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Effects of Specialty Hospitals on the Financial Performance of General Hospitals, 1997–2004

Hospital specialization has become a controversial topic, culminating in a moratorium issued in 2003 by Congress directing the Centers for Medicare and Medicaid Services to cease payments to new physician-owned specialty hospitals for those Medicare and Medicaid patients referred by physicians with a financial interest in the facility. This paper focuses on one important economic question: does the presence of specialty hospitals in a market affect general hospitals' financial performance? We estimate longitudinal fixed-effects models for a national panel of short-term acute care hospitals for the period 1997 though 2004; models are estimated for general hospital patient-care revenue, costs, and operating margins. We find that the presence of one or more new or established specialty hospitals in a market has a negative effect on general hospital costs and a positive effect on general hospital operating margins. Results, which were consistent across several different modeling approaches, imply that the presence of specialty hospitals encourages greater efficiency on the part of incumbent general hospitals, and the existence of profits attracts market entry. Our findings question the contention that competition from specialty hospitals harms general hospitals financially.

In 2003, Congress directed the Centers for Medicare and Medicaid Services (CMS) to cease payments to new physician-owned specialty hospitals for those Medicare and Medicaid patients referred by physicians with a financial interest in the facility; the action was, in part, a response to concern about the impact of specialty hospital entry on incumbent general hospitals.[1] The moratorium's intent—which added to existing laws in several states prohibiting the operation of some types of specialty hospitals—was partly to enable general hospitals to maintain their ability to internally cross-subsidize unprofitable services, many of which may be considered essential to the community.[2] There is an

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uneven playing field, some argue, if specialty hospitals can reap the benefits of profitable services without having to cross-subsidize unprofitable services (e.g., Fine 2004; Choudhry, Choudhry, and Brennan 2005; Kher 2006). Others argue that specialty hospitals offer higher levels of quality, more consumer-responsive products, more physician-responsive management, and healthy competition to general hospitals (Walker 1998; Domrzalski 2002; Herzlinger 2002; Casey 2004; Dobson and Haught 2005; MedPAC 2005b). In addition, it has been argued that policies of implicit cross-subsidization are suboptimal, particularly when paired with entry restrictions (FTC 2004; Havighurst 2005).

This paper focuses on one important economic question that frequently has arisen during these debates: does the presence of specialty hospitals in a market reduce general hospitals' financial performance? Most models of competition assume that low-cost producers attract consumers and improve market share by charging lower prices, and that the ability to charge lower prices depends on the ability to improve operating efficiency (e.g., Syverson 2006). New entrants may have lower costs, perhaps due to advantages in the use of technology, input mix, search costs, or organizational design.[3] Even if new entrants do not have lower operating costs, or if their costs are unobservable in the short run, market contestability suggests that the incentives associated with the threat of new entrants achieving lower costs may resemble the incentives associated with actual entry of low-cost providers (Baumol, Panzar, and Willig 1982). Both of these forces are expected to exert pressure on producers to lower operating costs and improve efficiency.

The evidence thus far suggests that the entry of specialty hospitals does not financially harm incumbent general hospitals. A recent report from the Government Accountability Office (GAO), based on a survey of general hospitals in markets with and without specialty hospitals, found that specialty hospitals had little, if any, adverse impact on neighboring general hospitals (GAO 2006). Earlier studies sponsored by CMS[4] and MedPAC reached similar conclusions regarding the relatively benign impact of specialty hospitals on neighboring general hospitals (CMS 2005; Greenwald et al. 2006; MedPAC 2005b). A recent study focused on specialty hospitals in Texas also reached similar conclusions (Chollet et al. 2006). These studies have provided a useful basis for policy making regarding specialty hospitals, but the methods employed are primarily descriptive and are limited in their ability to make inferences concerning the competitive impact of specialty hospitals over time.

We build on the GAO, CMS, and MedPAC studies by estimating multivariate regression models of the effects of the presence of specialty hospitals on the financial performance of neighboring general hospitals. We focus the analyses on the types of specialty hospitals that have been the center of recent controversy: general surgery, orthopedic surgery, and cardiac surgery. Using a database of all U.S. general hospitals from 1997 to 2004, combined with a 2004 survey of specialty hospitals, we estimate fixed-effects panel data models of short-term general hospital patient care revenue, costs, and operating margins in markets with and without specialty hospitals. We also conduct extensive sensitivity analyses of the statistical findings. Consistent with the findings of the recent GAO report, we find that the presence of specialty hospitals does not adversely affect general hospital financial performance. Instead, we find that the presence of specialty hospitals appears to encourage greater efficiency on the part of general hospitals, consistent with models of spatial competition commonly applied to other industries.

Background

Analogous to trends in specialization in non-health care industries (Skinner 1974; Womack, Jones, and Roos 1990; Gollop and Monahan 1991; Essletzbichler 2003), the hospital industry also has been moving toward increased specialization, evident in the recent diffusion and growth of free-standing specialty facilities and specialized units within general hospitals (Myers 1998; Eastaugh 2001; Robinson 2005). Specialty hospitals

typically are defined as those that treat patients with specific medical conditions or patients in need of specific medical or surgical procedures.[5] The former describes hospitals specializing in psychiatric care, cancer care, rehabilitation, women's care, children's care, and certain chronic diseases; the latter describes hospitals specializing in cardiac, orthopedic, and general surgery.

