

# Independent versus System-Affiliated Hospitals: A Comparative Analysis of Financial Performance, Cost, and Productivity

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*This article analyzes differences in the financial performance, cost, and productivity between system-affiliated and independent hospitals. Data for the study were obtained from the 1981 American Hospital Association (AHA) Annual Survey of Hospitals for the State of Iowa and included 94 nonstate or nonfederal short-term hospitals without long-term care units. An interpretation of the results indicated that system-affiliated hospitals are more profitable, have better access to capital markets, are more effective price setters, and experience higher costs per case which are related to longer lengths of stay and less productive use of plant and equipment in generating revenues.*

## INTRODUCTION

The rapid growth and development of multihospital systems has represented a major restructuring of the American hospital industry [1]. Some have viewed this organizational change as part of a process of "industrialization" [2], similar in many respects to the corporate consol-

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idation and resource accumulation which occurred during the development of other U.S. industries, in strategic response to changing market environments [3].

Growing competition from less costly and more convenient alternative delivery modes; increasing use of medical purchasing power by third-party payers and the business community; and increasing fiscal retrenchment and regulatory intervention into hospital operations by state and local government are among environmental trends which threaten the continued survival of many hospitals as autonomous institutions [2, 4, 5]. Well-established industry trends toward further aggregation of hospitals into systems, and toward increased centralization of policy formulation and management control within systems, are expected to gain momentum during the remainder of this decade [6-8].

This article reports the results of a study which sought to analyze empirically the differences in financial performance, cost, and productivity between system-affiliated and independent hospitals. The hypothesis tested is that hospitals owned or managed by multihospital systems experience significant advantages in financial performance and productivity. Measures of performance utilized in this study consist of a series of indicators of financial condition, efficiency of resource utilization, profitability, and productivity.

#### CONCEPTUAL CONSIDERATIONS

The growth of multihospital systems has been encouraged both by the hospital industry leadership and as a matter of national policy [9], on the traditional assumption that economies of scale in the concentration of human, financial, and other operating services enable system-affiliated hospitals to realize significant performance advantages over freestanding institutions [10-15].

The basis of the general assumption of system superiority is that organizational consolidation leads to improved utilization of capital and other resources. Through the combination and consolidation of their human and capital resources, multihospital systems have the potential to achieve enhanced levels of performance in the critical areas of management depth and capital acquisition. Managers of hospitals which are owned or managed by systems have access to and operate within an environment of enhanced organizational sophistication, particularly in the area of financial management, cost control, and productivity.

Theoretically, increased size and scope of operations through cen-

tralization should enable systems to enhance their productivity through increased coordination of activities, specialization of personnel and equipment, standardization of manpower staffing and other procedures based on system-wide experience, increased volume purchase discounts, reduced unit costs, and a host of other indicators of enhanced organizational efficiency and sophistication [12, 13]. Multi-hospital systems have become specifically noted for acquiring and retaining a variety of financial management specialists at the corporate level [14, 16-20].

The critical need for capital has had a "management effect" within the hospital industry [20]. The advantage of increased economic power in terms of the ability of multihospital systems to secure debt capital on terms superior to those obtainable by their individual operating units or by comparable freestanding institutions has been traditionally offered as a major incentive for the development and growth of these arrangements [20-27].

The combined effect of these structural and environmental differences should result in economies of scale in pooled management talent, technical expertise, and administrative experience within multihospital systems. System-wide standards of organizational performance both support and constrain individual hospital operations. The combined impact of economies of scale in management expertise and organizational discipline imposed on individual hospitals by top management within the system [28] should be reflected in significantly favorable indicators of financial condition [29], cost of operations, and productivity for system-affiliated hospitals when compared to freestanding hospitals.

Comprehensive reviews of the previous research have been presented recently by other authors [7, 12, 14]. Each of these authors has concluded that the empirical evidence regarding economies of scale and efficiency of operation in multihospital arrangements is, at best, mixed. Coyne concludes that we know very little about performance differences between system hospitals and independent institutions, and suggests the need for a body of empirical information which provides insight into how and to what extent differences between these two organizational categories exist [14].

Wheeler, Zuckerman, and Aderholdt [26] reported the use of measures of financial ratios in a time series study of ten contract-managed hospitals in one not-for-profit system. They reported that liquidity and debt structure remained relatively unchanged, although the latter measures had improved slightly in the direction of increased debt leverage. Profitability had increased significantly, and the finan-

cial viability of the hospitals had been improved from a trend of net losses to a modest return on assets within the 3-year period of the study. The primary factors in these financial turnarounds were substantial increases in prices and modest improvements in operation efficiency.

In a study designed to examine differences in performance between system and independent hospitals, Coyne reported that cost per case was significantly higher among all ownership categories of system hospitals, relative to their freestanding group [14]. Results of the other performance variables were mixed. No significant differences were observed on the measure of labor productivity; differences in payroll expenses per day were ambiguous across categories; and admissions per bed were higher for all ownership categories of system hospitals, except county-owned.

