Financial Characteristics of Hospitals Purchased by Investor-Owned Chains

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This article focuses on the preacquisition financial condition of not-for-profit hospitals acquired by investor-owned hospital chains. Financial ratios are used to determine if not-for-profit hospitals acquired by investor-owned hospital systems have common financial characteristics which make them a likely target for a takeover. The results indicate that during the time period studied, investor-owned hospital systems did tend to purchase hospitals with common financial characteristics and that these characteristics provide a reasonable description of a financially distressed hospital. This finding has important consequences for our health care delivery system.

The growth of investor-owned hospital chains over the last several years has been phenomenal. From 1983 to 1984 alone, the number of hospitals owned by investor-owned chains increased almost 20 percent. At the end of 1984, the number of hospitals owned, leased, or managed by investor-owned hospital chains totaled 958 and annual revenues were in excess of $13 billion [1].

There is a growing body of literature about investor-owned hospitals and their impact on our health care delivery system. While most of the early literature emphasized the potential impact of the rapid growth of the investor-owned hospital industry [2,3], more recent research has focused on the financial or operating performance of investor-owned chains. Most of this literature [4–13] concentrates on comparing the financial and operating performance of investor-owned chains with the performance of not-for-profit hospitals. A smaller body of literature

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compares the financial performance of hospitals before and after signing management contracts [14–17].

There remains a lack of empirical research concerning how or why investor-owned chains have grown at such a rapid rate. A limited number of studies have explored regional variations in the rate of growth of investor-owned chains [18–21]. These studies focus primarily on demographic and insurance coverage data. Some industry analysts have concluded that investor-owned hospital chains have grown rapidly by acquiring not-for-profit hospitals which are financially distressed at the time of the sale [22–24]. The new competitive market is forcing hospitals to compete for patients while national figures indicate an overall decline in occupancy. If this decline in occupancy leads to a decline in the financial condition of hospitals, and if investor-owned hospitals do tend to purchase single-unit not-for-profit hospitals in weak financial condition, it may further increase the speed with which investor-owned hospital chains will grow in future years. This potential for accelerated growth has important health policy implications. However, there is notable lack of empirical evidence to justify this scenario [24].

The purpose of this research is to determine if hospitals purchased by investor-owned chains have common financial characteristics and if these characteristics can be used to predict which hospitals will be purchased. A simple univariate test is first used to compare the financial ratios of a group of not-for-profit hospitals purchased during the 1978–1983 time period with a group of not-for-profit hospitals that were not acquired. These financial ratios are then incorporated into a multivariate classification model using a form of logistic regression analysis. The research results indicate that during the time period studied, investor-owned chains tended to purchase hospitals with common financial characteristics. More importantly, these financial characteristics represent a reasonable description of a small hospital in poor financial condition.

DATA BASE

The data for the study consisted of the financial ratios of 50 not-for-profit hospitals acquired by investor-owned chains and 50 not-for-profit, nonacquired hospitals. The sample of acquired hospitals represents all single-unit not-for-profit hospitals located in Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Texas purchased by an investor-

owned chain from 1978 through 1982. The financial statements for the last complete fiscal year prior to the acquisition were used as a source of financial data. The acquirer, and the date and location of the acquisition, were obtained from the "Under New Management" section of *Modern Health Care* and *American Hospital Association Guide to the Health Care Field* (1978–1983 editions).

The hospitals were matched by state to control for regional or state socioeconomic differences that are known to impact the rate of growth of investor-owned chains [21]. However, the hospitals were randomly selected within each state. In order to control for changes in reimbursement procedures and economic conditions over time, the data of the financial statements for each nonacquired hospital corresponded to the data of the financial statements for the matched acquired hospital.

FINANCIAL RATIOS

The financial ratios for the acquired hospitals were computed from data appearing on the balance and income statements which are a part of Worksheet G of the 2552 Medicare Cost Report form. The cost report forms were collected from the various Medicare intermediaries. The financial ratios of the nonacquired hospitals were obtained through the Healthcare Financial Management Association's Financial Analysis Service (FAS). The FAS data base produces 29 different financial ratios for 1,000 hospitals from throughout the United States.

