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Market Structure, Employment, and Skill Mix in the Hospital Industry*

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The influence of market structure on the earnings of hospital-based nurses has attracted a considerable amount of interest among economists, due to considerations of both theory and policy. On the theoretical level, the nursing labor market seems to be characterized by monopsonistic exploitation, given the small number of employers in most local hospital markets. On the policy level, the federal government has subsidized the training of nurses under the urging of the hospital industry. The reduction of the training subsidies in 1978 was due in large part to the acceptance by President Carter's advisors of the fundamental tenets of the monopsony model: the local nature of nurse labor markets allows hospitals to collude in holding down wages while seeking taxpayer support for increasing nurse supply.

A number of empirical studies have found a positive association between nursing wage rates and various measures of competition in local hospital markets. Based on these studies and the persistence of the nurse vacancy "crisis," many interested economists appear to have accepted the monopsony theory (for an exception, see Rosen [17]). This paper extends the empirical analysis of market structure influences on hospital wages to include the influence of market structure on overall employment and occupational mix within hospitals. It extends the theoretical literature on labor market monopsony to include the important potential effects of product market structure on hospital employment. On the policy level, it provides a framework for anticipating the effects of the important changes during recent years in the functioning of hospital product markets.

The first section of the paper reviews the theory and evidence of monopsonistic behavior in local hospital labor markets. The recent literature on nonprice quality competition in hospital product markets is applied to the questions of employment and skill mix in the second section. The third and fourth sections present the econometric specification and data to be used in the empirical analyses. Results are presented in the fifth section. A concluding section discusses the implications of the analysis for the understanding of recent policy initiatives in the hospital industry.

I. The Monopsony Model

The model of monopsonistic exploitation, due originally to Robinson [16], was applied to the hospital industry by Yett [20] and Aiken, Blendon, and Rogers [1]. These authors argued that the

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supply of nursing labor in a local market was relatively wage inelastic: (i) nurses were tied to their occupations due to the training they had received and hence were insensitive to the relative wages of different occupations; (ii) their labor force participation decisions were based on childrearing responsibilities and the employment status of their husbands, and hence were also relatively insensitive to wage differences; and (iii) mobility by nurses was limited and wage insensitive since the family's geographical location decision was based on the husband's job possibilities.

Given the inelasticity of supply, any increase in the wage offered by one hospital in a local market would lead to a shift of already employed nurses from one institution to another rather than increase total labor supply. Since wages to those nurses already employed by one hospital would also have to be raised when it sought to attract nurses from a competing institution, the marginal cost of each new nurse gained would considerably exceed her own wage. It would be financially advantageous for hospitals to collusively set wages at a low level rather than engage in costly bidding wars.

This model yields empirically testable predictions under the assumption that the ability of hospitals to collude in limiting nurse wages depends on the number of hospitals in the local market and the distribution of market shares. If this assumption is true, one would expect wages to be higher in hospital markets with more competitive structures, other things equal.

Although these latter issues have not been discussed in the literature to date, the monopsony model also yields testable predictions concerning the relative mix of nurse and non-nurse employees in hospitals operating within different market contexts. The marginal cost of employing an additional nurse is higher in a monopsonistic labor market than in a market with comparable labor supply and consumer demand for services but a fragmented and competitive hospital industry. Under the assumption that non-nurse labor markets are competitive in all local hospital markets, given the availability of non-hospital jobs for these workers, nurses are more expensive relative to non-nurses in monopsonistic than in competitive labor markets. The proportion of all hospital jobs filled by nurses, therefore, should be higher in competitive than in concentrated nurse labor markets. By extension, the proportion of all nursing jobs held by Registered Nurses (RNs) who have the greatest attachment to the industry due to their comparatively long training investment, should be higher in competitive than in concentrated local markets, with the other nursing positions being filled by the less trained Licensed Professional Nurses (LPNs). The monopsony model does not yield predictions concerning market structure influences on total employment, i.e., the sum of employment for workers with industry-specific skills and for workers with more general skills (i.e., maintenance and clerical workers).

