'd, 898 F.2d 1278 (7th Cir. 1990).

Several other theories assume that hospital administrators control nonprofit hospitals. The first of these theories assumes that hospital administrators seek to maximize the hospital's output. Thus, this theory predicts that a nonprofit hospital would not exercise market power since doing so would only reduce the number of patients served. The second of these theories assumes that hospital administrators obtain utility from both the quantity and the quality of a hospital's output.[3] The desire to increase the quality of the output may prompt a hospital to offer a higher quality of service than

[3] See Newhouse (1970).

[4] See Pauly and Redisch (1973).

bed capacity) rather than increasing the number of staff physicians. This increases the cost of hospital care. Where this occurs, medical care is both monopolized and produced inefficiently by combining too little physician services and too much hospital services.

Several of the theories described above predict that nonprofit hospitals do not exploit market power, while several of the theories predict that they do. This paper examines the behavior of hospitals in California in order to differentiate between these two possibilities. Section II of the paper reviews previous empirical studies, Section III describes the model and the data, Section IV presents the results, and Section V concludes.

II. Literature Review

Two previous studies consider how nonprofit hospitals behave when they have market power.[5] Lynk (1995) tests whether the relationship between price and market power differs for nonprofit, for-profit, and government hospitals. Lynk measures market power as a hospital's share of admissions in the county where it is located and as the Herfindahl-Hirschman Index for that county. Although Lynk estimates several specifications, let us focus on two in which the dependent variable is a hospital's price. In the first, Lynk uses slope dummy variables to test whether the relationship between price and market share differs for nonprofit, for-profit, and government hospitals. Using this specification, Lynk finds a positive relationship for for-profit hospitals and a negative relationship for nonprofit and government hospitals. However, none of these relationships is statistically significant.

In the second specification, Lynk uses two variables, market share and HHI, to measure market power. He then uses slope dummy variables to test whether the relationships between net price and market share and net price and HHI differ for nonprofit, for-profit, and government hospitals.

[5] A number of empirical studies examine generally whether nonprofit hospitals behave differently than for-profit hospitals. These include Watt et al. (1986), Sloan and Vraciu (1983), Hoerger (1991), and Norton and Staiger (1994).

For each ownership type, the sign of the coefficient for market share differs from the sign of the coefficient for HHI. This prevents any simple interpretation of these coefficients. However, Lynk does use these coefficients and the mean values for market share to simulate the effect of a merger of two hospitals of the same ownership class. Lynk estimates that a merger of two for-profit hospitals would increase net price by 8.7 percent, a merger between two government hospitals would increase price by 2.5 percent, and a merger between two nonprofit hospitals would decrease price by 4.1 percent. The results for the nonprofit and government hospitals are statistically significant at the 5 percent level, while the result for the for-profit hospitals falls just short of being statistically significant at the 10 percent level. Thus, Lynk's results suggest that nonprofit hospitals do not exploit market power, for-profit hospitals do exploit market power, and government hospitals exploit market power to a small extent.

Lynk's results, while interesting, should probably be viewed with some caution. Melnick et al. (1992) and Dranove et al. (1993) find a positive relationship between price and concentration in samples that include nonprofit, for-profit, and government hospitals in California. Melnick et al., for instance, calculate that moving from an HHI of 3333 to 5000 would lead to a price increase of 9 percent. Lynk's results are consistent with these studies only if the positive relationships between price and market power that he finds for for-profit and government hospitals dominate the negative relationship between price and market power that he finds for nonprofit hospitals. This seems unlikely given the magnitude of these relationships and the composition of his sample. Of the hospitals in his sample, 20 percent are for-profit, 28 percent are government, and 52 percent are nonprofit.