Political debates on specialty hospitals have focused primarily on facilities specializing in cardiac, orthopedic, and general surgery, and to a lesser extent obstetrics and gynecology. As of 2005, there were approximately 100 cardiac, orthopedic, and general surgery specialty hospitals nationwide (CMS 2005; GAO 2003a, 2003b, 2006; MedPAC 2005b).[6] The reason for the focus on these specific types of specialty hospitals is rooted in concerns over physician ownership and self-referral (MedPAC 2005a). Physicians' combined ownership shares were approximately 70% for general surgery specialty hospitals, 50% for orthopedic specialty hospitals, and 31% for cardiac specialty hospitals (GAO 2003a). Most specialty hospitals are located in states without certificate-of-need (CON) programs, which regulate the construction and augmentation of health care facilities (MedPAC 2005b). States with the highest concentrations of surgical specialty hospitals are South Dakota, Kansas, Oklahoma, Texas, Louisiana, Arizona, and California. Growth in specialty hospitals appears to be motivated by a combination of rising consumer demand for specialized services, favorable operating margins on certain procedures, and gains in economic and clinical efficiency (Walker 1998; Herzlinger 2004; CMS 2005; GAO 2003b; Greenwald et al. 2006).[7]

Methods

For these analyses, we consider only specialty hospitals that have been the subject of recent debates—those specializing in general surgery, orthopedic surgery, and cardiac surgery. Specialty hospitals were identified using a combination of membership data from the American Surgical Hospital Association (ASHA) and their affiliates, MedCath (which operates several specialized cardiac surgery hospitals), and a recent list of specialty hospitals identified by Cram et al. (2005). The latter source identified hospitals performing a disproportionate share of services within a particular set of diagnosis-related groups (DRGs), combined with cross-checking via Web sites, telephone directories, and telephone calls to differentiate between specialty hospitals and specialized general hospitals. Together, these methods identified 93 cardiac, orthopedic, and general surgery specialty hospitals nationwide in 2004, roughly similar to the counts made by MedPAC and GAO.

We analyzed the extent to which patient care revenue, costs, and operating margins of general hospitals are affected by the presence of one or more specialty hospitals in the market (i.e., the general hospital is the unit of analysis). We obtained hospital financial data from Medicare's Healthcare Cost Reporting Information System (HCRIS) for 1997 through 2004 for all U.S. acute care hospitals.[8] Patient care costs and operating margins were calculated for all general hospitals in the sample.[9] For the multivariate models, we assume the county to be the relevant geographic market.[10] We identified 548 general hospitals located in counties with one or more specialty hospital (2004 data).[11] For each hospital in the data set, we merged additional market-level data from the Bureau of Health Profession's Area Resource File (ARF) and the Bureau of Labor Statistics.

The analytic approach is to estimate revenue, cost, and profit functions; details on the structure and properties of these functions are described elsewhere (Breyer 1987; Chambers 1988; Vita 1990; Varian 1992; Greene 1993; Kumbhakar 1996; Carey 1997; Coelli, Prasada Rao, and Battese 1998). The principal components of a revenue function are output prices (**P**) and output volume (**Q**). Hospital production and profit models often have adopted an ad hoc approach, where models include a vector of additional covariates (**Z**) shown empirically to affect hospital production and profit margins (Kim et al. 2004; MedPAC 2003b; Sear 2004; Tennyson and Fottler 2000; Younis and Forgione 2005). The vector **Z** typically contains information on hospital and market

Table 1. Means and sources of hospital and county variables, 1997 and 2004

Variable	Description and source[a]	1997[b]	2004[b]
Dependent variables			
REV	Patient care revenue[c]	$54.17 million	$85.99 million
COST	Patient care costs[c]	$54.97 million	$87.57 million
MARGIN	Patient care margin[c]	−2.61%	−2.15%
Independent variables			
NEWSPEC	≥1 new specialty hospital[i]	.45%	.14%
ESTSPEC	≥1 established specialty hospital[i]	3.85%	9.33%
HHI	General hospital concentration level[c]	5,126.07	5,383.30
BEDSIZE	Hospital bed size[c]	121.28	119.44
ALOS	Mean length of stay[c]	5.75	5.57
TEACH	Teaching status[d]	4.92%	5.26%
AVGCOST	Mean cost per case[c]	$8,411.15	$13,408.02
TAXSTAT	For-profit ownership status[d]	19.38%	20.71%
DISCH	Inpatient discharges[c]	5,101.36	5,806.98
MCARE	Percent Medicare inpatient days[d]	46.53%	53.42%
MCAID	Percent Medicaid inpatient days[d]	18.19%	13.19%
CASEMIX	Medicare case-mix index[e]	1.26	1.32
ALLSTAFF	FTE staff per adjusted inpatient day[d]	12.41	12.29
RNSTAFF	RNs per adjusted inpatient day[d]	2.84	3.27
OCCRATE	Occupancy rate[d]	54.52%	59.51%
VISITS	Outpatient visits[d]	80,002.05	106,849.40
FTEMD	Full-time equivalent (FTE) MDs[d]	13.02	14.57
RNWAGE	RN median hourly wage[f]	$16.88	$24.46
INCOME	Per capita income[g]	$23,407.51	$33,031.06
DENSITY	Population per square mile[g]	1,222.28	1,381.18
MDPOP	Physicians per 1,000 population[g]	1.97	2.09
AAPCC	Medicare Part A AAPCC[g]	$291.27	$349.29
EMPLOY	Unemployment rate[g]	5.20%	5.70%
CON	1= CON present[h]	53.70%	44.29%