The effects of contract management on hospital performance have recently been reported by Kralewski et al. [30]. After matching contract-managed hospitals to a set of internally managed hospitals on a variety of hospital and market area characteristics, the authors measured and compared the performance of the two groups 3 years following the onset of contract management. The contract-managed hospitals showed no improvement in productive efficiency but did increase their markups. The ratio of gross patient revenue to total expense increased significantly in the contract-managed hospitals relative to their matches.

The consolidation and aggregation of American hospitals into multi-institutional systems has occurred largely in the absence of empirical evidence to support the almost universal assumption of their organization superiority [5, 12, 14, 15]. The lack of a cumulative body of empirical knowledge about the performance of system-affiliated and independent hospitals and the opportunity to contribute to the resolution of questions which remain unanswered provide the rationale for this study.

## STUDY DESIGN AND METHODOLOGY

### DATA AND SAMPLE CHARACTERISTICS

Data for this study were obtained from the 1981 AHA Annual Survey of Hospitals for the State of Iowa. The sample consisted of all short-term, acute care, general hospitals which responded to this survey, with the following exceptions. Hospitals which reported state or federal ownership, or which classified themselves as other than short-term or acute care, were excluded from the analysis. The 1981 AHA data

provide consolidated revenue and expense data for institutions which have separate long-term care units within their organizational structure. To facilitate comparability of hospital-specific indicators and to avoid the confounding influence of long-term care units on a study which was limited to short-term, acute care facilities, hospitals which reported the presence of special units were deleted from the sample. The analysis also excluded the major public university-owned teaching center in the state, which, because of its size and complexity, is the state's tertiary care hospital and is an unrepresentative outlier which would seriously confound study results.

A total of 94 hospitals comprised the sample. Of these, 74 were freestanding and 20 were affiliated with multihospital systems. In the latter category, 11 hospitals were owned and 9 were managed under contract. The 11 system hospitals ranged in size from 58 beds to 550 beds. Eight of the nine managed hospitals were under 100 beds. The largest managed hospital was 105 beds. Only 7 of the 20 system-affiliated hospitals were part of for-profit organizations. The system-affiliated category included representatives of religious, secular not-for-profit, and for-profit categories of management control. However, none of the hospitals in this sample was owned by a for-profit corporation.

The geographic boundaries of the sample supported the assumption that hospitals in both categories were homogenous with respect to environmental variables exogenous to the study, such as demographic and professional personnel shifts; changes in demand, utilization, and reimbursement procedures; wage rates and other resource costs; and the general state of the economy.

Iowa is a relatively small, predominantly rural state with a relatively homogenous population distribution. Its 1980 population was approximately 2.9 million, of whom 515,000 residents were over 60 years of age. One-half the counties in the state (49 of 99) do not contain a city with a population of 5,000 or more. Accessibility to acute general hospital care is adequate; over 98 percent of the population live within a 30-minute travel time to a hospital. Of the 132 acute-care general hospitals within the state, over two-thirds have fewer than 100 beds. Approximately 54 percent of office-based physicians are engaged in primary care, and 15 percent of this group are over 65 years of age.

#### ANALYTIC METHODS

The analysis proceeded as follows: (1) values for each performance measured were computed for each of the 94 hospitals in the sample; (2)

arithmetic group means and standard deviations were computed on each measure for the 20 system-affiliated and 73 freestanding hospitals which comprised the two groups; (3) within the system-affiliated category, subgroup means and standard deviations were calculated on each measure for the 9 contract-managed and 11 system-owned hospitals; (4) the SAS *t*-Test program was used to test for significant differences between subgroup means on each performance measure, for the contract-managed and system-owned hospitals within the system-affiliated category. The purpose of this preliminary analysis was to test the assumption that performance levels between these two subcategories of hospitals were sufficiently similar to permit their aggregation into the category of system-affiliated hospitals. Based on findings which supported the above assumption, the SAS *t*-Test program was then used to analyze observed differences in group means between system-affiliated and freestanding hospitals on each of the performance measures.

Observed differences between group means on each measure were analyzed for direction and statistical significance, using two-tailed student's *t*-test procedures for small samples. Significant differences in the hypothesized direction were interpreted as demonstrating empirical support for the hypothesized performance advantage of system-affiliated hospitals over freestanding institutions. Observed differences in a direction inconsistent with this hypothesis, or inability to reject the null hypothesis of no difference between group means, were interpreted as failing to support the hypothesized advantage of system affiliation.

#### OPERATIONALIZATION OF MEASURES

Three major categories of performance measures were used to assess relative hospital performance. The first of these was financial performance measured by a series of financial ratios. Table 1 provides the definition, industry benchmark standard, and interpretation for each measure. The use of financial ratio analysis as an analytic tool to evaluate and monitor organizational financial condition and performance is a well-established technique within general industry, which is currently being applied with increasing frequency to the hospital industry [29-35]. Table 2 presents the definition and interpretation of variables measuring case-mix-adjusted costs as indicators of hospital efficiency. The third category of variable consists of case-mix-adjusted measures which relate hospital output to resource inputs of labor, plant, and capital as indicators of hospital productivity. These variables are summarized in Table 3.

