CUT TO THE BONE? HOSPITAL TAKEOVERS AND NURSE EMPLOYMENT CONTRACTS

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The authors examine changes in the wages, employment, and effort of nurses in California hospitals following takeovers by large chains in the 1990s. The market for nurses has been described as a classic monopsony, so that one might expect increases in firm market power to be associated with declines in wages. However, a basic contracting model predicts effects on effort rather than on wages, which is what this analysis finds: nurses experienced few declines in wages following takeovers, but did see increases in the number of patients per nurse, the measure of effort used here. The authors show that their results are also consistent with an extended version of the monopsony model that considers effort and allows for revenue shifts following a takeover. Finally, they find that these changes were similar in the largest for-profit and non-profit chains, suggesting that market forces are more important than institutional form.

In a seminal paper, Ashenfelter and Hannan (1986) examined the effects of product market concentration on the wages and employment of women in the banking industry. The present paper examines the labor market effects of consolidation in the hospital industry in California over the 1990s. This industry has experienced remarkable changes in market structure in a very short period of time. Over half of all hospitals in California are now part of one or another multi-hospital chain, and the six largest chains control over a third of the hospitals (Spetz et al. 1999, 2000). This type of consolidation is apparent all over the country, with California on its leading edge. Although a good deal of qualitative evidence exists regarding the effects of these mergers, no quantitative investigation of their impact on employment contracts has been conducted.

The hospital sector is large, accounting for 3% of GDP, and individual hospitals are often important employers in the markets they serve. These facts have generated a literature on monopsony in the market for nurses. The standard monopsony model predicts that employment will be reduced below the competitive level, with subse-

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quent reductions in wages. However, although researchers such as Yett (1970) view hospitals as classic examples of monopsonists, careful empirical work by Sullivan (1989) and Hirsch and Schumacher (1995) has found little evidence that market power reduces wages. In a review of the monopsony literature, Boal and Ransom (1997) interpreted the evidence regarding effects on wages and employment as suggesting only small monopsony power in the market for nurses.

These negative findings are puzzling in light of the hostility that California nurses have shown toward hospital takeovers and large chains. However, surveys of nurses indicate that they associate takeovers with increases in workload rather than with reductions in wages. Such a connection, we show, is consistent with a simple model of contracting in which wages are "contractible" while effort is not. Sticky wages and increased effort are not consistent with the basic monopsony model, but we develop an extension of this model to consider an employer who sets minimum effort levels as well as wages and employment. In this extended model, increases in market power increase the effort demanded of employees but have ambiguous effects on the wage. Hence, it is perhaps premature to rule out monopsony on the basis of analyses of wages and employment alone.

Another claim by nurses is that nonprofit chains are "really no different in their business philosophy [than for-profit firms], in the way they provide care or the way they treat workers" (Sal Rosselli, President of Local 250 of the Service Employees International Union, quoted in Hall 1996). We are in a good position to evaluate the validity of that claim, because the two largest chains we examine, Catholic Healthcare West and Tenet, are, respectively, non-profit and for-profit.

Background

Why Do Hospitals Merge?

Several reasons have been given for hospital mergers, and for hospital consolidation more generally (see Barro and Cutler 1997 and Sloan 2002 for summaries of this literature). First, several case studies have suggested that hospitals that merge typically experience financial difficulties in the years leading up to the merger. Technological improvements in health care have led to shorter stays for many classes of patients (such as women giving birth), leading to a general shakeout of excess capacity in the hospital industry. Second, the rise of managed care organizations such as Health Maintenance Organizations (HMOs) has transformed the health care market (see, for example, Currie and Fahr 2004a,b). Hospitals may band together in order to deal with the financial pressures created by these organizations; or, more generally, they may join together to increase market power in the product market in order to raise prices, or in the labor market in order to reduce costs. These considerations suggest that it will be important to control for differences between hospitals and between hospital markets, when examining the effects of mergers.

A third possibility is that successful chains bring a more efficient mode of production to target hospitals. Conversations with executives of Columbia/HCA suggest that they impose a centralized set of procedures on all their hospitals and also track key indicators for each hospital centrally.[1] Such measures might increase the efficiency of production. Cutler and Horowitz (2000) offered case study evidence suggesting that for-profit hospital chains are better able to gain public-sector reimbursements, which again suggests that chain hospitals may be better managed than other hospitals.

Evidence Regarding Effects of Hospital Mergers

Several studies have examined the effects of mergers on hospital financial performance, and patient care, with mixed

[1]The first author met with executives of Columbia/HCA as part of the April 2000 NBER Conference on the Industrial Organization of Medical Care.

results.[2] Conner et al. (1998) studied 3,500 general hospitals from 1986 to 1994 and found some evidence of reduced costs per discharge after hospital mergers. Dranove (1998) suggested that scale economies exist only for small hospitals, and that there are no scale efficiencies possible for hospitals with 200 or more beds. Summarizing the mixed evidence on scale economies, Dranove (2000) concluded that cost savings from mergers are not substantial. Since labor costs are the largest component of hospital costs, these results have implications for whether employment contracts are likely to be affected.

However, Gaynor and Vogt (2000) argued that the empirical research on scale economies is plagued with difficulties. First, the caseload mix varies across hospitals. Large hospitals tend to treat more severely ill patients, and thus have higher costs. Moreover, these hospitals deliver a broader range of services. Thus, scale economies might be realized by consolidating the services of several hospitals, as a chain could do.

Several studies have suggested that hospital markets are not perfectly competitive and that mergers can result in higher prices. For example, Keeler et al. (1999) concluded that mergers can drive up prices by as much as 26%. Simpson and Shin (1998) showed that the prices of non-profit hospitals are higher in more concentrated markets. Krishnan (2001) examined prices within Diagnosis Related Groups (DRGs) and found that prices rise when merging hospitals gain substantial DRG-specific market share. On the other hand, Barro (2000) found no evidence of increases in market power, and Dranove and Satterthwaite (2000) argued that heterogeneity in provider services makes it difficult to reach firm conclusions about the relationship between market concentration and prices. Moreover, it is difficult to define a market, and data on actual prices paid for services are often unavailable.

Increases in product market power could be reflected in lower-quality services rather than higher prices. Hamilton and Ho (2000) found that hospital mergers have no effect on the mortality of heart-attack patients, but that the acquisition of independent hospitals raises readmission rates. Madison (2001) also examined heart-attack patients, and found that patients treated in a multi-hospital system received more intensive treatments at lower expenditure, but that there was no change in mortality. Farsi (2002) reported similar results for elderly heart-attack patients in California, while Kessler and McClellan (2000) found that the mortality of heart-attack patients is higher in more concentrated markets.

Effects on Labor Markets

In contrast to the relatively well-developed literature on the effects of mergers on prices and patient outcomes, there has been little attention to the effects on labor markets, at least by economists. This is surprising, since the quantity and quality of nursing care are likely to be highly related to outcomes (Needleman et al. 2002). Moreover, a good deal of qualitative evidence on the effects of takeovers on workers exists. Corey-Lisle et al. (1999) and Sochalski and Aiken (1999) noted that reductions in the registered nurse (RN) staff following takeovers require nurses to care for more patients who are sicker on average, and also to spend more of their time supervising unlicensed aides rather than engaging directly in patient care. Moreover, nurses are more likely to be rotated through different areas of the hospital in order to respond to fluctuations in demand, rather than to have downtime when their own unit is less busy. Davidson et al. (1997) found that these changes have increased voluntary turnover among nurses. Clark et al. (2001) reported

[2] A related literature examines the effect of conversions from non-profit (NP) to for-profit (FP) status and vice-versa. This is not the same question, since the majority of hospitals acquired by FP chains are FP and the majority of hospitals acquired by NP chains are NP. According to Spetz et al. (1999), only 20% of changes in ownership involved a change in the NP or FP status of the hospital.

on responses to a survey of 1,500 nurses. They found that nurses who experienced job restructuring related to mergers had more negative views of the climate for patient care than did other nurses.

These staffing issues have become major themes in the drive to organize California nurses and hospital workers. Historically, only workers in public hospitals were unionized.[3] However, in the past few years, the two unions representing nurses and hospital workers, the Service Employees' International Union (SEIU) and the California Nurses' Association (CNA), have made great strides, organizing many hospitals since 2001. Moreover, nurses have been lobbying the California Department of Health Services (DHS) to pass a law mandating minimum nurse-patient ratios.

This brief review of the literature suggests, first, that the issue of how mergers affect costs (which are dominated by labor) is unresolved; second, that it is important to control for heterogeneity between hospitals and health care markets when examining the effects of mergers; and third, that it will be important to consider "effort" as well as wages and employment when examining the effect of mergers on hospital labor markets.