[a] All variables pertain to short-term general hospitals unless otherwise noted. [b] The number of observations for each variable vary somewhat by year; regression sample sizes are shown on Table 2. [c] Authors' analysis of Medicare HCRIS Cost Reports (1997–2004). [d] American Hospital Association *Guide* (1997 and 2004 Editions). [e] Medicare case-mix index (www.cms.gov). [f] Bureau of Labor Statistics (BLS) median county-level wages for hospital-based workers. [g] County-level data from ARF. [h] State data based on data from Conover and Sloan (1998; 2003). (i) 2004 Survey of ASHA Membership (see text).

characteristics (e.g., hospital volume, case mix, tax status, teaching status, market concentration, demand shifters, and other market-level indicators). Thus, we specify an ad hoc revenue function of the general form:

$$\mathrm{REV}_{it} = f\left(\mathbf{P}_{jt}, \mathbf{Q}_{it}, \boldsymbol{Z}_{ijt}\right) \qquad (1)$$

Revenue is defined as total patient-care revenue for the i^{th} general hospital in year t. Output prices are defined for the j^{th} county, output volumes are defined for the i^{th} general hospital, and the $\mathbf{Z}$ vector contains variables at both levels.

Models of patient-care costs and operating margins share the same basic structure, with the addition of a vector of variable input prices ($\mathbf{W}$) based on a functional relationship that holds under a set of general assumptions about the firm and output markets (Varian 1992). We specify ad hoc cost and profit functions of the general forms:

$$\mathrm{COST}_{it} = f\left(\mathbf{Q}_{it}, \mathbf{W}_{jt}, \mathbf{Z}_{ijt}\right) \qquad (2)$$

$$\mathrm{MARGIN}_{it} = f\left(\mathbf{P}_{jt}, \mathbf{Q}_{it}, \mathbf{W}_{jt}, \mathbf{Z}_{ijt}\right) \qquad (3)$$

The definitions and sources of the variables associated with each covariate vector are described in Table 1. Medicare Part A (hospital) adjusted average per capita cost (AAPCC) serves as a proxy of county-level output prices. Hospital volume measures include inpatient and outpatient volume measures (BEDSIZE; ALOS; DISCH; VISITS), with separate measures indicating the