A number of studies have examined the association between local market structure and hospital wage rates, including Hurd [8], Link and Landon [10], Fottler [7], Sloan and Elnicki [18], and Feldman and Scheffler [4]. These studies generally find the hypothesized positive association between degree of structural competition and level of wages across local hospital markets.

II. The Product Market

Monopsonistic labor markets are in principle compatible with any type of product market. If the goods and services are sold and consumed locally, then it is likely that the labor market monopsonist is also a product market monopolist. If, on the other hand, goods and services are traded on national or international markets, then the labor market monopsonist could face highly competitive product market conditions. Hospital services are sold in geographically restricted

product markets. At least in urban areas, hospital product markets are not substantially larger than hospital labor markets, since they are both dependent on travel times. It is unlikely, however, that the nursing labor market monopsonist behaves like a conventional product market monopolist, who maximizes profits by restricting output to levels below those that would be obtained if the product market were competitive.

The conventional monopoly model fails to capture two salient characteristics of the hospital industry. First, the industry is dominated by nonprofit institutions that generally seek to maximize output levels subject to a break-even constraint, rather than to maximize net revenues [5; 6; 19]. Second, until recently, hospitals have been reimbursed on the basis of costs incurred. This gives even for-profit hospitals strong incentives to maintain high output levels, since marginal costs tend to fall significantly below the average costs upon which reimbursement rates are set.

Several recent studies on the nature of competition in local hospital product markets provide a basis for expecting an association between product market structure and labor market policies. These studies emphasize the role of public and private forms of health insurance in reducing the price elasticity of demand for hospital services while allowing different hospitals to charge different prices for similar services depending on the costs of production they incur. Hospitals compete on a nonprice rather than price basis. Dense hospital markets are the scene of more intense quality competition for physician affiliations and patient admissions than are monopolistic markets. This nonprice competitive process has been dubbed the "medical arms race." It has been found to take the form of excess capacity [9], longer average lengths of patient stay [15], and duplication of clinical facilities [11; 12]. Farley [3] and Robinson and Luft [13; 14] find production costs to be significantly higher in competitive than in monopolistic hospital markets, controlling for patient mix severity, hospital teaching role, and other relevant factors.

The theory of nonprice competition in insured hospital markets contains important predictions for nursing employment and earnings. Staffing inputs are highly visible to both physicians and patients, and are likely to play a central role in nonprice competition. Hospitals in more competitive local markets are likely to maintain higher ratios of nurses to beds than are comparable institutions in less competitive markets. They may also upgrade the quality of their nursing staff, hiring proportionately more Registered Nurses (RNs) and proportionately less Licensed Practical Nurses (LPNs). Within the category of Registered Nurses, they may hire those with more advanced training and specialization. This would require raising wages.

The monopsony and medical arms race models produce the same essential predictions concerning the hospital's wages and skill mix. Wage rates will be higher in competitive than in concentrated local markets, controlling for cost of living and labor supply differences, due either to monopsonistic practices in concentrated labor markets or the upgrading of skill levels in competitive product markets. Employment levels for Registered Nurses relative to Licensed Practical Nurses will also be higher in competitive than in concentrated local markets, controlling for hospital size and capacity utilization, due either to restriction of employment by labor market monopsonists or raising of staffing levels as a marketing strategy in competitive product markets. The arms race model predicts that total employment levels will be higher in competitive compared to concentrated local markets, while the monopsony model makes no predictions on this point. If the structure of local hospital labor and product markets could be measured separately, the relative importance of the monopsony and medical arms race effects could be estimated. Given the geographical overlap of the two markets, due to their mutual dependence on travel time, this study will focus on the combined effects of labor and product market structure on hospital performance.