California's Hospital Market[4]

As discussed above, six chains own more than a third of hospitals in California. In this paper, we will examine the impact of joining each of five large chains: Catholic Healthcare West, Sutter, Columbia-HCA, Tenet, and OrNda. We define a large for-profit chain, somewhat arbitrarily, as a chain that owned at least ten hospitals for three or more years in our sample. Many of the hospitals in our data set merged with one or two other hospitals over our sample period to form groups of two or three hospitals. We do not treat these as chains.

Tenet and Columbia/HCA are the largest for-profit hospital corporations operating in California, with 40 and 10 general acute-care hospitals each, respectively, in 2002. Tenet was formed by the merger of American Medical Holdings and National Medical Enterprises in 1995. In 1997, it absorbed 17 hospitals from the OrNda chain, which itself had been formed via the merger of American Healthcare Management and Summit Health Ltd. in 1994. Columbia/HCA has grown via a series of smaller acquisitions.

The non-profit chains we focus on are Catholic Healthcare West (CHW) and Sutter Health. Sutter is a secular non-profit hospital group that owned 26 acute-care hospitals in northern California in 2002. CHW represents the merger of several small groups of hospitals owned by different, mainly Catholic, religious orders. CHW operated 42 general acute-care hospitals in California in 2002, making it the largest non-profit hospital group in the state. However, as Spetz et al. (1999) argued convincingly, the concept of ownership is somewhat murky for Catholic non-profits. They quoted an official at CHW who explained that under canon law, each hospital is owned by its religious order. Thus, it is not clear *a priori* how much direct control is exercised by the larger organization, although it is unlikely that a hospital could unilaterally choose to leave CHW.

We omit Kaiser Permanente, which owns 27 hospitals in California, from our data because Kaiser does not report much of the data we use to the State of California's Office of Statewide Health Planning and Development (OSHPD). We do, however, take account of Kaiser Permanente's holdings when we construct measures of hospital firm share below. Also, while we include Adventist Health's hospitals in the data, we do not treat Adventist Health as a chain. This group, which is affiliated with the Seventh Day Adventist Church, owns 15 hospitals but did not experience changes in ownership over our sample period. Kaiser also experienced few ownership changes.

[3]The major exception to this generalization was Kaiser, whose workers were unionized over our sample period. Kaiser's 27 hospitals are not included in our main sample, because Kaiser does not report all of the information on wages and employment.

[4]Much of the material in this section is drawn from Spetz (1999, 2001).

Data

The data for our study come from California's Hospital Disclosure Data (CADD) for fiscal years 1989/90 to 1998/99. The CADD consists of information from hospital financial reports (disclosure reports), which are submitted annually to OSHPD. All non-federal hospitals are required to report (although, as discussed above, Kaiser does not submit full reports). Hospitals include information about ownership, for-profit or non-profit status, number of beds, costs and revenues, and personnel.

The reports include the number of productive hours (hours actually worked), nonproductive hours (paid time off, including vacation, sick-leave, and holidays), and hourly wages for seven categories of personnel: Registered Nurses (RNs), Licensed Vocational Nurses (LVNs), aides and orderlies, managers and supervisors, technical and specialist workers, clerical and other administrative workers, and workers in food and accommodation services (environmental).[5] An eighth category covers all other classifications, including salaried physicians and non-physician medical practitioners. Under California law, only public hospitals can employ physicians. Hence, the number of physicians who are treated as employees is small. In this study we focus on nursing staff (RNS, LVNs, and aides), since the other categories of workers are more heterogeneous, making it difficult to interpret changes in group wages.[6]

As Spetz et al. (1999, 2001) reported, the OSHPD data are quite noisy. Three of the most important problems are non-standard reporting periods, multiple reports in a single year, and late reporting of, or failure to report, ownership changes. That last problem is particularly acute for non-profit chains, probably because of the ambiguity about ownership noted above. Since the beginning and end dates of each reporting period are included in the data, it is relatively easy to adjust for the first two problems.[7] Spetz et al. (1999) included a data appendix with corrected ownership data, which we have used to correct the OSHPD data.[8] We also discovered many cases in which psychiatric hospitals or drug rehabilitation centers (such as the Betty Ford Clinic) were incorrectly coded as general purpose acute-care hospitals, and we deleted these from our data set. We do not have systematic data on union status. As discussed above, most unionization activity has occurred very recently, and did not take place during the period covered by our data.[9]

Figure 1a shows the distribution of hospitals across California in 1990, and Figure 1b shows California's "health service areas." HSAs are health care markets, as

[5]Nurses working as supervisors or instructors are included in the management/supervision and technical/specialist categories.

[6]For example, technical employees include accountants as well as X-ray technicians.

[7]In our analyses, the unit of observation is a hospital-year. In order to create a single observation for each hospital-year, we first arranged the data so that every report was considered in the fiscal year (beginning June 30) that covered the largest part of the reporting period. We then combined multiple reports for a single year to form a single record. For example, we took weighted averages (where the weights were the number of days in each reporting period) of stock variables such as assets and personnel, and we took weighted sums of flow variables such as discharges, costs, and revenues. If the hospital's ownership changed, we used the report that covered the largest part of the year.

[8]The appendix covers data through 1996. Spetz et al. (1999) do, however, report on mergers that took place between 1996 and 1999 in the text, and we verified ownership of hospitals in recent years using parent organization web sites and hospital web sites.

[9]Given that unionization drives are currently being conducted at many hospitals, and are vigorously resisted by management, the SEIS and CNA are reluctant to share information about their organizing activities. Thus, we were unable to obtain a complete list of unionized hospitals with dates of unionization. However, the SEIS negotiated a breakthrough agreement with CHW in 2001, covering 20 hospitals in 15 cities. The CNA also organized 8 large hospitals in 2001, accounting for approximately 2,000 nurses. News reports indicate that these victories were regarded as important turning points in the battle to unionize California hospital workers.

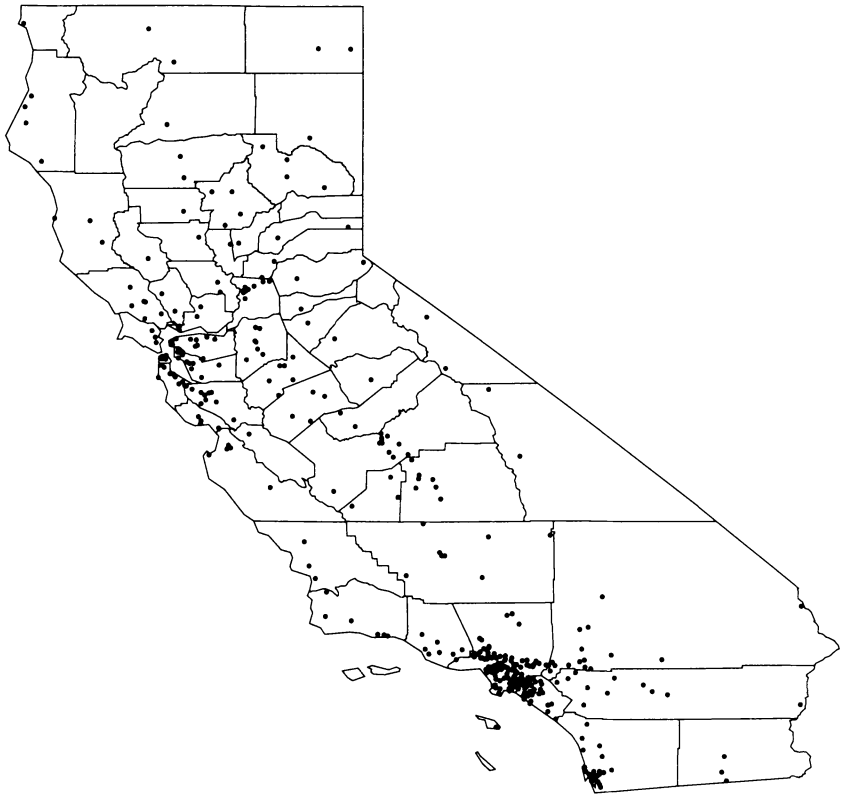

Figure 1a. Distribution of California Acute-Care Hospitals, 1990.

defined by the state. They reflect the fact that hospitals are more densely concentrated in urban areas (so that urban HSAs cover smaller areas). Figures 2a and 2b show the growth in the chains we study between 1990 and 1999, and their geographical coverage. The figures illustrate the rapid growth of chains, and their concentration in urban markets. The for-profit chains tend to be slightly more concentrated in urban areas than are the nonprofit chains. There is also some division between northern and southern California: for example, Sutter operates only in the north, while Tenet has moved into the Los Angeles area very aggressively.