**Table 1: Definition, Industry Benchmark Standard, and Interpretation of Financial Ratios\***

<i>Measure of Financial Performance</i>	<i>Definition</i>	<i>Variable Name</i>	<i>Approximate Industry Benchmark</i>	<i>Favorable Direction</i>
<i>Liquidity Ratios</i>				
Current ratio	$\frac{\text{Current assets}}{\text{Current liabilities}}$	CURRATIO	1.81	Above
Acid test (quick)	$\frac{\text{Cash} + \text{net accounts receivable}}{\text{Current liabilities}}$	ACIDTST	1.57	Above
Absolute (pure) liquidity	$\frac{\text{Cash} + \text{marketable securities}}{\text{Current liabilities}}$	ABSLIQU	0.31	Above
Accounts receivable	$\frac{\text{Net accounts receivable}}{\text{Current assets}}$	ACRECRAT	0.70	Below
Uncollectibles ratio	$\frac{\text{Allowance for bad debt}}{\text{Gross patient accounts receivable}}$	UNCOLL	0.19	Below
Collection period	$\frac{\text{(Net accounts receivable} \times 365)}{\text{Operating revenue}}$	COLLPD	60.70	Below
<i>Capital Structure Ratios</i>				
Equity financing	$\frac{\text{Fund balance (unrestricted and restricted)}}{\text{Total assets}}$	EQTYFIN	0.54	Above
Long-term debt to equity	$\frac{\text{Long-term debt}}{\text{Unrestricted fund balance}}$	LTDEQTY	0.57	Below
Long-term debt to fixed assets	$\frac{\text{Long-term debt}}{\text{Net fixed assets}}$	LT DFA	0.48	Below
Cash flow to debt	$\frac{\text{Net income} + \text{depreciation expense}}{\text{Total liabilities}}$	CAFLDBT	N/O	Above

Continued

Table 1: Continued

<i>Measure of Financial Performance</i>	<i>Definition</i>	<i>Variable Name</i>	<i>Approximate Industry Benchmark</i>	<i>Favorable Direction</i>
<i>Financial Activity Ratios</i>				
Total asset turnover	$\frac{\text{Operating revenue}}{\text{Total assets}}$	TOTASTVR	0.99	Above
Fixed asset turnover	$\frac{\text{Operating revenue}}{\text{Net fixed assets}}$	FXASTVR	1.63	Above
Current asset turnover	$\frac{\text{Operating revenue}}{\text{Current assets}}$	CASSTVR	4.19	Above
<i>Depreciation Ratios</i>				
Plant depreciation	$\frac{\text{Accumulated depreciation}}{\text{Gross plant assets}}$	PLNTDPR	N/O	Below
Average age	$\frac{\text{Accumulated depreciation}}{\text{Current depreciation expense}}$	AVGAGE	N/O	Below
<i>Profitability Ratios</i>				
Return on equity	$\frac{\text{Net income}}{\text{Total fund balance (restricted and unrestricted)}}$	RETEQTY	0.080	Above
Return on total assets	$\frac{\text{Net income}}{\text{Total assets}}$	RETTASS	0.030	Above
Return on total assets, controlling for financing	$\frac{\text{Net income} + \text{interest expense}}{\text{Total assets}}$	RETTAFIN	N/O	Above
Return on total assets, from patient services	$\frac{\text{Net income} + \text{interest expense}}{\text{Total assets}}$	RETTAPTS	N/O	Above



Profit margin from patient services	$\frac{\text{Net income from patient services}}{\text{Net revenue from patient services}}$	MARGPTSV	N/O	Above
Operating margin	$\frac{\text{Operating income}}{\text{Operating revenue}}$	OPMARG	N/O	Above
Net profit margin	$\frac{\text{Net income}}{\text{Operating revenue}}$	NETPFMAR	0.037	Above
Total margin	$\frac{\text{Net income}}{\text{Total revenue}}$	TOTMARG	0.010	Above
Markup	$\frac{\text{Gross patient revenue and other operating revenues}}{\text{Operating expenses}}$	MARKUP	1.12-1.19	Above
Deductible ratio	$\frac{\text{Allowances for contractual adjustments and bad debt}}{\text{Gross patient revenues}}$	DEDUCT	0.140	Below

\*Source: Indicators of industry standards were compiled by the authors from a search of the literature (Cleverley, 1980, 1981; Choate, 1979; Bentkover, 1982).