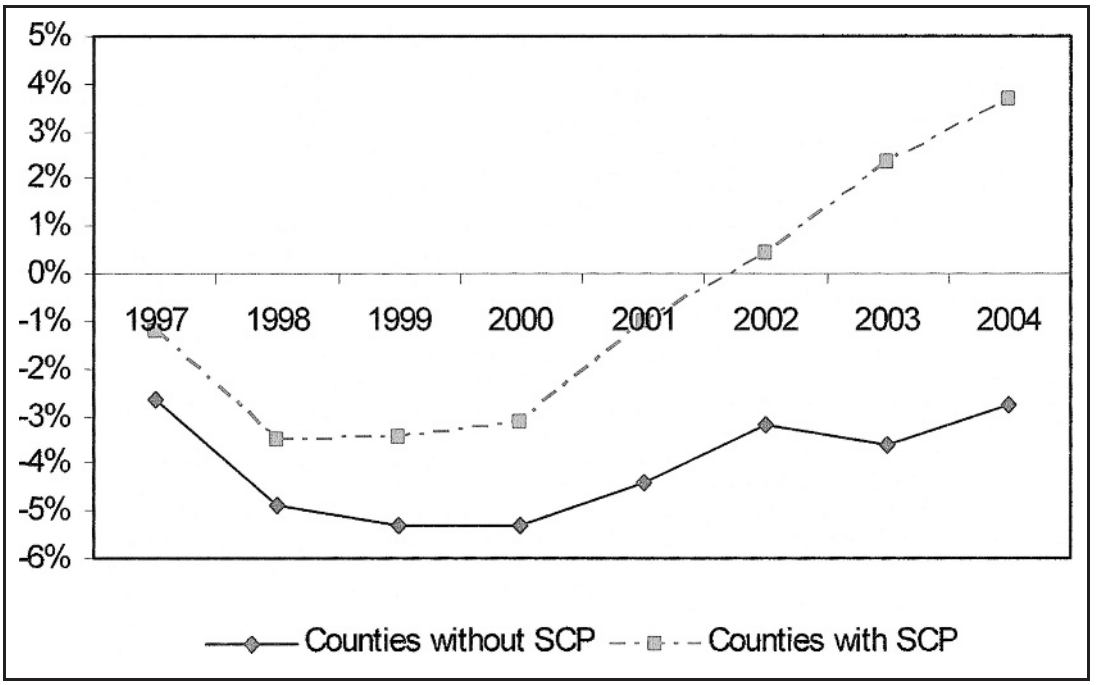

Figure 1. Trends in mean short-term general hospital profit margins: U.S. counties with specialty hospitals compared to U.S. counties without specialty hospitals, 1997–2004 (means are based on the calculated profit margins for all short-term general hospitals in a county; county specialty hospital data are based on the authors' analysis of a survey of ASHA membership, Medicare HCRIS cost reports for the period 1997–2004, Bureau of Labor Statistics wage data, and various data from the Area Resource File; SCP = specialty hospital, new or established)

share of Medicare and Medicaid inpatient days (MCARE; MCAID). Variable input price proxies include mean wages for hospital workers (RNWAGE) and average cost per case (AVGCOST).[12] To a lesser extent, per capita income (INCOME) and population density (DENSITY) also may reflect variable input prices. The remaining variables shown in Table 1 represent a collection of hospital and market area characteristics. Hospital characteristics include payer mix (MCARE; MCAID), teaching status (TEACH), tax status (TAXSTAT), capacity utilization (OCCRATE), staffing levels (ALLSTAFF; RNSTAFF; FTEMD), and Medicare's case-mix index (CASEMIX). Additional market area characteristics include physicians per population (MDPOP), county unemployment rate (EMPLOY), and state-level CON.[13]

The main **Z** variables of interest in this study are specialty hospital indicator variables and a measure of market competition. We constructed two county-level variables to measure the presence of specialty hospitals, one measuring the presence of an established specialty hospital in existence for at least two years (ESTSPEC), and one measuring the presence of a new surgical specialty hospital in existence for one year or less (NEWSPEC). The other main variable of interest is a measure of market concentration, which we measure using the Herfindahl-Hirschman Index (HHI).[14]

The estimations of equations 1 to 3 are specified as longitudinal panel data regressions with fixed hospital effects (Hsiao 1986; Baltagi 1995). One of the advantages of this approach is that it allows for the effects of specialty hospital entry to accrue over time, effects that may not be observable looking only at a cross-sectional snapshot. The other advantage of the eight-year fixed-effects panel

Table 2. Panel-data fixed-effects models of general hospital patient care revenue, cost, and operating margin, 1997–2004

Covariate[a]	ln(REV)	ln(COST)	MARGIN
NEWSPEC[b]	.002282	−.021154 *	.167902
ESTSPEC[b]	−.004583	−.044204 *	1.839555 *
HHI	.088941 *	.062870 *	.000149 *
BEDSIZE	−.017663 *	−.062347 *	−.000301
ALOS	.317728 *	−.099191 *	.120018
TEACH	.022143	.020105	−2.079056 *
PROFIT	.020271 *	.014433	2.228668 *
DISCH	.590474 *	−.091370 *	.000315 *
MCARE	.001641 *	.000408	.976224
MCAID	−.000326	−.001385 *	−.407903
CASEMIX	.305065 *	.297790 *	3.436009 *
RNSTAFF	−.002698 *	−.001749	−.124089
OCCRATE	.008425	−.027411 *	4.888605 *
VISITS	.002927 *	.019487 *	.000000
INCOME	.130697 *	.092073 *	−.000023
DENSITY	.046782 *	.036885 *	.000287 *
MDPOP	−.001660	.000176	−.059038
AAPCC	.233857 *		.006439
EMPLOY	.002068	.001261	8.353228
CON	.009130	−.005428	1.273306
ALLSTAFF		−.000401	.009784
FTEMD		.000405 *	−.001618
RNWAGE		−.016060	−.059974
AVGCOST			−.000014 *
ln(ALOS)*ln(DISCH)		.068035 *	
ln(ALOS)*ln(VISITS)		−.005365 *	
ln(DISCH)*ln(VISITS)		.000428	
$\ln(ALOS)^2$		.006811	
$\ln(DISCH)^2$		.042931 *	
$\ln(VISITS)^2$		.000742 *	
Constant	8.780467 *	13.271520 *	−16.099550 *
Observations	31,477	31,500	30,929
Groups	4,704	4,710	4,686
R-squared	.90	.93	.03
F statistic	1,620.60 *	2,007.67 *	21.92 *

Notes: Based on authors' analysis of a survey of ASHA membership, Medicare HCRIS Cost Reports (1997–2004), Bureau of Labor Statistics wage data, and various data from the Area Resource File.

[a] All models include dichotomous year indicators (parameters not shown), and all continuous variables in the revenue and cost models are log transformed.