In the second study, Gruber (1994) examines the effect of increased price shopping over the 1984-1988 period on the provision of uncompensated care by California hospitals. Gruber finds that net income for nonprofit hospitals rose more slowly in less concentrated markets than in more concentrated markets. He also finds that the amount of uncompensated care provided by nonprofit

$$PRICE = \alpha_1 + \alpha_2 PROFIT + \beta_1 MARKETPOWER + \beta_2 PROFIT*MARKETPOWER + \beta_3 CASEMIX + \beta_4 ALOS + \beta_5 LONGTERM + \beta_6 WAGEINDEX + \beta_7 INCOME + \beta_8 BEDSIZE + \varepsilon,$$

B. Variable Descriptions

Price

PRICE is the average price paid per inpatient, acute-care admission for privately insured patients. PRICE is computed by multiplying the total net revenues from privately insured patients by the ratio of gross *inpatient* revenue from privately insured patients over the gross *total* revenue from privately insured patients. This yields an estimate of the net *inpatient* revenue from privately insured patients.[10] The price paid per admission for privately insured patients is this amount divided by the total number of discharges of privately insured patients.[11]

Market Power

(...continued)
variables generally do not change. (See Models 5 and 6 in Appendix A).

[10] A hospital's net revenue equals its gross revenue minus any discounts that it offers. Since hospitals generally offer substantial discounts, computing PRICE using net revenue rather than gross revenue is preferable.

[11] The data that we use groups indigent patients and privately insured patients into a category called "other third party." We adjust the number of "other third party" discharges by the ratio (total revenue - bad debt)/total revenue. This yields an estimate of the number of discharges of privately insured patients. Dividing net inpatient revenue from privately insured patients by this estimate yields PRICE.

Factors affecting a hospital's market power include the distance to surrounding hospitals, the size and service mix of these hospitals, and the behavior of these hospitals. Because no single measure of market power can fully capture all of these factors, we use two alternative measures of market power. Each has advantages and disadvantages.

HHI, our first measure of market power, computes a Herfindahl-Hirschman Index based on the licensed beds of the acute-care hospitals within a county. While HHI accounts for the presence and relative size of the acute-care hospitals within the defined market, HHI has several disadvantages. First, the definition of the market is arbitrary.[12] Second, HHI accounts for neither localized competition within the market nor competition outside of the market. For instance, an HHI of 10,000 does not necessarily indicate whether a hospital's closest competitor is five miles away or fifty miles away. Third, HHI imperfectly measures market power if hospitals exploit market power differentially based on their ownership: A hospital that shares a market with a for-profit hospital may have more market power than a hospital that shares a market with a nonprofit hospital.[13]

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[12] In previous studies of hospital pricing behavior, Noether (1988) defined markets as metropolitan statistical areas, Staten et al. (1988) and Lynk (1995) defined markets as counties, and Dranove et al. (1993) defined markets as urbanized areas. These definitions are also arbitrary. Melnick et al. (1992) defined markets based on actual patient flow. We were reluctant to do this because of possible endogeneity problems.

We also computed HHI by defining geographic markets as a 15-mile radius around an urban hospital and a 20-mile radius around a rural hospital. The estimated coefficient for HHI changes little when we define markets this way.

[13] If nonprofit hospitals behave as fringe competitors irrespective of their market share, then presumably the square of their market shares should not be included in computing HHI. (e.g., if a for-profit and a nonprofit hospital each had a 50 percent market share, then the HHI should be 2500 not 5000.) We regressed PRICE on the HHI computed using all hospitals, the HHI computed using only for-profit hospitals, and the control variables described later. We found that the HHI computed using all hospitals is statistically significant while the HHI computed using only for-profits is not. This suggests that the HHI computed for all hospitals is the better measure of market power

MINDIST1, the second measure of market power, measures market power as the distance from a hospital to its next closest competitor.[14]

[14] We assigned each hospital in the data set the latitude and longitude coordinates of the post office in their zip code. $DISTANCE_j$ is the distance between $hospital_i$'s coordinates and $hospital_j$'s coordinates. MINDIST is the smallest DISTANCE for which $hospital_j$ has at least 40 percent of the licensed beds as $hospital_i$. (We also measured MINDIST as the smallest DISTANCE for which $hospital_j$ has at least 25 percent of the licensed beds as $hospital_i$. The results changed little.)

selectively with hospitals (Gruber (1994)). Prior to 1987, California's CON regulation affected both hospital entry and hospital size.