III. Specification

Reduced form employment equations were specified as follows:

$$\mathbf{EMP} = b_{10} + b_{11}\mathbf{COMP} + b_{12}\mathbf{SUPPLY} + b_{13}\mathbf{SIZE} + b_{14}\mathbf{HOSP} + U_1$$

$$\mathbf{MIX} = b_{20} + b_{21}\mathbf{COMP} + b_{22}\mathbf{SUPPLY} + b_{23}\mathbf{SIZE} + b_{24}\mathbf{HOSP} + U_2.$$

Here **EMP** is a vector of variables measuring total employment and employment of major occupational groups, while **MIX** is composed of two variables directly measuring the percentage of all nursing positions filled by Registered Nurses and the percentage of all non-physician positions filled by nurses (RNs and LPNs). **COMP** is a vector of variables describing the structure of the local hospital market. **SUPPLY** is a vector of variables describing the local supply of nurses, total population, and opportunity wages for non-nurse hospital employees. **SIZE** is a vector of variables measuring the scale of the hospital (including both inpatient and outpatient services) and the level of inpatient capacity utilization. **HOSP** is a vector of variables measuring hospital characteristics that influence demand for labor, including patient case mix, teaching role, availability of specialized clinical services, and ownership type. Hospital-specific wage rates are excluded from the regressions since they are clearly endogenous.

IV. Data

The data used in this study are drawn primarily from the 1982 Annual Survey of Hospitals, conducted by the American Hospital Association (AHA). The AHA survey contains information on hospital employment data for RNs, LPNs, and non-nursing employees. While the overall response rate to the AHA survey is over 90%, response rates to specific questions are often substantially lower. The AHA inserts predicted values for specific non-answered questions, based on answers to the previous year's survey and the answers to other questions in the same year's survey. The AHA tape does allow the analyst to distinguish hospitals which actually answered each question from those for which values were estimated by the AHA staff. The study restricted itself to those hospitals which answered all the relevant questions on the 1982 survey. Of the universe of 5898 short-term nonfederal hospitals in the continental United States in 1982, usable information was available for 3577, (61%).

Existing studies of market structure and nurse earnings have all used the county or SMSA as the definition of the local market. This creates obvious problems since both hospital patients and hospital employees frequently cross county lines on their way to treatment and work. SMSA boundary-crossings are less frequent, but these geopolitical units are often far larger than are local hospital product and labor markets. In this study, hospital markets are defined in terms of the physical distance between adjacent institutions. Using latitude and longitude coordinates for each of the nation's ZIP codes, straight-line distances between hospitals were computed using the Pythagorean theorem. Although, as discussed above, accurate personnel information was only available for a subset of the nation's hospitals, location and bed size information was obtained for all hospitals. Each hospital's local market was defined as including all other short-term nonfederal hospitals within a 15 mile radius (700 square miles). The 15 mile radius was chosen based on an

average travel time to work for hospital nurses of 20 minutes, calculated using the 1/1000 sample from the 1980 Census of Population.¹

Herfindahl indexes for each hospital market were then calculated based on the share distribution of staffed beds among all hospitals in the market. Market structure could also in principle be measured based on the share distribution of employment rather than beds. As mentioned earlier, however, employment information is not available for almost two-fifths of the nation's hospitals. The AHA does provide accurate data on hospital beds. In any case the distribution of product market shares, as measured by beds, is likely to be highly correlated with the distribution of labor market shares, as measured by employment. To be able to pick up nonlinear associations between market structure and the various dependent variables, these Herfindahl indexes are used in the form of four binary variables, *HERF1–HERF4*, with higher values indicating more competitive local markets. The comparison category is composed of monopoly hospitals with no neighboring institutions within 15 miles.²

Many of the early studies of hospital monopsony power failed to adequately distinguish between the role of hospital market structure and that of city size. Most concentrated hospital markets are in small towns, and hence these studies were picking up the influence of cost of living differences on nurse wages. This study controls for these effects by including the population in the county in which the hospital is located (based on the 1980 Census of Population) and the average annual earnings for manufacturing workers in the county (based on the 1982 Census of Manufacturing Industries). The county population and manufacturing earnings variables were obtained from the machine readable versions of the 1982 Area Resource File and City and County Data Book, respectively, and merged with the AHA hospital data using county codes.