Increased concentration has also occurred because of hospital closures. A report commissioned by the California Attorney General examined 17 hospital closures that occurred between 1995 and 2000 (Nicholas C. Petris Center 2001). Tenet was involved in at least five of these closures, including four closures of facilities that it acquired when it absorbed OrNda. CHW closed one hospital in 1999. The report indicated that the closed hospitals were generally small (all of the closures considered in the report, including some that occurred in 2000, accounted for 3% of California's hospital beds) and in considerable financial difficulty. Some hospitals closed because they were unable to meet more stringent seismic requirements, and many more hospitals are expected to close for this reason in future. Many shuttered hospitals remained medical centers, converting to long-term care or outpatient facilities. In this paper, we consider employment contracts at all operating acute-care

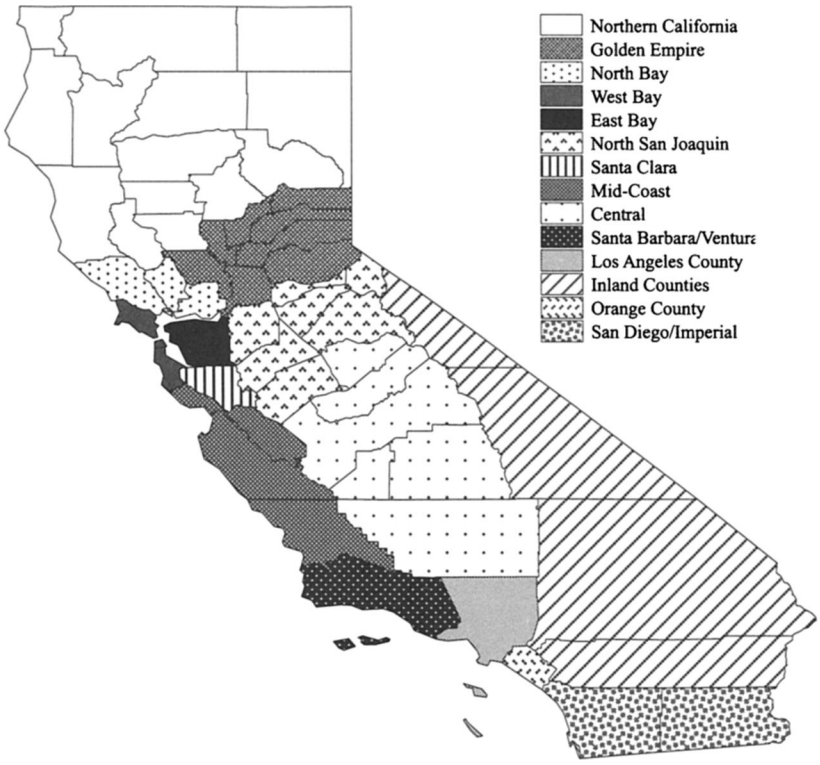

Figure 1b. California Health Service Areas.

hospitals. We do, however, account for the effect of closures indirectly when we consider the effect of the firm's share (of the beds in the local hospital market) on outcomes. We also account for changes in the number of beds in the market over time by including HSA*year effects in our regression models, as discussed further below.

Increased concentration in the hospital market is shown in Figure 3, which plots Herfindahl indices for four HSAs. The Herfindahls are computed using the number of acute-care beds in each hospital. Figure 3 illustrates that while concentration has increased throughout the state, it has grown much more rapidly in northern than in southern California, exceeding 20% in some HSAs. Sacramento was the most concentrated market over much of the period, with San Francisco catching up in the last two years of the sample. In contrast, the degree of concentration in Los Angeles is much smaller, although it has been rising.

Means of key variables are shown in Table 1 for all hospitals and separately for each chain. The unit of observation is a hospital year, and a hospital is included in the column for the chain only in the years when it actually belonged to that chain. The first three measures in Table 1 show the output of the hospital. One can see that there is little systematic difference between the chain hospitals and other hospitals in number of beds, number of patient days (per day), or gross patient revenues per day. Gross patient revenues are what is actually billed rather than what is collected, and so reflect the value of services rendered. While CHW hospitals, with an average of 242 beds, are larger than the others, Sutter and Te-

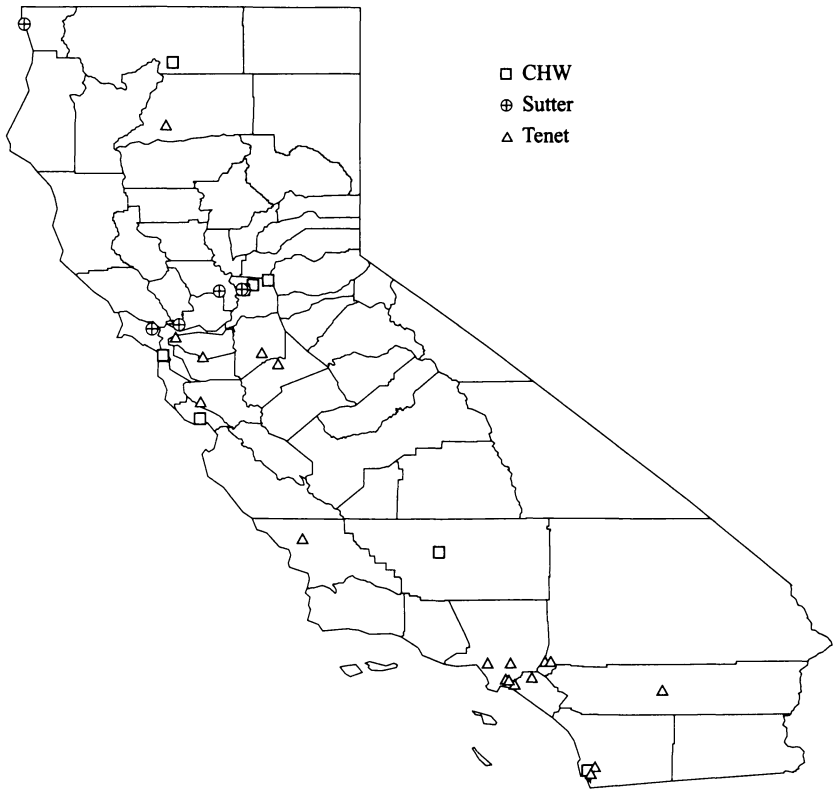

Figure 2a. Distribution of California Acute-Care Hospitals Operated by Major Chains, 1990.

net both have hospitals that are somewhat smaller on average than the overall mean of 185 beds.

The next four rows show wages for four categories of nursing personnel: registered nurses (RNs), Licensed Vocational Nurses (LVNs), aides, and contracted nursing personnel. RNs are more highly trained then LVNs, who in turn are more skilled than aides. Beginning in December 1992, OSHPD also asked hospitals about the employment of contracted nursing personnel. Unfortunately, data for RNs, LVNs, and aides working under contract are all grouped together. These wages (which, for convenience, are shown in real 2001 dollars) do not suggest monopsony, since nurses working for large chains are, if anything, more highly paid than other nurses. Note that this does not reflect a hospital size effect, since, as we saw above, hospitals are not systematically larger in large chains. However, it might reflect a firm size effect, something we will control for below. It is also possible that the higher wages in chains reflect the concentration of chains in large urban areas.

We next show the number of nursing hours employed by the hospital (per day). It is evident that the average hospital employs more RNs than LVNs or aides. Only 62% of the hospitals employ contract workers, and the number of contract worker hours is very small relative to RN hours. While less skilled LVN and aide hours may be substituted for RN hours, the literature suggests that RNs remain ultimately responsible for supervising less skilled workers.