Table 2: Definition and Interpretation of Cost Measures

<i>Measure</i>	<i>Definition</i>	<i>Variable Name</i>	<i>Favorable Direction</i>
Cost per case	$\frac{\text{Total expenses}}{(\text{Adjusted admissions} \times \text{HCFACM})}$	CMCPC	Below
Cost per day	$\frac{\text{Total expenses}}{(\text{Adjusted patient-days} \times \text{HCFACM})}$	CMCPD	Below
Pay per day	$\frac{\text{Total salary expenses}}{(\text{Adjusted patient-days} \times \text{HCFACM})}$	CMPPD	Below
Pay per admission	$\frac{\text{Total salary expenses}}{(\text{Adjusted admissions} \times \text{HCFACM})}$	CMPPADM	Below
Nurse pay per day	$\frac{\text{Total nursing salary expenses}}{(\text{Adjusted patient-days} \times \text{HCFACM})}$	CMNPPD	Below
<i>Notes</i>			
1. Adjusted admissions = Admissions $\left( \frac{\text{inpatient} + \text{outpatient revenue}}{\text{inpatient revenue}} \right)$			
2. Adjusted patient-days = Patient-days $\left( \frac{\text{inpatient} + \text{outpatient revenue}}{\text{inpatient revenue}} \right)$			
3. HCFACM = Medicare Case-Mix Intensity Index for each hospital			

Table 3: Definition and Interpretation of Productivity Measures

<i>Measure</i>	<i>Definition</i>	<i>Variable Name</i>	<i>Favorable Direction</i>
Number of full-time equivalents per average daily census	$\frac{\text{Number of full-time equivalents}}{(\text{Adjusted average daily census} \times \text{HCFACM})}$	CMFTEADC	Below
Fixed assets per average daily census	$\frac{\text{Net fixed assets}}{(\text{Adjusted average daily census} \times \text{HCFACM})}$	CMFAPADC	Below
Total assets per admission	$\frac{\text{Total assets}}{(\text{Adjusted admissions} \times \text{NCFACM})}$	CMTAPADM	Below
Admissions per bed	$\frac{(\text{Adjusted admissions} \times \text{NCFACM})}{\text{Total beds set up and staffed}}$	CMADMBED	Above
Full-time administrators per average daily census	$\frac{\text{Number of full-time administrators}}{(\text{Adjusted average daily census} \times \text{HCFACM})}$	FTADMRAT	Below
Case-mix-adjusted average length of stay	$\text{HCFACM} \times \left( \frac{\text{total inpatient-days}}{\text{total admissions}} \right)$	CMALOS	Below

*Note*  
Adjusted average daily census =  $\text{Average daily census} \left( \frac{\text{inpatient} + \text{outpatient revenue}}{\text{inpatient revenue}} \right)$

## FINDINGS

## COMPARISON OF CONTRACT-MANAGED AND SYSTEM-OWNED HOSPITALS

Tables 4 and 5 present the results of the first phase of the analysis, which tested the assumption that contract-managed and system-owned hospitals were similar in performance and thus could be combined into a category of system-affiliated hospitals. Table 4 compares observed

Table 4: Comparison of Financial Indicators for Contract-Managed and System-Owned Hospitals

<i>Measure</i>	<i>Contract-Managed</i>		<i>System-Owned</i>		<i>t-Value</i>
	N = 9		N = 11		
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	
<i>Liquidity</i>					
CURRATIO	3.14	(1.89)	2.31	(1.10)	1.227
ACIDTST	2.56	(1.73)	1.89	(0.99)	1.084
ABSLIQU	1.18	(1.44)	0.61	(0.83)	1.114
ACRERAT	0.498	(0.14)	0.596	(0.16)	-1.458
UNCOLL	0.165	(0.058)	0.134	(0.072)	1.033
COLLPD	52.86	(15.99)	53.01	(9.24)	-0.026
<i>Capital Structure</i>					
EQTYFIN	0.684	(0.239)	0.546	(0.274)	1.157
LTDEQTY	0.691	(0.884)	1.533	(1.628)	-1.419
LTDFA	0.397	(0.341)	0.736	(0.523)	-1.672
CAFLDBT	0.466	(0.406)	0.263	(0.235)	1.354
<i>Financial Activity</i>					
TOASTVR	0.967	(0.422)	0.974	(0.325)	-0.045
FXASTVR	1.76	(0.942)	1.65	(0.645)	0.329
CASSTVR	3.73	(1.600)	4.09	(0.898)	-0.629
PLNTDPR	0.337	(0.131)	0.391	(0.201)	-0.686
AVGAGE	6.90	(3.86)	10.51	(8.83)	-1.219
<i>Profitability</i>					
RETEQTY	0.130	(0.151)	0.080	(0.050)	0.955
RETTASS	0.083	(0.115)	0.041	(0.027)	1.058
RETTAFIN	0.103	(0.119)	0.070	(0.037)	0.811
RETTAPTS	0.009	(0.086)	0.001	(0.025)	0.274
MARGPTSV	-0.012	(0.090)	-0.002	(0.026)	-0.327
OPMARG	0.052	(0.069)	0.027	(0.031)	1.018
TOTMARG	0.069	(0.071)	0.042	(0.024)	1.107
MARKUP	1.14	(0.123)	1.14	(0.083)	-0.002
DEDUCT	0.063	(0.049)	0.090	(0.041)	-1.340

Note: No significant differences observed.