Published tests of the monopsony hypothesis have also been limited by an inability to control for the supply of nurses in the local market. If nurses' decisions of where to live are not strongly influenced by relative wage rates, as the monopsony model assumes, then differences across areas in wage rates may simply reflect differences in labor supply, due for example to the presence or absence of a nursing school. This study includes variables measuring the number of RNs and LPNs residing in the county where the hospital is located. These data are based on the 1980 Census of Population and were obtained from the Area Resource File. They count nurses who are currently employed in the occupation, those unemployed but seeking employment, and those out of the labor force but whose last job was in nursing. Trained nurses who had been out of the labor force for more than five years are not counted, however. These data thus provide a reasonable measure of the potential supply of nurses in a given location during 1980.

A number of other important hospital-specific variables were drawn from the AHA survey. Facility size is measured via four binary variables (100–199 beds, 200–299 beds, 300–399 beds, 400 or more beds, with less than 100 beds being the comparison category) and two continuous variables, one for the number of outpatient visits per year, and one for the annual number of births

1. The mean travel time for hospital nurses ($N = 617$) was 19.6 minutes, with a standard deviation of 14.9. For central city residents, the mean (standard deviation) was 19.0 (13.3). For SMSA residents outside the central city, the comparable figures were 20.0 (14.2). For nurses residing outside an SMSA, the figures were 18.9 (19.8).

2. The omitted Herfindahl index category (index = 1) accounts for 26 percent of the total sample of hospitals. The remainder of the hospitals were divided into five categories each containing approximately 15 percent of the hospitals. No significant differences in effects were observed between the two categories with indexes between 0.34 and 0.99 and so they were combined into one category with 30 percent of the sample. The other categories are (0.17–0.34), (0.058–0.17), and (0.00–0.058).

in the hospital. Average annual bed occupancy rates are included since many hospitals exhibit substantial excess capacity. Hospital teaching role is measured via a binary variable taking the value of one if the institution is a member of the Council of Teaching Hospitals and a continuous variable indicating the number of house staff (physicians in training). The mix of patients treated by the hospital is measured in broad terms by five variables indicating the percentage of inpatient days during the year accounted for by pediatric acute care, psychiatric care, intensive care, long-term care, and chronic disease care (with the comparison category being adult medical and surgical acute care).

In order to capture differences across hospitals in the type of clinical facilities available (which influence the type of personnel employed), the study includes a vector of five binary variables indicating whether or not the hospital maintains a cardiac catheterization laboratory, a respiratory therapy capability, a CT scanner, x-ray therapy capacity, or an organ transplant unit, respectively. Hospital ownership type is measured by two binary variables indicating whether or not the hospital is governmental or for-profit, respectively, with private nonprofit hospitals being the comparison category.

V. Results

Table I presents the determinants of total employment, employment of RNs, LPNs, and non-nursing staff, and of the degree of variation across hospitals in substitution between RNs and LPNs and between nurses and non-nurses. Controlling for hospital size and utilization (beds, occupancy rate, outpatient visits, births) hospitals in more competitive markets employ substantially more personnel than do hospitals in concentrated markets. Hospitals in the most competitive local markets in 1982 reported an average of 86 more employees than did otherwise comparable monopoly hospitals. The relationship between market structure and employment is non-monotonic, however, with the highest employment levels being observed in markets with a moderate degree of competition. This non-monotonic relationship is due entirely to the drop off in nurse employment in the most competitive markets, as indicated in the second through fourth columns of the table. Registered Nurse employment is greatest in moderately competitive markets and Licensed Practical Nurse employment declines as the degree of competition increases. Employment of non-nursing personnel generally increases with the degree of competition: hospitals in the most competitive local markets employ an average of 94 more non-nurse staff than do otherwise comparable hospitals in the least competitive markets.³