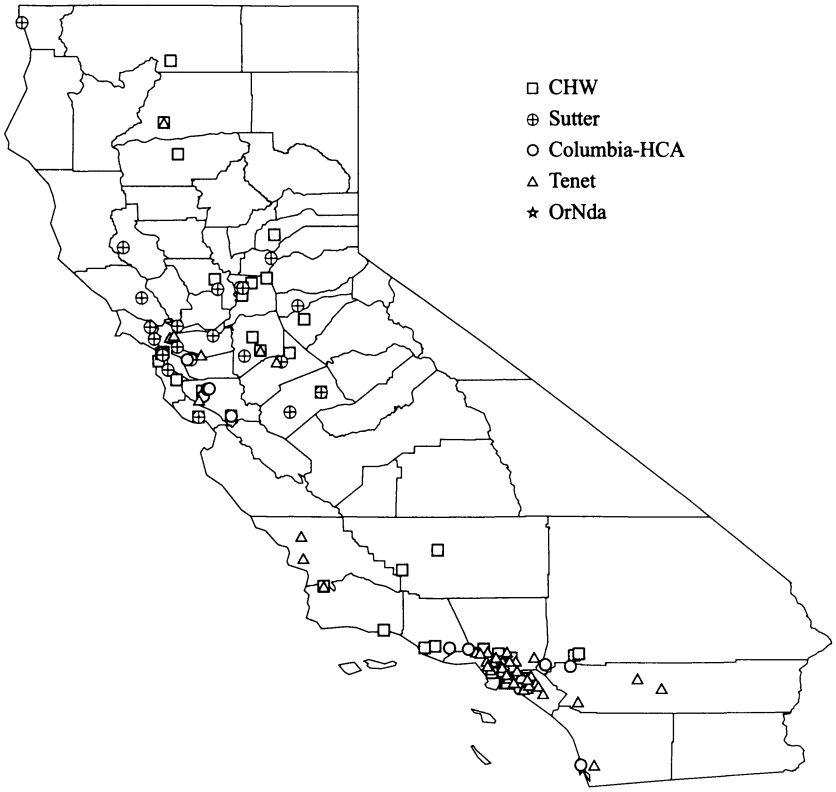

Figure 2b. Distribution of California Acute-Care Hospitals Operated by Major Chains, 1999.

Hence, in our empirical work below we focus on RN hours, and on total nursing hours measured as the sum of RN, LVN, and aide hours. We also show results for an alternative measure that includes the contract nursing personnel, although it is available only from 1993 on, and is generally quite similar to the RN plus LVN plus aide total.

Table 1 also shows several measures of nurse effort. Through these measures we attempt to capture the number of patients a nurse would be responsible for during his or her shift. This focus on patients per nurse corresponds to the emphasis on staffing ratios by nurse organizations. Since hospitalized patients require 24-hour nursing care, we take patient days (per day), divide by total productive hours (per day), and multiply by 24. The first measure, RN effort, is the number of patients each registered nurse attends. The average is 4.36 in non-chain hospitals, compared to 3.72 at CHW and 3.37 at Tenet.

However, when we consider all available nursing hours, or total effort, hospitals appear to be much more similar. For example, the non-chain hospitals have a mean of 2.24 patients per nursing staff member compared to 2.32 and 2.28 for CHW and Tenet, respectively. Thus, more of the care is provided by RNs in chain hospitals than in non-chain hospitals. Again, these differences could reflect either the types of services offered by the hospitals (for example, hospitals treating sicker patients would require more skilled staff), or differences in the markets served by chain and non-chain

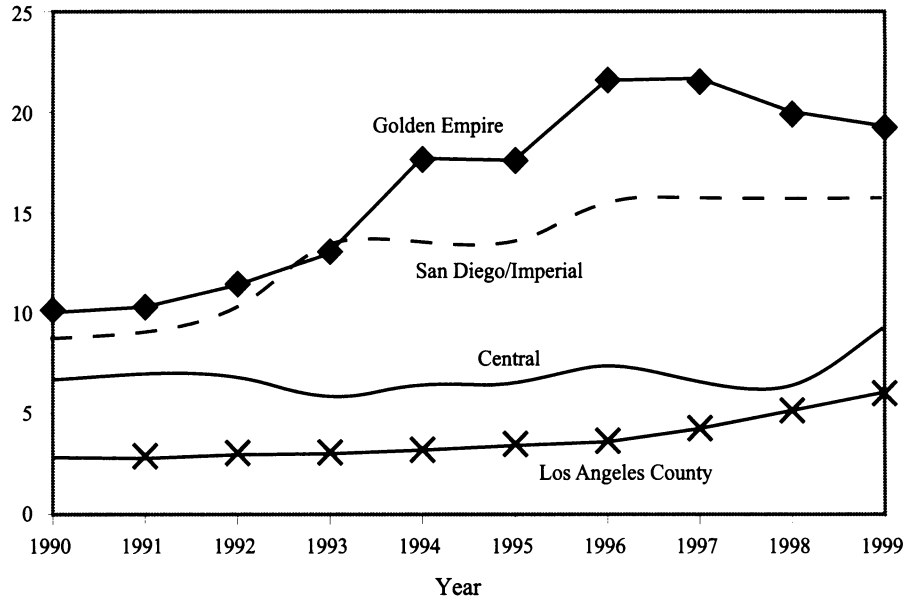

Figure 3. Herfindahl Index (%) of Selected Health Service Areas in California.

hospitals. It will be important to control for these differences below.

Finally, Table 1 indicates the average firm share of each hospital. On average, hospitals belong to firms that have only 4% of the local acute-care hospital beds. But in the largest chains, hospitals belong to firms having closer to 10% of the available beds, on average. The hospital whose firm has the largest share is San Francisco General Hospital Medical Center, which has 33% of its HSA's beds, and does not belong to a chain. Among the chains, the largest firm shares, in descending order, are 28% for CHW in the Santa Barbara area, 26% for Sutter in the Sacramento area, and 21% for Tenet in Orange County.

The Model

The question we wish to address is how revenue, wages, employment, and effort change when a hospital is taken over. Two sources of change are considered here. First, the acquiring firm may increase the hospital's revenue stream, either by making it more efficient or through increased market power in the product market. Second, a takeover may result in an increase in the firm's share of the local labor market for health services personnel, particularly nurses. In this section the consequence of each of these changes for the observed variables is considered for three simple employment models: perfect competition, monopsony, and contracting.

The standard monopsony model is based on the idea that a large local employer can affect wages via its demand for labor. This implies that demand is reduced below the competitive level, to reduce wages. However, the standard monopsony model supposes that wages depend only on the supply of and demand for nurses. In practice, a job at a particular hospital is likely to have features that make it more or less desirable in comparison with other similar positions, and hence, as Rosen (1986) argued, market wages should reflect not only current labor market conditions, but also the nature of working conditions. Although it is difficult to find evidence of such compen-

Table 1. Variable Means for Non-Chain and Chain Hospitals.
(Standard Errors in Parentheses)

Variable	*Non-Chain*	*CHW*	*Sutter*	*Columbia*	*Tenet*	*OrNda*	*No. Obs.*
No. Beds	183	235	174	189	178	182	3,978
	(2.67)	(8.79)	(14.1)	(16.1)	(5.49)	(13.75)	
Patient Days	107	144	109	79	89	72	3,978
	(1.91)	(5.78)	(10.36)	(6.62)	(3.38)	(6.00)	
Gross Patient Revenues	353	546	491	391	471	285	3,971
(100,000s)	(8.14)	(.278)	(.526)	(.353)	(.260)	(.218)	
Wages							
RN	19.60	21.80	23.28	23.88	21.44	21.85	3,978
	(.082)	(.314)	(.513)	(.493)	(.252)	(.295)	
LVN	12.10	13.77	13.86	14.96	13.51	13.82	3,914
	(.066)	(.182)	(.294)	(.272)	(.162)	(.306)	
Aide	8.30	9.25	9.99	10.44	9.01	8.77	3,934
	(.036)	(.135)	(.235)	(.228)	(.126)	(.169)	
Contract Workers	32.26	33.02	33.50	31.00	29.53	30.50	1,594
	(.228)	(.694)	(.751)	(.925)	(1.30)	(1.56)	
Hours							
RN	878	1,084	966	740	720	579	3,978
	(17.2)	(47.91)	(91.07)	(69.05)	(31.69)	(51.19)	
LVN	129	178	147	95	92	87	3,914
	(2.28)	(10.6)	(14.5)	(9.19)	(4.42)	(9.01)	
Aide	268	291	248	204	176	99	3,934
	(17.23)	(15.90)	(29.38)	(23.96)	(8.13)	(8.31)	
Contract Workers	28.8	33.5	33.7	39.9	24.3	29.3	2,505
	(2.98)	(3.66)	(9.47)	(7.09)	(3.15)	(6.33)	
Effort							
RN	4.36	3.69	2.73	2.69	3.37	3.10	3,978
	(.134)	(.200)	(.114)	(.068)	(.117)	(.118)	
RN+LVN+Aides	2.23	2.31	1.89	1.88	2.28	2.26	3,978
	(.023)	(.051)	(.051)	(.048)	(.043)	(.055)	
RN+LVN+Aides+Contract Workers	2.08	2.22	1.81	1.81	2.15	2.20	2,505
	(.022)	(.059)	(.053)	(.047)	(.040)	(.053)	
Firm Share	0.034	0.090	0.099	0.044	0.075	0.029	3,978
	(.001)	(.005)	(.009)	(.006)	(.003)	(.002)	
HSA Herfindahl	0.083	0.122	0.133	0.104	0.074	0.061	3,978
	(.001)	(.004)	(.004)	(.007)	(.002)	(.005)	
Observations	3,298	187	117	63	254	59	

sating wage differentials in practice, the theory is very clear and some evidence does exist. For example, Abowd and Ashenfelter (1981) have shown that the probability of a layoff can affect the wage premium offered by a firm. Schumacher and Hirsch (1997) found that 10% of the wage difference between hospital nurses and other nurses is a compensating differential for shift work. In this paper, we examine the effect of incorporating work intensity or effort on the compensating differential offered by the firm.