Four sets of ratios were computed. These sets represent a common grouping of ratios for financial analysis purposes and, in combination with each other, they provide a good profile of the financial condition of a hospital [25,26]. The first set of ratios consists of liquidity ratios which measure the ability of the institution to meet current financial obligations. The ratios compare various current assets with current liabilities. The ratios used in this study were:

Current ratio	=	Current assets/current liabilities.
Quick ratio	=	Cash + marketable securities + net accounts receivable/current liabilities.
Acid test ratio	=	Cash + marketable securities/current liabilities.

Capital structure ratios measure the contribution of the owners (equity or fund balances) relative to creditors (debt). These ratios are often referred to as financial leverage ratios. The two capital structure ratios used in this study were:

Equity ratio	=	Fund balance/total assets.
Long-term debt to equity ratio	=	Long-term debt/fund balance.

Profitability ratios measure the ability of a hospital to generate income. These ratios normally compare either operating income or the excess of revenues over expenses (net income) to total assets, total equity, or total revenues. The profitability ratios employed were:

Return on assets	=	Excess of revenues over expenses/total assets.
Return on equity	=	Excess of revenues over expenses/fund balance.
Operating margin	=	Operating income/operating revenue.
Deductible ratio	=	Deductions/gross patient service revenue.

The fourth set of ratios consists of activity ratios. Activity ratios indicate how effectively a hospital is using its assets. This set of ratios includes three turnover ratios and the days in accounts receivable ratio (often called the average collection period).

Total asset turnover ratio	=	Total operating revenue/total assets.
Fixed asset turnover ratio	=	Total operating revenue/net fixed assets.
Current asset turnover ratio	=	Total operating revenue/ current assets.
Days in accounts receivable	=	Net patient accounts receivable/net patient revenue ÷ 365.

Even though some authors argue that financial ratios tend to mitigate the effect of size, a size variable (number of beds) was included in the study [27].

UNIVARIATE TEST

The mean and standard deviation for each variable for both groups of hospitals are presented in Table 1. The differences between the mean values for the liquidity ratios were statistically insignificant. Although the differences in the mean values for the capital structure ratios were also not statistically significant at the .05 level, the mean value for the

Table 1: Comparison of Means and Standard Deviations

	Acquired Hospitals		*Nonacquired Hospitals*	
	Mean	*Standard Deviation*	*Mean*	*Standard Deviation*
Liquidity ratios				
Current	2.706	2.071	3.000	1.698
Quick	2.131	1.654	2.470	1.453
Acid test	0.390	0.519	0.581	0.653
Capital structure ratios				
Equity	0.480	0.499	0.550	0.221
Long-term debt to fund balance	1.629	3.198	0.880	0.948
Profitability ratios				
Return on asset	-0.004*	0.122	0.048*	0.039
Return on equity	-0.081*	0.916	0.095*	0.075
Operating margin	-0.040†	0.104	0.029†	0.058
Deductible	0.135†	0.061	0.165†	0.059
Activity ratios				
Total asset turnover	1.408†	0.511	0.928†	0.280
Current asset turnover	3.641	1.230	3.632	0.982
Fixed asset turnover	2.538†	1.207	1.669†	0.751
Days in accounts receivable	69.046	18.786	66.554	17.526
Size	100.100†	62.031	325.080†	217.673

*Significant at .05 level.
†Significant at .01 level.

long-term debt to equity ratio for the acquired hospitals was twice as large as the mean value for that of the nonacquired hospitals.

Significant differences were found between the mean values for the profitability and activity ratios. The differences between the mean values for the operating margin, deductible, total asset turnover, and fixed asset turnover were significant at the .01 level, and the differences in the means for the return on asset and return on equity ratios were significant at the .05 level. The difference between the average size was also significant at the .01 level.