Table 5: Comparison of Cost and Productivity Measures for Contract-Managed and System-Owned Hospitals

Measure	Contract-Managed		System-Owned		t-Value
	Mean	SD	Mean	SD	
<i>Cost</i>					
CMCPC	1,408	(292)	1,597	(380)	-1.220
CMCCPD	229	(44)	239	(18)	-0.654
CMPPD	106	(18)	123	(6)	-2.688*
CMPPADM	653	(125)	816	(161)	-2.481*
CMNPPD	38	(7.5)	44	(9.0)	-1.588
<i>Productivity</i>					
CMFTEADC	3.2	(0.89)	3.34	(0.35)	-0.462
FTADMRAT	0.032	(0.25)	0.047	(0.027)	0.199
CMFAPADC	68,599	(47,304)	65,080	(31,505)	-0.342
CMTAPADM	1,793	(883)	1,932	(916)	-0.617
CMADMBED	39.36	(12.02)	42.36	(9.74)	-1.232
CMALOS	6.18	(1.37)	6.76	(1.67)	-0.840

\* $p < .05$ .

means and standard deviations between these two subgroups on the measures of financial performance. Table 5 compares the two subgroups on measures of cost and productivity.

#### *Measures of Financial Performance*

No significant differences between the two subgroups were observed on the measures of financial performance. It is noted that, although not significant, the direction of difference in measures of capital structure consistently indicate a higher level of debt leverage on the part of system-owned hospitals. This observation is consistent with the frequently cited advantage of multi-institutional systems in debt acquisition [22].

The only area of significant difference between the two groups in terms of cost and productivity measures was salary expense (Table 5). Mean values of pay per day and per admission were significantly lower for contract-managed hospitals.

In summary, the comparison of system-owned and contract-managed hospitals revealed significant differences in only 2 of 35 performance measures used. Both of these measures were indicators of salary expense (per case and per day).

Based on the preceding, it was concluded that contract-managed and system-owned hospitals could validly be combined into a system-

**Table 6: Comparison of Financial Indicators for Freestanding and System-Affiliated Hospitals**

<i>Measure</i>	<u><i>Freestanding</i></u>		<u><i>System-Affiliated</i></u>		<i>t-Value</i>
	N = 74		N = 20		
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	
<i>Liquidity</i>					
CURRATIO	3.32	(2.13)	2.68	(1.53)	1.261
ACIDTST	2.64	(1.83)	2.19	(1.38)	1.015
ABSLIQU	1.07	(1.64)	0.87	(1.15)	0.507
ACRERAT	0.548	(0.184)	0.552	(0.154)	-0.089
UNCOLL	0.119	(0.112)	0.149	(0.066)	-1.466
COLLPD	52.20	(11.73)	52.94	(12.35)	-0.248
<i>Capital Structure</i>					
EQTYFIN	0.769	(0.241)	0.611	(0.261)	2.492†
LTDEQTY	0.418	(0.713)	1.13	(1.36)	-2.212†
LTDFEA	0.282	(0.331)	0.583	(0.472)	-2.679†
CAFLDBT	0.639	(0.904)	0.359	(0.354)	-2.152†
<i>Financial Activity</i>					
TOASTVR	1.03	(0.350)	0.97	(0.361)	0.494
FXASTVR	1.88	(0.770)	1.70	(0.772)	0.344
CASSTVR	3.95	(1.42)	3.93	(1.24)	0.942
PLNTDPR	0.39	(12)	0.38	(0.17)	0.616
AVGAGE	10.36	(7.01)	8.89	(7.12)	0.830
<i>Profitability</i>					
RETEQTY	0.054	(0.168)	0.103	(0.110)	-1.563
RETTASS	0.038	(0.103)	0.060	(0.080)	-0.871
RETTAFIN	-0.047	(0.103)	0.085	(0.084)	-1.513
RETTAPTS	-0.046	(0.128)	0.005	(0.059)	-2.557†
MARGPTSV	-0.055	(0.143)	-0.007	(0.061)	-2.218†
OPMARG	0.011	(0.084)	0.038	(0.052)	-1.771*
TOTMARG	0.043	(0.095)	0.054	(0.051)	-0.715
MARKUP	1.08	(0.123)	1.14	(0.100)	-2.129†
DEDUCT	0.052	(0.038)	0.078	(0.046)	-2.577†

\* $p < .10$ .† $p < .05$ .

affiliated category, during subsequent phases of the analysis, without introducing any major bias.

#### COMPARISON OF FREESTANDING AND SYSTEM-AFFILIATED HOSPITALS

The mean values and standard deviation observed for system-affiliated and freestanding hospitals on the performance measures are presented in Tables 6 and 7. Table 6 reports values observed for the measures of

Table 7: Comparison of Cost and Productivity Measures for Freestanding and System-Affiliated Hospitals

Measure	Freestanding		System-Affiliated		t-Value
	Mean	SD	Mean	SD	
<i>Cost</i>					
CMCPC	1,345	(325)	1,512	(348)	-2.012†
CMCPD	225	(49.6)	234	(32)	-1.077
CMPPD	115	(23)	115	(15)	-0.104
CMPPADM	690	(155)	743	(165)	-1.334
CMNPPD	41	(10.77)	41	(8.77)	0.037
<i>Productivity</i>					
CMFTEADC	3.83	(2.58)	3.28	(0.63)	1.660*
FTADMRAT	0.054	(0.052)	0.040	(0.027)	1.613
CMFAPADC	53,054	(28,612)	66,664	(38,312)	-1.750*
CMPPADM	1,498	(648)	1,869	(880)	-2.100†
CMADMBED	37.94	(10.99)	41.01	(10.63)	-1.115
CMALOS	5.90	(1.53)	6.50	(1.53)	-1.538

\* $p < .10$ .† $p < .05$ .