Let q denote the effort per hour of a nurse. The total output from H hours of nursing services is qH. The utility per hour

of a nurse is assumed to be decreasing in the level of effort, and given by

$$(1) \qquad U(w,q) = w - V(q),$$

where w is the hourly wage and $V(q)$ is the disutility of effort. The function V satisfies $V(0) = 0$, $V' > 0$, $V'' > 0$, with $\lim_{q \to \bar{q}} V(q) = \infty$, where $\bar{q}$ is the maximum effort possible in the market. We cannot observe individual nurses, and hence it is assumed that they all have the same preferences within a single category of employee. Let q^0 be the customary level of effort in the market, and w^0 the corresponding market wage.

Let $\alpha R(qH,K)$ be the revenue function for a hospital, where α is a revenue shifter, qH is total nurse services, and K is capital. Marginal revenue may go up with a takeover because the firm is better able to negotiate with HMOs or otherwise able to charge higher prices for its services, or because the firm is more effective in getting revenues from government, as Cutler and Horowitz (2000) found. In the short run, capital is assumed to be fixed, and hence the question is how a takeover affects wages, effort, and hours.

The Competitive Model

First suppose that the labor market remains competitive after a takeover. Then the only way for the takeover to have an effect is through the revenue shifter, α. The problem solved by the owners of the hospital is

$$(2) \qquad \max_{qH,w} \alpha R(qH,K) - Hw$$

subject to

$$U(w,q) \geq U(w^0,q^0).$$

The owner can increase effort q above the market norm q^0 by paying a compensating differential $V(q) - V(q^0)$, and hence the nurse's wage is $w = w^0 + V(q) - V(q^0)$. Let $\bar{w} = w^0 - V(q^0)$ denote the net market wages. Then the first order conditions for an optimum are given by

$$(3) \qquad \alpha R'(qH,K)\, q - (\bar{w} + V(q)) = 0,$$

$$(4) \qquad \alpha R'(qH,K) - V'(q) = 0.$$

Notice that substituting the first order condition $V'(q) = \alpha R'(qH,K)$ into condition (3) results in the expression

$$(5) \qquad M(q) \equiv qV'(q) - V(q) = \bar{w},$$

where $M(q)$ is the marginal revenue net of the utility cost of effort, and is increasing with q. This implies that effort is an increasing function of the net market wage, is independent of the revenue shifter (α), and can be determined independently of hours. Taking effort as given, from expression (4) it follows that hours are increasing in α. Thus we have the following proposition:

Proposition 1: *If the hospital's marginal revenue increases in a competitive labor market, then demand for labor (H) and revenue increase. If the firm is small relative to the market, then effort remains unchanged.*

This result implies that when a firm takes over a hospital, a reorganization of the hospital should not result in an increase in effort by nurses if the labor market is perfectly competitive and the hospital is small relative to the market.

Monopsony

Now consider the case in which the firm's hiring decisions can affect the local labor market. Market power is modeled by supposing that the net wage is $\bar{w}(H) = w^0(H) - V(q^0)$, where $w^0(H)$, the local wage as a function of total hours demanded in the local market, is an increasing function of H. Suppose a single hospital employs H^i hours and it is a member of a firm that employs H^0 hours at its other hospitals, while the other firms employ a total of H^r hours. In that case the total hours in the labor market are $H = H^i + H^0 + H^r$.

The hospital chooses its hours taking into account the effect that its employment decisions have on the wage costs of the chain owning the firm. Hence H^i solves

$$(6) \qquad \alpha R'(qH^i,K)\, q = (\bar{w}(H) + V(q)) + (H^i + H^0)\partial\bar{w}(H)/\partial H > \bar{w}(H) + V(q).$$

If we let $\varepsilon_s = \frac{H}{\bar{w}}\, \partial\bar{w}(H)/\partial H$ be the wage elasticity of labor supply, then H^i solves

$$\alpha R'(qH^i,K)\,q - V(q) = \bar{w}(H)(1+\varepsilon_s S), \tag{7}$$

where $S = \frac{H^i + H^0}{H}$ is the share of the market owned by the firm. The first order conditions for effort are given by

$$\alpha R'(qH^i,K) - V'(q) = 0. \tag{8}$$

Let $q^*(H,\alpha)$ be the solution to this first order condition. From the concavity of the revenue function it follows that $\partial q^*/\partial\alpha > 0$ and $\partial q^*/\partial H < 0$. Substituting this first order condition into the condition for hours yields

$$M(q^*(H,\alpha)) = \bar{w}(H)(1+\varepsilon_s S), \tag{9}$$

where $M(q) = qV'(q) - V(q)$ is an increasing function of q.

This expression can be used to determine the effect of increasing concentration on the market. It implies that $\partial H/\partial S < 0$, and therefore $\partial q^*/\partial S > 0$. The increase in effort implies via equation (8) that revenue decreases at the hospital when concentration increases (given a concave revenue function).

The wage paid to an individual is given by the market wage plus the compensating differential, or

$$w^*(H) = \bar{w}(H) + V(q^*(H,\alpha)). \tag{10}$$

Since $q^*(H,\alpha)$ is decreasing with H, a decrease in H results in an increase in the compensating differential $V(q^*(H,\alpha))$, with the total effect being ambiguous.

This relationship is illustrated in Figure 4, which shows that the wage at the hospital, $w^*(H)$, lies everywhere above the alternative wage, $w^0(H)$. The difference is the compensating differential for the effort provided by the nurses given hours H. At low hours, employers demand greater effort, so the compensating differential is larger. The wage, w^*, is initially decreasing with hours because an increase in hours has a larger effect on the compensating differential than on the alternative wage. In the diagram, the competitive model would yield H_1 hours and a wage of w_c (which incorporates the compensating differential for effort). Under monopsony, the firm chooses H_2 hours and a wage of w_q. Without the compensating differential due to effort, the wage would be the standard monopsony wage of w_m.

Equation (9) can also be used to determine the effect of a change in the revenue shifter. Differentiating with respect to α, one sees that $dH/d\alpha > 0$ and $dq^*(H(\alpha),\alpha)/d\alpha > 0$, and therefore wages, as well as revenues, rise. These effects are summarized in the following proposition.

Proposition 2: *In a monopsonistic market, an increase in a firm's market share results in increased effort, and a decrease in hours and revenue. The effect on wages paid is indeterminate. Keeping market share fixed, an increase in the ability to generate revenue (α) results in more effort, more hours, more revenue, and a higher wage.*

Thus in the case of monopsony, the addition of effort modifies the standard results in two important ways. First, it implies that the effect of market power on wages paid is ambiguous because an increase in market power results in a decrease in the profit-maximizing level of labor demanded (which depresses wages) and in higher effort (which increases wages). The model would be rejected if we observed a decrease in effort and an increase in wages. Second, the first order condition for effort implies that the revenue shifter α affects wages and hours through its effects on effort. In other words, when α goes up, effort should rise, as should revenue and hours.

Contracts

The monopsony model supposes that firms exercise market power through their labor demand decisions. However, beginning with Simon (1951), there is a large literature that views the employment relationship as the outcome of a contract between the employee and the employer. Beginning with Williamson, Whacter, and Harris (1975), the literature highlights the fact that even if the labor market is competitive, a contract is needed to protect relationship-specific rents that arise after an employee has accepted a position.