[b] Coefficients in revenue and cost models are adjusted to allow correct interpretation of dummy variables in log-log models (refer to Kennedy 1981).

* Significant at $p \leq .05$ (*t*-test).

design is that the potential endogeneity of specialty hospital entry is reduced.[15] Fixed-effects models assume that unobserved heterogeneity is essentially a parameter to be estimated, typically by dummy variables for all *i* observations (Wooldridge 2002). Compared to random effects, the fixed-effects estimator is more robust and better suited to data sets that reflect the population of interest (i.e., general hospitals). The revenue model is specified as log-log functional form, and the cost model is specified as a modified translog functional form in order to accommodate nonconstant returns to scale (see Breyer 1987; Vita 1990; Carey 1997).

Results

Sample means for all model variables are shown in Table 1. Mean general hospital patient care operating margins were relatively small, negative, and declining over the time

period, consistent with other analyses of patient care operating margins based on HCRIS data (MedPAC 2003a, 2003b, 2003c). In 1997, 4% of acute care hospitals in the cohort were situated in counties with at least one specialty hospital. By 2004, the percentage had climbed to over 9%, including new and established facilities. Mean operating margins of general hospitals differed in markets with and without specialty hospitals (Figure 1). Throughout the eight-year period, mean general hospital operating margins were consistently higher in counties with general, orthopedic, and/or cardiac specialty hospitals, with the magnitude of the differences increasing over time.

The results of the revenue, cost, and operating margin models are reported in Table 2. For each model, the unit of observation was the general hospital. The covariates generally had the expected signs, and model fit was consistent with similar models reported elsewhere. The fixed-effects log-log revenue model (column 1) had an *R*-squared of .90 and the fixed-effects translog cost model had an *R*-squared of .93 (column 2). Models of operating margins generally have a high level of unexplained variance, due mainly to the difficulty in adequately capturing organizational and market variables, such as management effectiveness and negotiated commercial-payer prices. The overall model fit (*R*-squared) for the operating margin model in this study was .03, which reflects the "within" variation over time. To gain a better understanding of the overall extent to which the covariates explain variation in operating margins, we also estimated a random-effects operating margin model with the same regressors (results not shown). The random effects "between" *R*-squared was .19, which is consistent with cross-sectional studies of hospital margins (Tennyson and Fottler 2000; Younis and Forgione 2005).

Specialty Hospital and Competition Effects

In the revenue model, both specialty hospital indicator variables had relatively small coefficients and were not statistically different from zero ($p \leq .05$). As expected, greater market concentration was associated with higher revenue. Similar to the revenue model, market concentration had a positive effect on costs. Interestingly, whereas the presence of specialty hospitals in the market had no effect on general hospital revenue, the presence of established specialty hospitals was associated with lower general hospital patient care costs. General hospitals located in markets with at least one established specialty hospital had costs 4.5% lower than general hospitals in markets without established specialty hospitals. Moreover, the same relationship held for new specialty hospital entry; general hospitals located in markets experiencing the entry of one or more new specialty hospitals had costs 2.1% lower than general hospitals in markets without such entry.[16] In the margin model, the specialty hospital indicator variables suggest an unanticipated effect. New market entry did not appear to affect incumbent operating margins, but the presence of one or more established specialty hospitals in the market was associated with higher general hospital operating margins. Market concentration had a small but statistically significant positive effect on operating margins.

Other Effects

In the revenue model, the number of hospital beds and the number of registered nurses (RNs) per adjusted inpatient day were associated with lower revenue, but the coefficients were small. As anticipated, average length of stay, volume of inpatient discharges, and Medicare AAPCC had relatively large positive effects on revenue. For-profit tax status, outpatient visits, per capita income, and population density also had positive effects on patient care revenue. Case-mix severity had a relatively large positive effect on patient care revenue, most likely due to the ability to bill for more services or code patients into higher-priced diagnostic groups. In the cost models, considering the translog expansion terms together with the logged terms, the general hospitals in the sample exhibited economies of scale in the number of discharges. Costs decreased in the logged discharges, but increased in squared discharges. Average length of stay interacted with dis-

Table 3. Sensitivity analyses for models of general hospital patient care revenue, cost, and operating margin, 1997–2004

Alternative models[a]	HHI[b]	NEWSPEC[b]	ESTSPEC[b]
Revenue			
Baseline[c]	.088941 *	.002282	−.004583
Specialty hospital measures[d]	.091626 *	−.001160	−.000941
Total v. patient care[e]	.087152 *	−.006428	−.004297
Reduced forms[f]	.151420 *	−.005695	−.006532
Costs			
Baseline[c]	.062870 *	−.021154 *	−.044204 *
Specialty hospital measures[d]	.071270 *	−.000159	−.004322 *
Total v. patient care[e]	.071625 *	−.015387	−.034193 *
Reduced forms[f]	.150050 *	−.021890	−.024752 *
Margins			
Baseline[c]	.000149 *	.167902	1.839555 *
Specialty hospital measures[d]	.000127	.017955	.273821 *
Total v. patient care[e]	.000048	.138000	1.236177 *
Reduced forms[f]	.000183 *	.221403	2.156477 *