Ownership

The data we use classifies hospitals into four categories based on ownership: nonprofit, for-profit, government, and district. For-profit, government, and district hospitals should not be included in our sample if they behave differently than nonprofit hospitals with respect to the other control variables, which are described later. To test whether this is the case, we interact dummy variables for for-profit, government, and district hospitals with the market power control variables and with the other control variables. We then estimate our model using these interaction terms. With respect to the other control variables, an F-test for each set of interaction terms indicates whether an ownership class (e.g., for-profit hospitals) behaves the same as nonprofit hospitals. With respect to the other control variables, these F-tests indicate that we can reject the hypothesis that government hospitals behave the same as nonprofit hospitals at the 1 percent level, but that we can not reject the hypothesis that for-profit and district hospitals behave the same as nonprofit hospitals at even the 10 percent level. Based on this, we include for-profit and district hospitals in our sample, but we delete government hospitals.

District hospitals are nonprofit hospitals that have a publicly elected board and can levy taxes. District hospitals tend to be smaller than other hospitals and tend to serve rural areas. Although Lynk (1995) treats district hospitals as government hospitals, we believe that district hospitals are more similar to nonprofit hospitals than to government hospitals. Consequently, we group district hospitals and nonprofit hospitals together into one nonprofit category. This leaves two ownership classes, nonprofit and for-profit, in our sample.

The intercept dummy variable PROFIT measures any difference in the intercepts for nonprofit and for-profit hospitals. Interacting

this dummy variable with MARKET POWER allows the relationship between PRICE and MARKET POWER to vary for nonprofit and for-profit hospitals while allowing the observations for both ownership classes to be used in computing the coefficients of the other control variables.[15] Given this specification, the coefficient for the MARKETPOWER variable (either HHI or MINDIST) measures the relationship between price and market power for nonprofit hospitals. The sum of the coefficient for the MARKET POWER variable (either HHI or MINDIST1) and the coefficient for the interaction term (either PROFIT*HHI or PROFIT*MINDIST1) measures the relationship between price and market power for for-profit hospitals.

Other Control Variables

[15] We also regress PRICE on MARKETPOWER and the other control variables for a sample of only nonprofit and district hospitals. The results are presented in tables 8 and 9 in Appendix A.

hospitals with longer average lengths of stay are likely treating sicker patients. The coefficient for ALOS should be positive.[16] LONGTERM measures the ratio of long-term days to total inpatient days. Long-term care, which includes skilled nursing care, intermediate care, and sub-acute care, is less expensive per day than is acute care. Because of the way some hospitals report their data, our measure of price for some hospitals will include some long-term days. LONGTERM, which is included to account for this, should be negative.

WAGEINDEX attempts to account for differences in wage rates across geographic areas. The Health Care Financing Administration, which administers Medicare, computes a wage index for

[16] CASEMIX and ALOS are determined by three factors: The health of the population that the hospital treats, the relative cost of treating different illnesses (measured by the DRG weights), and a hospital's ability to provide advanced care. We believe that the first two factors are largely beyond a hospital's control. While a hospital does decide whether it will provide advanced care, we believe that this factor is largely determined by previous competitive conditions.

[17] Federal Register, Vol 60, No. 170, September 1, 1995, p 45883.

[18] For Los Angeles, which is a very large city in both area and population, we measure income as 1989 per capita income for the zip code where the hospital is located.

INCOME should be positive. Finally, BEDSIZE measures the number of licensed beds. The coefficient for BEDSIZE would be negative if scale economies enable large hospitals to produce inpatient acute care at lower cost than small hospitals. The coefficient for BEDSIZE would be positive if larger hospitals offer higher quality, higher cost care that is not picked up by our other control variables.[19]

C. Data Description and Sources

An observation is the price charged in 1993 by a general acute care hospital in California. Therefore, the data set excludes psychiatric hospitals, rehabilitation hospitals, specialty hospitals, and hospitals with a heavy nursing focus.[20] While all of the remaining hospitals are used in the computation of the HHI and MINDIST1 variables, ninety-two additional hospitals are excluded as observations. Thirty-six hospitals did not report sufficient data to compute PRICE.[21] Ten university teaching hospitals are deleted as observations because both their mission, which is to train physicians, and the type of care that they provide differ significantly from other hospitals.[22] Twenty-six hospitals are deleted from the sample because they had fewer than 100 discharges of private-pay patients in 1993 or because they had fewer than 20 staffed beds. Sixteen government hospitals are deleted for the

[19] While BEDSIZE may be endogenous, we believe that endogeneity bias is not serious for the reasons listed on page 8.