Firms may invest in training the worker for hospital-specific tasks. Among workers, examples of relationship-specific invest-

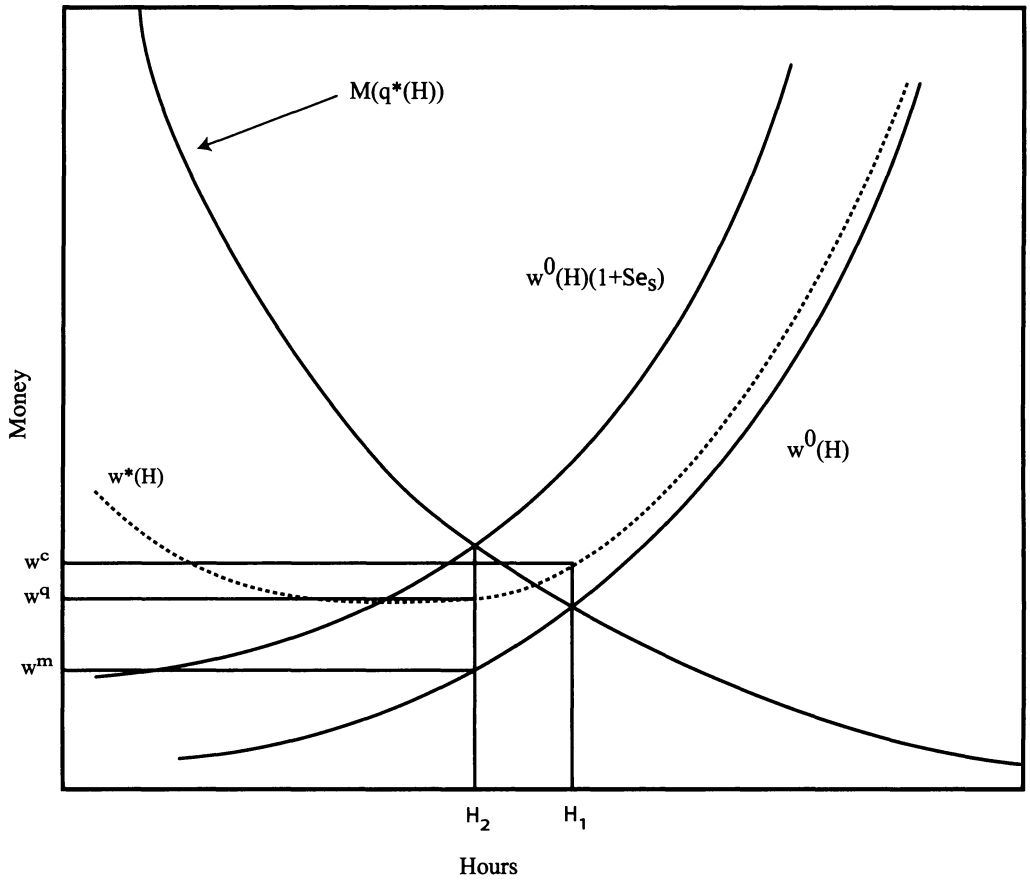

Figure 4. Equilibrium in a Monopolistic Market with Endogenous Effort.

ments include finding living accommodations that are closer to one's place of work, learning about job-specific characteristics or routines, and learning to cooperate with co-workers. Grout (1984) and Hart and Moore (1998) have shown that in the absence of a contract, both the firm and employee will under-invest, a problem that can be solved by having a wage that is fixed in advance. MacLeod and Malcomson (1993) have shown, more generally, that under the appropriate conditions the optimal contract entails a fixed wage that is periodically renegotiated to reflect market conditions. Ashenfelter and Brown (1986) used data on a sample of unionized workers to study the important properties of these types of employment contracts.

A difficulty with using contract theory to study the market for nurses in California is that they are employed at-will, and therefore when a merger occurs there is no legal obligation for the new owner to respect any previous wage agreements. Moreover, if it is costly for incumbent workers to leave and find alternative employment, the new firm can unilaterally decrease wages to the point that current employees are indifferent between staying and leaving. In this case the allocation would be the same as for the competitive labor market described above, and the takeover would not entail any change in effort.

However, given that it is efficient for the

firm to enter into long-term employment contracts, firms must also be able to enter into implicit agreements that employees feel they can rely on. In this regard, wages and effort demanded are quite different. The wage is a fixed amount that is paid regularly, and the amount is easily verifiable. Thus, if the new owner were to unilaterally lower wages, this would signal to employees that they should not make any relationship-specific investment, and the resulting outcomes would be inefficient.

But this reasoning is unlikely to apply to effort. As Simon (1951) emphasized, an important feature of the employment relationship is the right of the employer to exert authority over an employee. In the hospital context, the amount of work an employee is expected to perform depends on the current demand for services. This demand can vary hourly in the face of unexpected events such as car accidents, patients with complications, and so on.

Hence, when an employee is hired, effort would typically not be explicitly specified. Rather, the individual would be given a description of the job from which expected effort could be inferred. This implies that as long as an employee's utility remains greater than his or her alternative, the firm can vary demand for effort without this violation of the implicit agreement being immediately obvious, especially since, in the context of a takeover, it would be reasonable for the firm to engage in a reorganization of work.

These arguments suggest that in the event of a takeover the firm may be reluctant to lower wages, but will feel free to adjust effort, subject to a market constraint. If the new owner reduces employment, incumbent workers also face the possibility of losing their relationship-specific rent K_w. The optimization problem faced by a new owner is given by

$$\max_{q,H} \alpha R(qH) - H\bar{w},$$

subject to

$$U(\bar{w},q) + K_w \geq U^0.$$

If the firm were to increase employment, K_w would be zero, and hence there is an asymmetry between increases and decreases in employment. Given a binding individual rationality constraint, the effort level that solves this problem is the solution to

$$V(q(K_w)) = \bar{w} + K_w - U^0. \tag{11}$$

The corresponding expression for hours is

$$\alpha R'(q(K_w)H)\,q(Kw) = \bar{w}. \tag{12}$$

If the revenue function is concave, then H is decreasing in K_w and increasing in α.

This model generates the following predictions. In the event of a takeover, effort increases, hours decrease, and wages are unchanged. There will also be an increase in revenue. If there are no relationship-specific rents, the contract model implies that an increase in marginal productivity will result in more hours and higher revenues. With wages fixed, effort will also remain constant. These observations can be summarized as follows.

Proposition 3: *If firms respect outstanding wage agreements and enforce pay equity among workers, then a takeover leads to fewer hours, more effort, and higher revenues. If the takeover is motivated solely by the opportunity to shift the revenue function outward (that is, increase α), then hours and revenues increase, and there is no effect on wages or effort.*

Summary

In summary, if α is held constant, the three models outlined above have the predictions shown in Chart 1; and if a merger is motivated only by the new management's ability to increase marginal revenues (α), the three models have the predictions shown in Chart 2.

Chart 1. Effect of an Increase in Firm Market Share.

	Perfect Competition	*Monopsony*	*Contract*
Revenue	0	–	+
Wages	0	?	0
Hours	0	–	–
Effort	0	+	+

Chart 2. Effect of the Revenue Shifter, α.

	Perfect Competition	*Monopsony*	*Contract*
Revenue	+	+	+
Wages	0	+	0
Hours	+	+	+
Effort	+	+	0

Empirical Model

The data are not rich enough to allow structural estimation and testing of these models. Rather, we simply ask if any of the models are consistent with the patterns of changes that are observed in the data. Also, a takeover is not a perfect natural experiment, since the choice of hospital to be purchased is endogenous. However, we can include hospital fixed effects in our model in order to control for characteristics of hospitals that might be associated with being takeover targets as well as for HSA*year effects. Thus, we can identify the changes that occur within hospitals that are purchased.

We estimate regression models using measures of output, revenue, wages, hours, and effort as the dependent variables. The first set of models examines the effects of being taken over by a chain, where effects are allowed to differ between chains. They take the form

$$(13)\quad \log(\text{OUTCOME}_{it}) = \alpha_i + \alpha_1 \text{CHW}_{it} + \alpha_2 \text{SUTTER}_{it} + \alpha_3 \text{COLUMBIA}_{it} + \alpha_4 \text{TENET}_{it} + \alpha_5 \text{ORNDA}_{it} + \alpha_6 \text{HAS}_{it} * \text{YEAR}_t + u_{it},$$

where OUTCOME is one of the dependent variables discussed above, and CHW and so on are dummy variables equal to one if the hospital belongs to one of the specified chains. A vector of hospital-specific fixed effects, α_i, is included in order to control for factors such as the size of the hospital and the case mix at the beginning of the sample period. Since the model includes these fixed effects, the coefficients on the "chain" variables are identified using changes in ownership, and capture the effect of joining a chain (rather than the effect of being in a chain per se). Finally, a complete set of HSA and year interactions controls for market conditions in each HSA and year.