The figures in the fifth and sixth columns of the table indicate the extent to which market structure influences the relative mix of Registered and Licensed Practical Nurses on the one hand and nurses and non-nurses on the other hired by hospitals. Hospitals in competitive markets substitute RNs for LPNs substantially more frequently than do hospitals in concentrated markets, as indicated in column five. Hospitals in the most competitive local markets report the mix of RNs relative to LPNs to be nine percentage points higher than otherwise comparable hospitals in the least competitive markets; this should be evaluated in light of the sample average of 69% of nurse positions being filled by RNs. Nurses as a percentage of all employees has a non-monotonic relationship with market structure, with lower percentages of nurses being observed in especially

3. For the hospital sample as a whole ($N = 3577$), mean employment for all non-physicians was 823, for RNs was 202, for LPNs was 68, and for non-nurse staff was 553.

Table I. The Association Between Hospital Market Structure and Total Employment and Occupational Mix

	Total Employment	RN Employment	LPN Employment	Non-Nurse Employment	Percentage RN	Percentage Nurse
<i>HERF1</i>	4.823 (15.373)	3.836 (5.033)	2.804 (2.227)	-1.817 (11.087)	-0.322 (0.620)	1.137 (0.327)
<i>HERF2</i>	-2.548 (20.373)	5.026 (6.670)	2.552 (2.951)	-10.126 (14.694)	2.178 (0.821)	1.274 (0.434)
<i>HERF3</i>	99.774 (22.990)	50.066 (7.527)	-7.573 (3.330)	57.281 (16.582)	6.780 (0.927)	0.255 (0.490)
<i>HERF4</i>	85.982 (28.044)	27.885 (9.181)	-36.131 (4.062)	94.228 (20.226)	8.746 (1.131)	-2.171 (0.597)
RN in County	55.161 (6.854)	19.843 (2.244)	5.561 (0.993)	29.757 (4.944)	0.232 (0.276)	0.466 (0.146)
LPN in County	137.664 (17.819)	18.863 (5.834)	45.705 (2.581)	73.095 (12.851)	-6.734 (0.718)	1.614 (0.379)
County Population	-53.863 (5.971)	-14.380 (1.955)	-10.795 (0.865)	-28.688 (4.307)	1.055 (0.241)	-0.552 (0.127)
Log Manufactur- ing Earnings	9.255 (11.384)	2.513 (3.727)	1.629 (1.649)	5.113 (8.210)	1.667 (0.459)	1.357 (0.242)
Teaching Hospital	183.603 (32.721)	54.018 (10.712)	-27.082 (4.739)	156.667 (23.600)	2.815 (1.319)	-1.931 (0.697)
Housestaff	2.217 (0.142)	0.358 (0.046)	0.066 (0.021)	1.792 (0.102)	-0.00042 (0.00572)	-0.0077 (0.0030)
Public Hospital	-84.632 (13.664)	-32.840 (4.473)	-4.086 (1.979)	-47.707 (9.855)	-4.394 (0.551)	-1.555 (0.291)
For-Profit Hospital	-170.121 (23.655)	-40.148 (7.744)	-13.093 (3.426)	-116.880 (17.061)	-2.161 (0.954)	1.291 (0.504)
Occupancy Rate	0.237 (0.109)	0.043 (0.036)	0.029 (0.016)	0.163 (0.079)	-0.0041 (0.0044)	-0.0052 (0.0023)
100-199 Beds	189.757 (16.548)	39.116 (5.418)	31.672 (2.397)	118.969 (11.935)	0.073 (0.667)	1.357 (0.352)
200-299 Beds	434.984 (23.978)	102.276 (7.850)	58.907 (3.473)	273.801 (17.294)	1.143 (0.967)	0.229 (0.511)
300-399 Beds	705.139 (31.155)	174.531 (10.200)	81.870 (4.512)	448.738 (22.470)	1.505 (1.256)	-0.274 (0.663)
400 or More Beds	1256.013 (36.925)	286.926 (12.089)	120.776 (5.348)	848.312 (26.631)	0.027 (1.489)	-2.167 (0.786)
Outpatient Visits	18.012 (1.072)	2.774 (0.351)	0.462 (0.155)	14.776 (0.773)	0.082 (0.043)	-0.030 (0.023)
Births	166.271 (8.386)	53.058 (2.745)	15.078 (1.215)	98.135 (6.048)	0.304 (0.338)	1.425 (0.179)
Cardiac Cathe- terization Lab	169.490 (20.828)	51.118 (6.819)	5.038 (3.017)	113.334 (15.022)	0.861 (0.840)	-0.638 (0.444)
Respiratory Therapy Unit	66.579 (22.791)	14.508 (7.462)	7.702 (3.301)	44.369 (16.438)	0.384 (0.919)	0.939 (0.485)