[20] OSHPAD groups hospitals into peer groups, which indicate the type of care that the hospital provides. The data set excludes hospitals in peer groups 1, 7-13, and 15-24. The data set also excludes five hospitals where the ratio of long-term days to total days exceeded 0.75 and several hospitals that the 1993 American Hospital Association does not categorize as general acute care hospitals. Finally, the data set excludes hospitals operated by Vencor, a chain of specialty hospitals, and THC Orange Hospital, which only had discharges in 9 DRG's in 1993.

[21] Twenty-five of these hospitals are operated by pre-paid health care plans such as Kaiser.

[22] OSHPAD coded nine of these hospitals as university teaching hospitals. We added USC-University Hospital to this list.

reasons discussed earlier. Two hospitals are deleted from the sample because they had a negative price, and one hospital is deleted because its net revenue exceeded its gross revenue. Finally, Ukiah Valley Hospital is deleted from the sample because the merger that created this hospital was being reviewed by the Federal Trade Commission through 1993. Ukiah Valley Hospital's pricing behavior may have been affected by this review.

The data for this study comes from several sources. California's Office of Statewide Health Planning and Development (OSHPAD) compiles quarterly financial data for California hospitals. PRICE, ALOS, LONGTERM, BEDSIZE, and the ownership dummy variables come from this data set.[23] OSHPAD also compiles annual data on inpatient discharges for each hospital in California. We use this data to compute CASEMIX. WAGEINDEX is simply the HCFA Medicare Wage Index for the county in which a hospital is located.[24] Finally, the data for INCOME is reported in the Summary Social, Economic, and Housing Characteristics published by the U.S. Department of Commerce. Table 1 summarizes the means and standard deviations of the variables.

IV. Results

Table 2 presents the estimated coefficients for two models in which HHI measures market

[23] OSHPAD codes Barstow Community Hospital as a for-profit hospital because it is operated by a for-profit corporation. However, the City of Barstow both owns the hospital and places some constraints on the hospital's pricing. For this reason, we have re-coded Barstow Community Hospital as a government hospital.

[24] Federal Register, Vol 60, No. 170, September 1, 1995, p. 45792.

[25] CASEMIX is based on the DRG weights used by the Health Care Financing Administration, which administers the Medicare program. These weights are constructed so that a diagnosis with a DRG weight of 2 should cost twice as much to treat as a diagnosis with a DRG weight of 1. If these weights accurately reflect the cost of treating diagnoses for privately insured patients, then the coefficient for CASEMIX should roughly equal the mean of PRICE divided by the mean of CASEMIX (see Table 1). It does not. Our estimate of the CASEMIX coefficient (5000 dollars) is roughly two-thirds of this quotient (6870 dollars/0.93 = 7387 dollars).

the coefficient for yHI is positive, large, and statistically significant.

PROFIT*yHI is positive and large. However, because it is not statis

creating offsetting efficiencies. While these results differ from Lynk's (1995) results, they are consistent with findings by Gruber (1994), Dranove et al. (1993), and Melnick et al. (1992).

Analyzing how nonprofit hospitals use whatever surplus they obtain by exploiting market power is beyond the scope of this paper. However, as noted earlier, Gruber (1994) finds that California hospitals in competitive markets decreased uncompensated care by 0.4 to 1.0 percent for each 1 percent decline in hospital resources. This suggests that at least some of the surplus that a nonprofit hospital would generate by exercising market power would be used to provide charity care. However, even if nonprofit hospitals exploit market power in part to provide charity care, society might be concerned about such an exercise of market power for two reasons. First, part of the surplus may be used for other purposes such as fancier offices. Second, from society's standpoint, an implicit tax on privately insured patients may be an inefficient means of obtaining the revenue needed to provide charity care.