Table 8: Comparison of Sources of Revenue for Freestanding and System-Affiliated Hospitals

Percentage of Revenue from	Freestanding		System-Affiliated		t-Value
	Mean	SD	Mean	SD	
Medicare	0.434	(0.095)	0.427	(0.104)	0.296
Medicaid	0.061	(0.034)	0.067	(0.041)	-0.639
Blue Cross/Blue Shield	0.168	(0.073)	0.171	(0.076)	-0.203
Other commercial insurance	0.207	(0.086)	0.176	(0.133)	-0.974
Self-pay patients	0.077	(0.061)	0.041	(0.035)	3.516*

Note: Values not expected to sum to 1.0.

\* $p < .01$ .

financial performance; Table 7 presents the cost and productivity measure observations. A description of observed differences in sources of patient revenue between the two groups is provided in Table 8.

### Measures of Financial Performance

*Liquidity Measures.* No significant differences were observed between system-affiliated and freestanding hospitals on any of the mea-

asures of liquidity. Both hospital categories had mean values on all six measures which were more favorable than industry benchmarks reported in the literature, indicating that hospitals in both groups were generally in good short-term financial health. The direction of difference in liquidity consistently favored the freestanding hospital category. This was particularly noticeable in the area of accounts receivable management, where the collectible ratio reflected a considerably lower percentage of bad debt for freestanding hospitals. Interpretation of this direction of difference as reflecting more effective accounts receivable management by freestanding hospitals was supported further by the observation that freestanding hospitals received a significantly higher percentage of revenue from self-pay patients (Table 8). This category of uninsured patients would be expected to constitute the major source of bad debt facing a hospital. Higher percentages of revenue from the self-pay category would thus normally be associated with higher amounts of bad debt. The data observed in this study reflected a reverse of this relationship and, thus, a substantially favorable position on the part of freestanding hospitals.

*Capital Structure.* Observed differences between the two hospital categories were significant at the .05 level for all measures of capital structure. The directions of difference on each measure were consistent and indicated that system-affiliated hospitals were using a significantly greater degree of debt leverage than were hospitals in the freestanding category. System-affiliated hospitals were within but approaching industry-wide benchmarks beyond which further borrowing would be difficult and possibly dangerous for long-term solvency. Observed values for freestanding hospitals were well within reported standards and reflected considerable potential for additional debt.

Other than the limits imposed by excessive debt which can lead to long-term insolvency, no firm guidelines are available for evaluating the appropriate mix of equity and debt in measures of capital structure [36]. Cleverly has noted that a long-term debt to equity ratio of 2.0 is a maximum beyond which additional debt would not be usually granted [29]. The industry benchmark for this ratio, as noted in Table 1, indicates that the hospital industry, as a whole, is well below this maximum. Lower levels of debt and higher levels of equity financing are generally regarded as reflecting a conservatively favorable position. On the other hand, a low level of debt may also reflect inability to obtain access to needed capital, or an overly conservative approach to debt. The judicious use of debt, supported by adequate levels of profitability to ensure continued solvency can be interpreted as reflecting



favorably on the ability of the firm to acquire debt capital and on the astuteness of managerial performance in optimizing this capital acquisition capacity. This is particularly true in the hospital industry, where cost and charge reimbursement formulas of third-party payers have historically recognized interest expense as being reimbursable. This has permitted hospitals to pass through their costs of capital. Since debt is thus essentially interest free to the organization, it could be expected that the major constraint on the judicious use of debt would be the capacity of the organization to acquire debt capital.

The observed values for system-affiliated hospitals are well within industry standards and, thus, do not necessarily reflect negatively on future solvency. The significance of observed differences on these measures between the two hospital categories may thus be interpreted as reflecting favorably on system-affiliated hospitals in terms of management sophistication and capital acquisition capacity.

*Activity Ratios.* No significant differences were observed between the two groups on measures of asset turnover. Differences in observed values for measures of plan depreciation and average age of assets were also not significant. The slightly favorable relative position of freestanding hospitals was consistent with slightly higher observed values of plant depreciation and average age for hospitals in this category.

*Profitability.* Observed differences in mean values on the rate of return and margin measures of profitability consistently favored the system-affiliated category of hospitals. However, no significant differences were observed between the two groups on measures of overall profitability. The total margin, which relates total revenues to total expenses, and thus measures the overall profitability of the organization, provided weak though statistically insignificant support favoring system-affiliated hospitals.