Notes: Based on authors' analysis of a survey of ASHA membership, Medicare HCRIS Cost Reports (1997–2004), Bureau of Labor Statistics wage data, and various data from the Area Resource File.
[a] See text for description of sensitivity analysis model specification; model I measures the presence of specialty hospitals as the ratio of specialty hospital beds to acute hospital beds.
[b] Coefficients in the revenue and cost models are adjusted to allow correct interpretation of dummy variables in log-log models (refer to Kennedy 1981).
[c] Coefficients repeated from Table 2.
[d] Models measure the presence of specialty hospitals as "specialty hospital beds as percent of acute hospital beds in market area."
[e] Models use total revenue/cost/margin instead of patient care revenue/cost/margin.
[f] Models are reduced form.
* Significant at $p \leq .05$ (t-test).

charges had a positive effect on costs. Percent Medicaid inpatient days and occupancy rate were associated with lower costs. Case-mix severity, outpatient visits, per capita income, population density, and the number of full-time equivalent (FTE) physicians employed by the hospital were associated with higher costs. In the margin model, teaching status had a negative effect on operating margins, mainly because teaching hospitals typically have higher operating costs but face similar price schedules as nonteaching hospital competitors. For-profit tax status, inpatient volume, case-mix severity, occupancy rate, and population density were associated with higher operating margins. Average costs were associated with lower operating margins.

Sensitivity Tests

To evaluate the robustness of these findings, we estimated several alternative model specifications. The results of these sensitivity analyses are presented in Table 3. First, rather than a dummy variable indicating the presence of a specialty hospital, we allowed for heterogeneity in specialty hospital scale effects by substituting a measure of total specialty hospital beds.[17] These results were consistent with those reported in Table 2.[18] Third, rather than limiting the dependent financial performance variables to those pertaining to patient care, we estimated all three models using total revenue, total costs, and total operating margin. Again, the results were identical to those pertaining to patient care operations. Fourth, to determine the sensitivity of the analysis to the definition of market area, we replicated the analyses using the Metropolitan Statistical Area (MSA) as the market.[19] These results were nearly identical to the results based on counties. As a final sensitivity test, each model was replicated with reduced-form specifications by excluding all input and output variables. Again, the results were similar to the full specifications, but had lower explanatory power overall. This suggests

that most of the output and input variables are uncorrelated with the specialty hospital variables and that their inclusion has no effect on the specialty hospital variable coefficients. To further test for the possibility that specialty hospital entry is endogenous to general hospital financial performance, we first specified a two-stage instrumental variable model. Three variables were identified as primary instruments for specialty hospital entry: lagged county-level mean general hospital operating margin, lagged county-level population density, and the presence of CON regulation. The results of the fixed-effects two-stage models were remarkably similar to the fixed-effects single-stage models. However, the two-stage models generally had low *F*-test scores and were sensitive to small changes in model specification.

Discussion

This analysis found that general hospitals in markets with at least one specialty hospital had higher reported profits, and that the entry of new specialty hospitals had no effect, negative or positive, on general hospital profit margins. One explanation for these findings is that specialty hospitals somehow made the general hospitals more successful, either by causing them to become more efficient and less costly or by raising their revenues, or by both. We find strong evidence to support the cost and efficiency story. Markets with existing specialty hospitals and those experiencing the entry of new specialty hospitals have lower-cost general hospitals. However, the same entry phenomena do not appear to affect general hospital revenues.

In addition to efficiency effects, we suspect that the apparent relationship between specialty hospitals and general hospital financial performance is driven by a second factor. The economics of entry are reasonably straightforward. New firms enter a market when potential profits are available. We argued at the outset that this explained in part the entry and growth of specialty hospitals. Our empirical results simply make the same point ex post. Even after the entry of specialty hospitals in these markets, the average general hospital continued to earn profits. Apparently the new entrants were able to share some of the available profits; the general hospitals in these markets were financially healthy enough that, even after this entry, they continued to record above-average operating margins. Indeed, because these general hospitals continued to be profitable, the economics suggest that there will continue to be entry into their markets. As a corollary, general hospitals in markets that did not see entry were, on average, less profitable. Unless underlying market forces change, they need have little fear of entry by specialty hospitals.

Our findings raise questions about the contention that specialty hospitals harm the ability of general hospitals to provide indigent care. We show that over time the presence of specialty hospitals is associated with lower general hospital costs and higher general hospital operating margins. These findings are robust to several different modeling strategies. The longitudinal fixed-effects panel design accounts for temporal changes over the 1997 to 2004 period and helps establish the direction of causality. Moreover, as noted, the results are robust to changes in model specification, market area definition, specialty hospital variable definition, and the scope of covariates. In sum, over the eight-year study period, we find no evidence that general hospital operating margins were lower in markets shared with specialty hospitals.