Table I. Continued

	Total Employment	RN Employment	LPN Employment	Non-Nurse Employment	Percentage RN	Percentage Nurse
CT Scanner	102.983 (17.819)	38.073 (5.834)	6.916 (2.581)	57.995 (12.852)	2.322 (0.718)	0.997 (0.379)
X-Ray Therapy	54.006 (17.260)	6.392 (5.651)	3.667 (2.500)	43.946 (12.448)	-0.337 (0.696)	-0.600 (0.368)
Transplant Unit	173.011 (29.472)	39.717 (9.649)	5.478 (4.269)	127.816 (21.256)	0.104 (1.188)	-0.235 (0.628)
% Pediatric Care	12.942 (76.781)	-25.696 (25.137)	-4.198 (11.121)	42.835 (55.377)	8.248 (3.096)	-6.408 (1.635)
% Psychiatric Care	270.526 (109.569)	61.309 (35.871)	-4.468 (15.870)	213.686 (79.025)	8.950 (4.418)	-4.544 (2.333)
% Intensive Care	416.311 (158.446)	345.176 (51.873)	16.962 (22.950)	54.173 (114.277)	31.452 (6.388)	29.482 (3.374)
% Long-Term Care	-10.280 (39.923)	-0.558 (13.070)	-7.037 (5.783)	-2.685 (28.794)	3.590 (1.610)	-1.585 (0.850)
% Chronic Disease Care	262.531 (86.467)	74.126 (28.308)	17.403 (12.524)	171.002 (62.363)	5.957 (3.486)	2.101 (1.841)
Intercept	0.587 (108.876)	-8.939 (35.645)	-3.263 (15.770)	12.789 (78.525)	47.486 (4.390)	17.392 (2.319)
Adjusted R^2	0.88	0.80	0.60	0.87	0.26	0.14
<i>N</i>	3577	3577	3577	3577	3577	3577

Note: Standard errors are in parentheses.

concentrated and especially competitive markets. In the sample as a whole, 32% of non-physician jobs are filled by nurses.

Hospitals located in counties with larger supplies of RN and LPN labor report higher levels of employment for all categories of workers. The effect on nurse employment is as one would expect, given the tendency for large labor supplies to depress wage rates. (Nurse earnings in this data set were negatively and significantly influenced by nurse labor supply, controlling for hospital market structure, area cost of living measures, and other relevant factors.) The positive association between nurse labor supply and non-nurse employment is more surprising, and suggest that nurse and non-nurse staff operate more as complements than as substitutes in the hospital care production process. The effect of large nurse labor supply is proportionately greater for nurse employment than for non-nurse employment, however, producing a significant increase in the overall percentage of hospital jobs filled by nurses.⁴

County population is negatively associated with all four measures of hospital employment,

4. It could be argued that nurse labor supply was endogenously determined by hospital wage rates and staffing levels, in which case the inclusion of labor supply in the staffing regressions would be inappropriate. The monopsony model rests in this case upon the assumption that geographical location decisions are based largely on career opportunities for their husbands, rather than on relative wage rates in different hospital markets. This assumption cannot be tested with these data. Exclusion of the nurse labor supply variables from the regressions reported in Table I does not materially influence the estimated coefficients on the other independent variables.