Hospitals in both categories of the sample appeared to be in a relatively favorable profit position, compared to industry benchmarks. The mean return on equity for the freestanding category was slightly below the industry average of .08—a reflection of the relatively high levels of equity financing observed in this group. The more favorable values of return on equity and return on total assets, controlling for interest expense, observed among system-affiliated hospitals, were consistent with the higher levels of debt leverage within this category. Although nonsignificant, the direction of these differences reveals the advantage of using debt acquisition ability, within judicious limits.

*Indicators of Pricing Policy.* Notable differences were observed among several measures related to pricing policy, which consistently demonstrated a significantly favorable position for system-affiliated hospitals in pricing to cover costs adequately. The measure of markup was significantly higher for system-affiliated hospitals. Significantly higher profit margins and returns on total assets from patient services, as well as weaker but still significantly higher operating margins in favor of the system-affiliated hospitals, revealed the positive impact of a more aggressive pricing policy on overall profitability. The fact that the difference in overall profitability between the two categories was not greater was partially accounted for by the significant difference in the deductible ratio, on which freestanding hospitals were in a significantly favorable position. The observed difference in the deductible ratio, which measures bad debts and contractual allowances, in favor of the freestanding category was consistent with the favorable indicators of receivables management also observed for this category.

#### *Cost and Productivity Measures*

All measures of cost and productivity used hospital output measures which were adjusted for case-mix intensity, using each hospital's Medicare Case-Mix Intensity Index. In addition to this adjustment, output measures of admissions, patient-days, and average daily census were further adjusted to reflect outpatient activity.

*Measures of Costs.* The observed mean value of case-mix-adjusted total costs per case was significantly higher for system-affiliated hospitals. Although statistically insignificant, the direction of observed differences between the two groups on the measures of total cost per patient-day and labor costs per case consistently favored the freestanding category. Group means on measures of general labor and nursing salary costs per patient-day were virtually the same.

A probable explanation for the variance in degree (but not of direction) of observed differences in total costs per case and per patient-day is provided by the observed difference in case-mix-adjusted average length of stay between the two groups. Although not statistically significant, the direction of difference on this measure favors freestanding hospitals as having considerably shorter average lengths of stay. Thus, with slightly higher costs per patient-day, and considerably longer lengths of stay, system hospitals reasonably experienced higher costs per case.

*Productivity Measures.* Observed differences in mean values for the measures of productivity used in this study yielded findings which were mixed. Labor productivity, measured by full-time equivalents per average daily census, was significantly higher for system-affiliated hospitals. However, the relatively high degree of variability observed for this measure warrants caution in the interpretation of this finding. The notably higher variability in staffing ratios observed among the larger sample of freestanding hospitals may itself be interpreted as indicating a relative lack of standardization in personnel management procedures among hospitals in this category.

Although not significant, the direction of difference in the number of full-time administrators per average daily census favored system-affiliated hospitals. The observed use of substantially fewer administrators per output unit provided some support for the possibility of economies of scale in the use of management resources by system-affiliated hospitals.

Observed differences in values for measures of plant, equipment, and total asset productivity were in the reverse direction and favored freestanding hospitals. Hospitals in this group were using significantly lower fixed assets per average daily census and total assets per admission.

Although not significant, the direction of the difference for the measure of bed productivity favored system-affiliated hospitals. This finding was consistent with the previously mentioned longer average lengths of stay observed for the system-affiliated category.

## DISCUSSION

A summary of study findings is presented in Table 9. Column entries indicate the hospital category which was observed to have the relatively favorable position on the performance measure(s) involved. Measures of financial performance provided strong support for the hypothesized advantage of system affiliation over freestanding hospitals in the areas of enhanced capital acquisition capacity and in a more sophisticated pricing policy. Weaker but consistent support was provided by the relatively favorable profit position observed among the system-affiliated category. These findings are consistent with previously cited research of Wheeler, Zuckerman and Aderholdt [26]. Measures of short-term financial condition did not support the hypothesis of system advantage. Freestanding hospitals appear to be managing their receiv-

Table 9: Summary of Findings

<i>Aspect of Performance</i>	<i>Free-standing</i>	<i>System-Affiliated</i>	<i>Significant Difference?</i>
I. Financial performance			
A. Liquidity measures	Higher		No
B. Receivables:			
Accounts receivable	Smaller		No
Uncollectibles	Smaller		No
Collection period	Shorter		No
C. Capital structure			
Equity financing	Higher		Yes
Long-term debt to equity	Lower		Yes
Long-term debt to FXASS	Lower		Yes
CASH FLOW to debt	Higher		Yes
D. Activity Ratios	Better		No
E. Depreciation	No significant difference		
F. Profitability			
Return on equity		Higher	No
Return on TOT assets		Higher	No
Controlling for financing		Higher	No
Total margin		Higher	No
G. Pricing policies		Better	Yes
Return on assets from PTS SVC		Higher	Yes
Margin from PT SVC		Higher	Yes
Operating margin		Higher	Yes
Markup		Higher	Yes
Deductible	Lower		Yes
II. Costs			
Cost per case	Lower		Yes
Other cost measures of efficiency	Better		No
III. Productivity			
A. Labor		Higher	Yes
B. Management		Higher	No
C. Plant	Higher		Yes
D. Total assets	Higher		Yes
E. Beds		Higher	No
F. Average length of stay	Shorter		No

ables more effectively with considerably lower bad debt while receiving significantly higher percentages of revenue from self-pay patients.