Unfortunately, our results provide no specific indication of the means through which general hospitals maintained operating margins and reduced costs; it is possible that they did so in part by reducing the provision of unprofitable services or by reducing charity care. However, a recent study focused on specialty hospitals in Texas concluded that entry by specialty hospitals was not associated with any significant changes in the provision of charity care by competing general hospitals (Chollet et al. 2006). Additional research is needed to identify general hospitals' specific responses to market entry of specialty hospitals.

One of the lynchpins in the argument for limiting specialty hospital entry is the wide-

spread practice on the part of general hospitals to internally cross-subsidize less profitable services. Administering cross-subsidization was an explicit goal of many of the former state hospital regulatory programs (Fournier and Campbell 1997; Schneider 2003). However, all but one of the state rate regulation programs were dismantled during the 1990s. In the absence of state rate regulation, hospitals have relied on a mix of mechanisms beyond internal cross-subsidization to pay for unprofitable services, including tax-deductible donations, tax-exempt bond financing, exemption from income and property taxes, Medicaid disproportionate share payments (additional payment for treating a disproportionate share of Medicaid patients), and state-administered charity care risk pools.[20]

Hospital internal cross-subsidization is to be distinguished from the popular notion that hospitals shift costs between third-party payers—that is, "one group pays more because another pays less" (Morrisey 1994). In this case, hospitals cross-subsidize low-margin indigent services with the proceeds from high-margin services. Under normal circumstances, hospital internal cross-subsidization would not be sustainable, mainly because sustained high margins on some services would encourage market entry, and as firms enter the market, increased competition reduces the amount of profits available to all firms (i.e., market entry results in the "competing away" of excess profits). For internal cross-subsidization to work, government must restrict market entry, either through CON or some other means. Indeed, that is how many states currently approach the problem, and it is an important reason why Congress enacted the specialty hospital moratorium.[21]

However, restrictions on market entry generate other problems, the costs of which may in some cases far exceed the costs of unmet uncompensated care—a point recently emphasized by Havighurst (2005) in the context of the specialty hospital debate and more generally by the Federal Trade Commission (FTC 2004). Studies of the impact of CON programs consistently have found the programs to be ineffective at controlling costs and enhancing access, and in some cases have been shown to increase costs (Sloan 1988; Lanning, Morrisey, and Ohsfeldt 1991; Antel, Ohsfeldt, and Becker 1995; Conover and Sloan 1998). The U.S. experience with airline regulation is the opposite. To develop air travel infrastructure, airline regulation required carriers to cross-subsidize unprofitable routes with profitable ones. Cross-subsidization appeared to contribute to infrastructure development in the early years of regulation, but eventually led to high costs; consumer welfare and producer surplus improved markedly following deregulation (Morrison and Winston 1986; Winston 1998; Peltzman and Winston 2000). Studies of hospital all-payer rate regulation reached similar conclusions (Lanning, Morrisey, and Ohsfeldt 1991; Antel, Ohsfeldt, and Becker 1995; Schneider 2003).

Conclusion

This study finds that the presence of specialty hospitals, independent of the analytic modeling strategy employed, is associated with higher general hospital operating margins and lower operating costs. Contrary to the conjecture that entry by specialty hospitals erodes the overall operating profits of general hospitals, general hospitals residing in markets with at least one specialty hospital have lower costs and higher profit margins than those that do not compete with specialty hospitals. This is consistent with economic theory, which suggests that firms will enter markets in which extant profit margins are comparatively higher, and that market entry is a form of discipline delivering strong efficiency incentives.

The main implication of these findings is that policymakers should not rely solely on the conjecture that specialty hospital entry erodes general hospital profits. Our results suggest that additional research should be aimed at how the entry of specialty hospitals affects incumbent general hospitals' utilization and the ability to provide indigent care. Alternative funding mechanisms, such as direct subsidies to hospitals that perform a specified set of services, should be given serious consideration.

Notes

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1 The moratorium was enacted by Congress as part of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA). It became effective when the law was signed on December 8, 2003, and following extensive committee-level debate was allowed to expire on June 8, 2005.

2 Acute care hospitals' implicit obligation to serve the community is based on two policies: the Hospital Survey and Construction Act of 1946 and nonprofit tax exemption. The nominal intent of the Hospital Survey and Construction Act of 1946 (commonly known as the Hill-Burton Act) was to bolster the relatively underdeveloped postwar hospital industry by requiring states "to develop programs for the construction of such public and other nonprofit hospitals as will, in conjunction with existing facilities, afford the necessary physical facilities for furnishing adequate hospital, clinic, and similar services to all their people" (Hospital Survey and Construction Act 1946).

3 There is some evidence that specialty hospitals have lower operating costs attributable to economies of scale and scope and organizational design (for example, refer to an unpublished manuscript: Schneider, J.E., T.R. Miller, R.L. Ohsfeldt, M.A. Morrisey, B.A. Zelner, and P. Li. 2007. The Economics of Hospital Specialization. Working paper. Morristown, N.J.: Health Economics Consulting Group LLC). In addition, specialty hospitals may be associated with lower search costs. Specialty hospitals perform limited services and publish extensive quality data on those services, which may lead to lower search costs for consumers.