but not significantly with the two measures of occupational mix, controlling for the structure of the local hospital market. On the other hand, the two occupational mix variables are significantly associated with the level of wages paid to manufacturing workers in the county where the hospital is located, while none of the four employment variables are. The manufacturing wage level measures the quality of non-hospital employment possibilities in the local area. These non-hospital employments are of more direct interest to non-nurses than to nurses and to LPNs than to RNs, given the industry-specific nature of nurse training in general and Registered Nurse training in particular. It is not surprising, therefore, that hospitals facing high market rates for non-nurse and non-RN employees hire proportionately more nurses and RNs than do hospitals facing lower market rates for non-nurse and non-RN employees. The negative association between county population and hospital employment is more difficult to explain. It may be that this variable is positively correlated with hospital-specific wage rates due to cost of living differences, even after controlling for manufacturing wage levels. High wage rates would exert pressure on hospitals to utilize a less labor-intensive mode of production. The simple association between county population and employment is strongly positive, however, due to the positive correlation between population and the degree of hospital competition.

Teaching hospitals, measured via membership in the Council of Teaching Hospitals and by the number of physicians in training programs, is positively associated with overall employment, Registered Nurse employment, and non-nurse employment. These strong statistical associations are probably due both to the medical education process itself, since non-physician staff inputs are more often complements than substitutes for medical student and physician housestaff inputs, and to the more severe diagnostic case mix found in university-affiliated hospitals.

Public hospitals and for-profit hospitals both hire substantially fewer employees than do the comparison category of private non-profit hospitals, though perhaps for different reasons. The public hospital variable is probably picking up the influence of rural county hospitals with limited budgets and relatively mild diagnostic case mixes; the urban public hospitals often have high employment levels, but this effect is captured by the teaching hospital variables, since urban-public institutions are often university-affiliated. For-profit hospitals, on the other hand, tend not to be university-affiliated. Their relatively low employment levels may reflect a relatively mild diagnostic case mix or a more efficient allocation of resources.

The hospital size and utilization variables are positively associated with all four employment variables, as one would expect. The clinical service variables measure the presence of highly specialized facilities that require specialized staff and hence are also positively associated with employment levels, controlling for bed size and capacity utilization. Hospitals with large fractions of all admissions composed of psychiatric patients hire especially large numbers of non-nurse employees (primarily psychiatric technicians). Hospitals with large numbers of patients undergoing intensive care employ disproportionately large numbers of Registered Nurses.

VI. Conclusions

This study documents extensive differences with respect to nursing employment and skill mix among hospitals in markets with different structures. Hospitals in more competitive markets are found to employ substantially more employees than hospitals in concentrated markets, controlling for a number of measures of hospital size. These findings are consistent with both the hypothesis that nurses and other specialized workers in concentrated hospital markets are subject to monop-

sonistic exploitation, and with the "medical arms race" model, which focuses on nonprice competitive strategies utilized in hospital product markets under conditions of permissive cost-based reimbursement.

These findings on the association between market structure and hospital personnel practices in 1982 are important for understanding the recent turbulent events in hospital labor and product markets. The most important change has been the substitution of prepayment for cost-based reimbursement by Medicare and the growth of price competition for privately insured patients. Taken alone, these events could be expected to reduce employment throughout the industry and, given their probable greater impact on hospitals in competitive local markets, reduce the association reported in this paper between market structure and employment levels.

These changes in the health care financing system have, however, been accompanied by changes in the structure of local hospital labor and product markets. Labor markets are becoming considerably more competitive due to the proliferation of outpatient surgery centers and drop-in treatment centers that provide non-hospital employment possibilities for nurses and some types of medical technicians. These new institutional developments have served to make the treatment of patients at the low end of the hospital complexity scale more price-competitive. Treatment at the high end of the complexity scale may become less competitive, however, as hospitals in local markets merge to present a more united front in negotiations with insurers [2]. Hospitals in these increasingly concentrated markets appear to prefer avoiding price competition while competing for market share via nonprice quality of care strategies. Declines in monopsony power and continuing reliance on nonprice competitive strategies will both tend to increase employment in structurally competitive hospital markets. Taken together, these developments could significantly offset the cost-reducing tendencies of changes in financing mechanisms.

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