#### COST MEASURES

The findings of this study did not support the hypothesis that system-affiliated hospitals are more cost efficient. Indeed, the reverse appears to be the case. System-affiliated hospitals were found to incur signifi-

cantly higher case-mix-adjusted costs per case, relative to the freestanding hospitals in this sample. Directions of difference between the two groups on other cost measures, although not significant, consistently indicated lower costs for the freestanding category. This finding was consistent with the major finding of the previously cited study reported by Coyne [14], and provides further evidence for questioning whether minimization of costs is an important component of the hospital objective function, given the environment of cost-based reimbursement which existed during the reporting period.

Cost and productivity measures generally failed to support the hypothesized advantage of system affiliation. With the exception of cautious support for the hypothesis that system hospitals achieve higher levels of standardization in staffing, higher levels of labor productivity, and some economies of scale in the use of management resources, this study found freestanding hospitals to be more cost efficient and productive in the use of plant, equipment, and total assets. These findings provide further evidence of the need to question seriously the basic assumption that cost minimization is part of a not-for-profit hospital's objective function.

## CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

The results of this study support the major findings of the earlier research reported by Wheeler, Zuckerman, and Aderholdt [26], Pattison and Katz [36], and Coyne [14]. The ability to replicate the results of these previous efforts using a different methodological approach within a different sample of hospitals lends added credence to the following conclusions. There is strong evidence that system hospitals have a decided advantage over freestanding hospitals in access to debt capital. Weaker but consistent evidence that system-affiliated hospitals have enjoyed higher levels of profitability was also found. Strong evidence was found that system-affiliated hospitals employ more effective levels of pricing policy as measured by markup and relationships between expenses and revenues from patient services. Organization advantage in the effective use of price will become more critical as reimbursement mechanisms move to case-based prospective payment procedures. Limited evidence was found that system hospitals experienced greater productivity of human resources, to include management. In addition, system hospitals were using staffed beds more productively in terms of admissions per bed.

No support was found for the hypothesized performance advantages of system affiliation among measures of liquidity, receivables management, and asset activity. Evidence in these areas favored freestanding hospitals, particularly in the area of receivables management where, with a higher percentage of self-pay patients, the freestanding group was experiencing lower levels of bad debt and favorable indicators of collection.

Consistent with earlier studies, this study found higher levels of cost per case among system hospitals. This finding appeared to be related to longer length of stay, more effective use of beds, higher levels of bad debt, and less productive use of plant and equipment assets on the part of systems hospitals, rather than the consumption of assets by freestanding hospitals.

The results of this study, while providing additional information on the performance of system-affiliated hospitals, demonstrate the need for further research in the following areas:

*Broadened scope.* Attempts to replicate this study should be made, using a larger and more representative sample of hospitals. The major limitations on interpretation of the results of this analysis were the possibility of bias of unknown direction arising from the relatively small sample of system hospitals studied and the potential limits on the generalizability of results because of the relative homogeneity of hospitals within a single state. The use of a larger and more representative sample of hospitals across geographic areas in which different reimbursement methods prevailed and which included balanced representation of all ownership categories would enable an enhanced understanding of hospital performance.

*Internal procedures.* There is a need for better understanding of the internal processes by which systems appear to achieve more effective pricing policies and standardization in personnel allocation. Further research should seek evidence of the existence of analytic protocols within systems which may be applicable to independent hospitals.

*Objective function.* The consistently higher costs associated with systems demonstrate the urgent need for research into the hospital objective function aimed at empirically testing the growing evidence that hospitals do not seek to operate "efficiently" in terms of minimizing costs, but instead seek to maximize revenue.

*The environment.* The effect of environmental factors in hospital markets on the decision to become system affiliated should be included as controlling variables. One recent article [30] reports the results of an analysis of changes in performance measures of matched contract-

managed and traditionally managed nonprofit hospitals before the contracts were executed. Matching and multivariate statistical methods in subsequent studies may provide an understanding of the impact of system affiliation, independent of other factors.

In summary, this study found that system-affiliated hospitals are more profitable and enjoy better access to capital markets than freestanding hospitals. Their pricing policy appears to relate expenses to revenues more effectively. However, system hospitals also have higher costs per case, which are related to longer length of stay and less productive use of plant and equipment in generating revenues. Although the differences in observed performance between system-affiliated and freestanding hospitals appear to provide some support for the generally acknowledged superiority of multihospital systems in the critical areas of management and capital acquisition, an interpretation of the empirical evidence of this study does not confirm the assumption that system-affiliated hospitals have a marked advantage, an assumption which underlies much of the largely testimonial literature on this subject.

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