4 The CMS study was conducted by RTI International.

5 For example, the GAO defines specialty hospitals as those that "tend to focus on patients with specific medical conditions or who need surgical procedures" (GAO 2003b).

6 The number of specialty surgical hospitals is reported differently in the CMS, MedPAC, and GAO studies. Our survey and other means to count specialty hospitals also revealed slightly different counts than the government studies. The primary reason for the lack of convergence on the count is the difficulty in determining: 1) the difference between a "specialized" general hospital and a specialty hospital, and 2) the extent of physician ownership (many general hospitals own their own specialty hospital). To address this lack of agreement, we combined several sources of information in order to identify specialty hospitals (described in more detail in the "Methods" section).

7 For a more detailed discussion of the motivations for specialty hospital market entry, refer to an unpublished manuscript: Schneider, J.E., T.R. Miller, R.L. Ohsfeldt, M.A. Morrisey, B.A. Zelner, and P. Li. 2007. The Economics of Hospital Specialization. Working paper. Morristown, N.J.: Health Economics Consulting Group LLC).

8 Refer to http://www.cms.hhs.gov/data/download/hcris_hha/readme_03_31_05.asp.

9 We calculated operating margins based on patient care activities only, based on the assumption that patient care revenues are ostensibly used to internally cross-subsidize services. Operating margins were calculated as the difference between gross patient care revenue and total patient care costs (i.e., net income from patient care activities), divided by gross patient care revenue [((operating revenue – deductions - operating expenses) / (operating revenue - deductions)) *100]. Basing operating margins on patient care revenue and patient care costs results in margins that are slightly lower than the total margins reported elsewhere. Note that sensitivity analyses (Table 3) suggest that the results are not particularly sensitive to this distinction.

10 There are several techniques for determining geographic market areas for hospitals; see Federal Trade Commission (FTC 2004, Ch. 4) for a recent review. The delineation of market areas is best done by combining information from discharge-level data critical loss analysis, patient willingness to travel, and hospital strategic planning documents. Given the national scope of our analysis, we could not realistically employ any of these techniques. Thus, we

make the assumption that, in most instances, the county reflects a reasonable approximation of the relevant geographic market. Interestingly, we found that the results did not differ significantly when market areas were defined as Metropolitan Statistical Areas (MSAs).

11 In 2004, there were a total of 60 counties with at least one surgical specialty hospital.

12 Defined as [total patient-care operating expenses / inpatient admissions]*1,000. This variable is excluded from the cost function.

13 As noted earlier, a familiar story in the hospital trade press is that the costs of uncompensated care are covered by profits from other more profitable product lines. Thus, patient care operating margins in some cases may be understated to the extent that cross-subsidization of this sort is occurring. One solution would be to add the costs of uncompensated care to the left-hand-side operating margin variable or include a right-hand-side covariate measuring the costs of uncompensated care. However, HCRIS data includes measures of uncompensated care only for 2003 onward. Constructing a two-year panel to accommodate the limited time series data for the uncompensated care measure is not practical mainly because of low temporal variation in the specialty hospital indicator variables from 2003 to 2004.

14 The HHI is calculated by summing the squares of each firm's market share in the county—that is, HHI = $\sum^{i} 100 * s_i^2$, where s denotes the market share of firm i. This method allows for firms with relatively large market share (e.g., 60%) to be more heavily weighted in the index.

15 Several alternative model specifications were also tested; refer to the discussion on sensitivity analyses and the accompanying Table 3.

16 It is conceivable that competition from specialty hospitals (or from any competitor) could force incumbent general hospitals to maintain or improve profit margins by reducing the level of uncompensated care provided. Depending on the extent of this "reverse" internal cross-subsidization, the effects of specialty hospitals on incumbent hospital profits may be masked. However, using the last two years of HCRIS data (the only years that include measures of uncompensated care costs), we found no significant differences in the levels and changes in uncompensated care costs between counties with and without specialty hospitals. General hospitals in counties without specialty hospitals provided uncompensated care equal to approximately 4.8% of total revenues in 2003 and 5.3% in 2004. The analogous levels in counties with specialty hospitals were 4.6% and 5.1% (not significant at $p \leq .05$). The nominal change from 2003 to 2004 was slightly higher for counties with specialty hospitals (+.5 percentage points).

17 We replaced the two dummy variables with the number of beds in specialty hospitals (lagged one year) and the change in the number of beds from the lagged period to the current period. We also repeated the analyses using percentage of county beds in specialty hospitals as the measure of specialty hospital beds. The analyses showed that lagged specialty hospital beds were associated with reduced hospital costs and increased hospital profit margin.

18 Lagged versions of these indicators also were tested (lagged one year and two years), but the main results remained unchanged.

19 A further test of market effects aggregated all financial measures to the county and MSA level, rather than taking the general hospital as the unit of analysis. Surprisingly, these models showed virtually identical results to those reported here.

20 See generally Lewin and Altman (2000).

21 Currently, 14 states have no CON program and another six states maintain CON programs only for long-term care (Conover and Sloan 2003).

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