In models of the form (13), the estimated effects of joining one chain may differ from those of joining another either because there is variation in the size and market power of the chains, or because different chains adopt different production technologies. Moreover, although we include hospital fixed effects in the regression, the firm's share of capacity in the HSA can change even in the absence of a takeover. For example, the other hospitals in a chain will experience a change in firm share when the target firm joins. In order to try to differentiate between these effects, we also estimate a set of models that augment (13) by adding an explicit control for the firm's share of the local market, as measured by the fraction of HSA hospital beds the firm controls.

The monopsony model predicts that an increase in firm share should reduce employment and increase effort, whether or not it is associated with a takeover (holding demand for services constant). The other models do not indicate any explicit role for firm share. However, in a contracting model firm share could reflect two offsetting effects. First, firms with larger market shares may have more ability to increase revenues per unit of output in the target firm (that is, α), which, in the absence of a direct measure of α, would lead to a positive correlation between firm share and hours. Second, the amount of relationship-specific capital K_w could be increasing in firm share, in which case one might find a positive correlation between firm share, effort, and output, and a negative correlation between firm share and hours.

The effects of firm share are explored by constraining variation in the effects of joining a chain to work primarily through differences in firm share. These models have the form

$$(14)\quad \log(\text{OUTCOME}_{it}) = b_i + b_1 \text{ANYCHAIN}_{it} + b_2 \text{ANYCHAIN}_{it} * \text{FSHARE}_{it} + b_3 \text{NOCHAIN}_{it} * \text{FSHARE}_{it} + b_4 \text{HSA} * \text{YEAR}_t + u_{it},$$

where ANYCHAIN indicates that the hospital belongs to one of the five large chains, FSHARE is the share of the firm's beds in the local HSA, and NOCHAIN indicates that the firm does not belong to one of our five chains. In these regressions, we expect that b_2 will be positive if the effect of joining chains is larger when the chains have greater market share, while b_3 captures the effect of firm share in the other hospitals.

Results

Estimates of model (13) are shown in Table 2. Since all of the outcome variables are in logs, the coefficient estimates give the percentage change in the variable of interest that is associated with joining one of the five chains. The first section of the table deals with our measures of output, and indicates that takeovers by the five chains appear to have little consistent effect on the number of beds and generally positive effects on the number of patient days in the target hospital, though these are generally only significant at the 10% level. Gross patient revenues increase, which may indicate either higher prices or an increased intensity of services provided to patients (as would be the case with sicker patients, for example). Hence, it appears that output increases rather than decreases in the target hospital following takeover by a chain. This result is consistent either with a contracting model or with takeovers that are motivated by the opportunity to increase the marginal efficiency of revenue generation. But it is not consistent with a takeover whose primary goal is to increase the firm's power in the labor market.

Effects on wages are small and not consistently statistically significant. Takeovers by CHW are accompanied by reductions in the wages of RNs and aides of approximately 3%, though there are no changes in the wages of LVNs. At Columbia-HCA hospitals, there are slightly larger declines in wages of LVNs and aides, but no change in the wages of RNs. At Sutter, there are no changes in wages, and at Tenet, only the wages of contract workers fall. However, since we do not know the composition of contract workers, it is difficult to determine if this represents a shift toward less-skilled contract workers, or a true decline in wages. These findings are consistent with the previous literature on monopsony in the market for nurses, in that they do not provide evidence in support of the wage effects predicted by the traditional monopsony model.

The third section of Table 2 shows the effects of takeovers on hours. Here again, the effects are somewhat inconsistent. Only Tenet shows large and statistically significant decreases in hours. CHW and Columbia-HCA also show some declines, though they are not statistically significant. Sutter, in striking contrast, shows a 9% increase in total nursing hours. However, Sutter also showed the largest increases in output, suggesting that takeovers by Sutter may increase hospital revenues per unit of output (α).

The last section of Table 2 focuses on effort, that is, nurse hours normalized by patient days. These findings are much clearer. There is an increase in the effort required both of RNs and of the total nursing staff in the two largest chains, CHW and Tenet, as well as an increase in effort by the total nursing staff in OrNda. All but one of the estimated coefficients are positive, though those for the other chains are not statistically significant. The size of the coefficients indicates that a takeover by one of the largest chains is associated with a 10% increase in nurse effort, which is a sizeable effect. This effort effect is consistent with both our monopsony and contract models.

Table 3 provides estimates of a version of (13) that also includes the firm's share of capacity (that is, beds) in the HSA. The first part of Table 3 suggests that the increase in firm share that accompanies takeovers is responsible for at least some of the increase in output at target firms, since the coefficients on the chain dummies (a_1 to a_5) fall or become statistically insignificant when firm share is controlled.

Firm share has little effect on wages, except among contract workers, a result that is difficult to interpret given that we do

Table 2. Effects of Hospital Takeovers by Large Chains.

Variable	*CHW*	*Sutter*	*Columbia*	*Tenet*	*OrNda*	*No. Obs.*	*No. Hospitals*	*R-Sq.*
Effect on Output								
No. Beds	-0.013	0.032	-0.059**	0.030	0.035	3,978	446	0.067
	(0.019)	(0.028)	(0.026)	(0.021)	(0.026)			
Patient Days	0.056	0.093	-0.007	0.012	0.126**	3,977	446	0.062
	(0.034)	(0.052)	(90.048)	(0.038)	(0.047)			
Gross Patient Revenues	0.056**	0.141**	-0.045	0.093**	0.157**	3,970	446	0.644
	(0.027)	(0.040)	(0.037)	(0.030)	(0.037)			
Effect on Wages								
RN	-0.029**	0.015	-0.010	0.000	0.024	3,978	446	0.586
	(0.011)	(0.017)	(0.016)	(0.012)	(0.016)			
LVN	-0.008	0.040	-0.040**	0.003	0.034	3,914	440	0.445
	(0.014)	(0.021)	(0.019)	(0.015)	(0.019)			
Aides	-0.025**	-0.007	-0.035**	-0.007	0.003	3,934	443	0.399
	(0.012)	(0.018)	(0.017)	(0.013)	(0.017)			
Contract Workers	0.032	0.117	0.017	-0.149**	0.174**	1,593	354	0.119
	(0.046)	(0.070)	(0.065)	(0.050)	(0.065)			
Effect on Hours								
RN	-0.046	0.112**	-0.056	-0.079**	0.084**	3,978	446	0.105
	(0.028)	(0.042)	(0.039)	(0.031)	(0.038)			
Total RN+LVN+Aides	-0.039	0.088**	-0.011	-0.114**	0.044	3,978	446	0.1067
	(0.026)	(0.038)	(0.036)	(0.028)	(0.035)			
Total Nursing Staff	-0.032	0.092**	-0.051	-0.151**	-0.038	2,506	424	0.0965
	(0.029)	(0.042)	(0.043)	(0.034)	(0.044)			
Effect on Effort								
RN	0.101**	-0.021	0.048	0.091	0.042	3,977	446	0.0988
	(0.036)	(0.054)	(0.050)	(0.039)	(0.049)			
Total RN+LVN+Aides	0.093**	0.003	0.003	0.126**	0.081**	3,977	446	0.1304
	(0.029)	(0.043)	(0.040)	(0.032)	(0.040)			
Total Nursing Staff	0.079**	0.005	0.076	0.083**	0.067	2,505	424	0.0943
	(0.032)	(0.047)	(0.048)	(0.038)	(0.050)			

Notes: Each row represents output from a separate regression. All regressions include HSA * year and hospital * year effects.

**Statistically significant at the .05 level.

not know the composition of the contract workers. Once again, then, the estimates provide little support for the standard prediction that increased market power will be accompanied with decreases in wages.

Given the effects of firm share on output, it is perhaps unsurprising that firm share also has positive effects on total nursing hours. However, the increases in hours are smaller than the increases in patient days, so that increases in firm share increase nurse effort. Again, the effects of joining a chain are somewhat reduced, though still statistically significant, when firm share is controlled, indicating that some of the effect of joining a chain operates through increases in market power as measured by firm share.

Table 4 shows estimates of (14). Like the results presented in the earlier tables, those shown in Table 4 suggest that joining a chain is associated with increased output, as measured by patient days, as well as with increased nurse effort. There is no statisti-

Table 3. Effects of Takeovers by Large Hospital Chains and Firm Share.