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TABLE 1
DESCRIPTIVE STATISTICS

Variables	Description	Mean	Std. Dev.	Minimum	Maximum
PRICE	average net price per discharge (private insurance)	6870	2702	1309	19671
HHI	Herfindahl-Hirschman Index for county	1822	2025	343	10000
MINDIST1	distance to a hospital's closest competitor	6.19	8.67	0.00	60.6
CASEMIX	case mix index	0.93	0.20	0.52	1.90
ALOS	average length of stay	3.97	1.15	1.99	10.20
LONGTERM	ratio of long-term days to total days	0.062	0.14	0.0	0.69
WAGEINDEX	Medicare wage index	1.21	0.14	1.01	1.52
INCOME	per capita income (county, 000's)	16.4	7.4	5.8	82.9
BEDSIZE	licensed beds	213.5	152.5	30	1094

sample:
nonprofit hospitals - 214
for-profit hospitals - 82

TABLE 2
REGRESSION RESULTS USING HHI

	MODEL 1	MODEL 2
INTERCEPT	-5694.04*** (1268.81)	-5692.72*** (1267.91)
HHI	0.3230*** (0.0679)	0.3054*** (0.0694)
PROFIT*HHI		0.3171 (0.2673)
CASEMIX	4811.46*** (688.07)	4715.16*** (692.36)
ALOS (average length of stay)	531.87*** (123.87)	537.10*** (123.86)
LONGTERM (long-term days/total days)	-1039.68 (872.25)	-1047.73 (871.66)
WAGEINDEX	2746.72*** (965.68)	2831.23*** (967.62)
INCOME	79.81*** (16.99)	81.47*** (17.04)
BEDSIZE	2.63*** (0.94)	2.54*** (0.94)
PROFIT	874.44*** (300.14)	554.18 (403.55)
ADJUSTED R^2	0.4482	0.4490
SAMPLE SIZE	296	296

Standard errors in parentheses
* significant at 10 percent, ** significant at 5 percent, *** significant at 1 percent

TABLE 3

APPENDIX A

ALTERNATIVE FUNCTIONAL FORMS AND DATA SAMPLES

	Model 5	Model 6	Model 7
	log-linear (HHI)	log-linear (MINDIST1)	4 outliers (MINDIST1 >40) deleted
INTERCEPT	6.50*** (0.31)	7.53*** (0.21)	-4855*** (1409.8)
HHI	0.118*** (0.024)		
PROFIT*HHI	-0.076 (0.048)		
MINDIST1		0.047** (0.022)	39.70* (21.57)
PROFIT*MINDIST1		-0.100** (0.049)	-104.0 (72.5)
CASEMIX	0.579*** (0.105)	0.600*** (0.109)	5007*** (717)
ALOS	0.393*** (0.086)	0.353*** (0.088)	491.1*** (128.0)
LONGTERM	-0.285* (0.157)	-0.204 (0.161)	-791.6 (911.9)
WAGEINDEX	0.372*** (0.180)	0.328* (0.188)	2598** (1044)
-791.6)	(03061) 4 0544)		
	(0.024)		
		38 -3.9)	0.18 6

PRICE-MARKET POWER REGRESSIONS FOR NONPROFIT AND DISTRICT HOSPITALS ONLY

	Model 8	Model 9
INTERCEPT	-4578.77*** (1247.34)	-4281.89*** (1362.38)
HHI	2732*** (631)	
MINDIST		40.30*** (15.16)
CASEMIX	4717.86*** (724.63)	4887.85*** (749.19)
ALOS	410.20*** (131.94)	382.82*** (135.30)
LONGTERM	-788.91 (796.11)	-683.91 (817.84)
WAGEINDEX	2729.74*** (944.00)	2979.47*** (1016.78)
INCOME	45.78** (22.39)	32.05 (22.77)
BEDSIZE	3.11*** (0.90)	2.52*** (0.90)
ADJUSTED R^2	0.4473	0.4170
SAMPLE SIZE	214	214

standard errors in parentheses
* significant at 10 percent, ** significant at 5 percent, *** significant at 1 percent