Variable	*CHW*	*Sutter*	*Columbia*	*Tenet*	*OrNda*	*Firm Share*	*No. Obs.*	*No. Hospitals*	*R-Sq.*
Effect on Output									
Number of Beds	−0.018 (0.019)	0.027 (0.028)	−0.060** (0.026)	0.012 (0.022)	0.032 (0.026)	0.280** (0.121)	3,977	446	0.0685
Patient Days	0.038 (0.035)	0.076 (0.052)	−0.010 (0.048)	−0.052 (0.040)	0.117** (0.047)	0.995** (0.224)	3,977	446	0.0671
Gross Patient Revenues	0.037 (0.027)	0.123** (0.040)	−0.048 (0.037)	0.026 (0.032)	0.148** (0.037)	1.040** (0.175)	3,970	446	0.6476
Effect on Wages									
RN	−0.031** (0.011)	0.013 (0.017)	−0.010 (0.016)	−0.007 (0.013)	0.023 (0.016)	0.120 (0.074)	3,977	446	0.5861
LVN	−0.009 (0.014)	0.040 (0.021)	−0.040** (0.019)	0.000 (0.016)	0.033 (0.019)	0.052 (0.000)	3,913	440	0.4449
Aides	−0.025** (0.012)	−0.007 (0.018)	−0.035** (0.017)	−0.008 (0.014)	0.003 (0.017)	0.013 (0.078)	3,933	443	0.3992
Contract Workers	0.043 (0.046)	0.119 (0.069)	0.026 (0.064)	−0.085 (0.054)	0.182** (0.065)	−0.965** (0.313)	1,593	354	0.126
Effect on Hours									
RN	−0.049 (0.028)	0.110** (0.042)	−0.056 (0.039)	−0.094** (0.033)	0.082** (0.038)	0.233 (0.181)	3,977	446	0.1054
Total RN+ LVN+Aides	−0.049 (0.026)	0.080** (0.038)	−0.012 (0.036)	−0.154** (0.030)	0.039 (0.035)	0.616** (0.166)	3,977	446	0.1098
Total Nursing Staff	−0.045 (0.029)	0.092** (0.042)	−0.055 (0.042)	−0.195** (0.036)	−0.042 (0.044)	0.699** (0.199)	2,505	424	0.1019
Effect on Effort									
RN	0.087** (0.036)	−0.034 (0.054)	0.046 (0.050)	0.042 (0.042)	0.035 (0.049)	0.763** (0.233)	3,977	446	0.1016
Total RN+ LVN+Aides	0.087** (0.029)	−0.004 (0.043)	0.002 (0.040)	0.102** (0.034)	0.078** (0.040)	0.379** (0.187)	3,977	446	0.1315
Total Nursing Staff	0.079** (0.033)	0.005 (0.047)	0.076 (0.048)	0.083** (0.041)	0.067 (0.050)	0.003 (0.223)	2,505	424	0.0943

Notes: Each row represents output from a separate regression. All regressions include HSA * year and hospital * year effects.

**Statistically significant at the .05 level.

cally significant effect on wages or on hours. In contrast, firm share in non-chain hospitals has a positive effect on all four outcomes. It is particularly remarkable that RN wages rise with firm share, which is inconsistent with the simplest monopsony model. Firm share in chain hospitals has a positive effect on patient days and RN effort, but only the latter effect is statistically significant at the 10% level of confidence.

In summary, our empirical results are consistent with the previous literature, which, when focusing only on wage and employment outcomes, has found scant evidence of monopsony in the market for nurses. There is little consistent evidence that increases in market power associated with joining chains reduce either wages or employment. On the other hand, they do consistently increase the amount of effort required from the nursing staff, as measured by the number of patients each nurse or aide must attend to. This increase in effort demanded is consistent with the con-

Table 4. Variation in Effects of Mergers with Firm Size.

	Chain	*Chain Firm Size*	*No Chain Firm Size*	*No. Obs.*	*No. Hospitals*	*R-Sq.*
Effect on Output						
Number of Beds	−0.004	0.293**	0.331	3,978	446	0.066
	(0.015)	(0.140)	(0.169)			
Patient Days	0.084**	0.362	1.570**	3,977	446	0.067
	(0.027)	(0.257)	(0.311)			
Gross Patient Revenues	0.064**	0.853**	1.190**	3,970	446	0.646
	(0.021)	(0.201)	(0.244)			
Effect on Wages						
RN	0.008	−0.030	0.326**	3,978	446	0.586
	(0.009)	(0.084)	(0.102)			
LVN	0.007	−0.008	0.133	3,914	440	0.443
	(0.011)	(0.103)	(0.125)			
Aides	−0.021**	0.060	−0.036	3,934	443	0.399
	(0.010)	(0.090)	(0.109)			
Contract Workers	0.077**	−1.690**	−0.999**	1,593	354	0.109
	(0.037)	(0.319)	(0.463)			
Effect on Hours						
RN	0.009	−0.153	0.418	3,978	446	0.099
	(0.022)	(0.208)	(0.253)			
Total RN+LVN+Aides	0.004	0.074	0.845**	3,978	446	0.103
	(0.020)	(0.192)	(0.234)			
Total Nursing Staff	−0.024	0.194	0.715**	2,506	424	0.087
	(0.024)	(0.207)	(0.298)			
Effect on Effort						
RN	0.075**	0.515	1.150**	3,977	446	0.101
	(0.028)	(0.267)	(0.324)			
Total RN+LVN+Aides	0.080**	0.289	0.722**	3,977	446	0.13
	(0.023)	(0.215)	(0.026)			
Total Nursing Staff	0.066**	0.050	0.077	2,505	424	0.093
	(0.027)	(0.231)	(0.333)			

Notes: Each row represents output from a separate regression. All regressions include HSA * year and hospital * year effects.

**Statistically significant at the .05 level.

tracting model outlined above, as well as with the amended monopsony model that we develop.

Discussion and Conclusions

The introduction of effort into a monopsony model can explain why previous studies have not found much evidence of monopsony power over wages, but the case in favor of the monopsony model is still far from clear-cut. The evidence presented here suggests that monopsony cannot be the whole story, since a monopsony achieves its gains in profits by restricting output. Hence, takeovers that are motivated only by monopsony should result in lower revenues rather than the higher revenues that we find. We show, however, that combining an increase in monopsony power with a shift in the target hospital's revenue per unit of output (that is, a shift in α) could generate these results. A shift in α could also explain why we sometimes see increases

rather than decreases in hours, as both the contracting and monopsony models would predict. We conclude that we cannot categorically reject the monopsony model, although the contracting model offers a simpler alternative that is equally consistent with the data.

We have not dwelt on the lengthy literature on the potential differences between non-profit and for-profit firms. Following Arrow (1963), theoretical models of the non-profit firm often assume that providers choose the non-profit form in order to signal their high commitment to quality care (see, for example, Frank and Salkever 1994; Glaeser and Schleifer 1998). However, the empirical literature has been hard pressed to demonstrate consistent differences in quality between non-profit and for-profit firms (Sloan 2000, Sloan 2002, and Baker et al. 2000 provide extensive summaries of this literature). For example, Sloan (2002) concluded that status conversions have little effect on in-hospital mortality or charity care, although pneumonia patients in hospitals that converted to FP status experienced an increased rate of complications. Farsi (2002) used models accounting for heterogeneity between hospitals and found that conversions to FP were associated with reductions in in-patient and subsequent mortality. However, conversion also increased rates of complications among heart-attack patients and reduced the probability of being admitted from the emergency room. Thus, it is difficult to conclude that overall quality is higher or lower.

Our work adds to this literature by demonstrating that the two largest California hospital chains have much in common with each other, despite the fact that one is for-profit and the other is non-profit. Moreover, CHW and Tenet are arguably more similar to each other than CHW is to Sutter (the other large non-profit chain), or Tenet is to Columbia-HCA (the other large for-profit chain). Thus our work supports the idea that "ownership differences turn out to be much less important than they might seem ... nominal ownership structure seems to matter much less than fundamental economic incentives" (Pauly 1987:262).

In May 2002, California nurses sued Tenet health care, claiming that they were working through breaks and missing meals because Tenet did not employ enough nurses to serve their patients. Nurses argue that high patient-nurse ratios are one of the main factors behind a shortage of hospital nurses, since many nurses are choosing to work elsewhere (Abelson 2002). High patient-nurse ratios are also said to be behind recent successful union organizing drives. According to the *Health Leaders Magazine,* "The managed care pressures of the 1990s created work environments that were ripe for organizing, with nurses and other healthcare workers forced to take on ever-increasing patient loads in workplaces that became increasingly unsafe for patient and employee alike" (Robitaille 2003). Our results provide strong support for nurses' concerns by showing that nurses are consistently asked to work harder after hospitals join chains.

If reductions in nurse-patient ratios do lead to lower-quality care, our results may have broader implications for hospital markets. To the extent that patients can observe quality and choose from hospitals offering a range of quality levels, reductions in quality will be reflected in the price of hospital services. However, in an increasingly concentrated market fraught with asymmetric information problems, there can be no presumption that such reductions in quality are efficient.

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