These results appear to imply that acquired hospitals make more efficient use of their assets (higher activity ratios) but earn less profit (lower profitability ratios). This sounds contradictory; however, an analysis of the activity ratios indicates that the higher activity ratios

result from more fully depreciated fixed assets. Since depreciated fixed assets appear in the denominator of both the fixed asset turnover and total asset turnover ratios, higher ratio values result. Therefore, the total asset turnover and fixed asset turnover ratios are apparently a proxy measure for the average age of the fixed assets of the hospital.

In summary, the univariate comparison of the mean financial ratios indicates that small hospitals with low profitability, large amounts of debt relative to equity, and old and more fully depreciated assets tend to be acquired.

LOGIT ANALYSIS

The objective of the logit model is effective classification of the sample of 100 hospitals into an acquired group and nonacquired group using financial ratios. Further, it is essential that the model also be able to profile or identify the financial variables that systematically explain the separation. In contrast to univariate analysis of variables which examines each variable in isolation, the logit model has the advantage of simultaneously analyzing a number of different variables common to the relevant hospitals.

PRINCIPAL COMPONENT ANALYSIS

Before using the logit model, principal component analysis was employed to reduce the multicollinearity among the independent variables. Principal component analysis attempts to group variables so that they are mutually uncorrelated. The method operates on the principal of extracting common variances from sets of measures [28]. Each component consists of a set of loadings which represents the correlation between an independent variable (financial ratio) and its component.

The components used in the predictive model are presented in Table 2. The first component has high positive loadings with the quick (.880), current (.853), and acid test (.710) ratios. Since this component is composed of highly correlated liquidity ratios, it can be considered a measure of liquidity. The second component reveals a high positive loading around the fund balance to total asset ratio (.702), and a high negative loading (-.906) around the long-term debt to fund balance ratio. The clustering of these ratios can be interpreted as a measure of capital structure. The third component indicates positive loadings for the total asset turnover (.931) and fixed asset turnover (.910) ratios. This component represents a proxy measure for the average age of the fixed assets of the institution. The last two components represent mea-

Table 2: Summary of Principal Component Loadings

Ratios	*Liquidity Component*	*Capital Component*	*Age Component*	*Profit Component*	*Patient-Mix Component*
Quick ratio	.880				
Current ratio	.853				
Acid test ratio	.710				
Fund balance to total asset		.702			
Long-term debt to fund balance		-.906			
Fixed asset turnover			.910		
Total asset turnover			.931		
Return on asset				.873	
Operating margin				.829	
Deductible					.830

sures of profitability. The fourth component reveals positive loadings for the return on asset (.873) and operating margin (.829) ratios while the fifth component reflects a high loading for the deductible ratio (.830). The fourth component measures the amount of income earned, while the fifth component reflects income not realized. The last component is also an indirect measure of patient mix (i.e., the proportion of Medicare, Medicaid, and charity care patients).

This data dimensional reduction technique reduces 13 financial ratios to 5 uncorrelated component variables measuring liquidity, profitability, capital structure, age, and patient mix. Three of the financial ratios, days in accounts receivable, current asset turnover, and return on equity did not have sufficient loadings to be accounted for within the components. The formulation of the five components with their individual loadings leads to the development of the component scores. The component scores are the weighted averages of the loadings representing the financial ratios. Finally, in order to align the hospital bed-size variable with the standardized values of the financial component scores, the size variable was scaled into a standardized distribution.

MULTIVARIATE TESTS

The beta coefficient, standard error, and partial correlation coefficients for each of the variables in the model appear in Table 3. The coefficients for the age and profitability component variables and the size

Table 3: Beta Coefficients, Standard Errors, and Partial Correlation Coefficients

Financial Variable	*Beta Coefficient (Standard Error)*	*Partial Correlation Coefficient*
Constant	-0.209 (.410)	—
Liquidity	-0.003 (.317)	.000
Capital structure	-1.113* (.521)	-.136
Age	1.467† (.458)	.244
Profitability	-0.983† (.362)	-.197
Patient mix	-0.425 (.346)	.000
Size	-2.308† (.726)	-.242

*Significant at .05 level.
†Significant at .01 level.
Pseudo R = .427.

variable were significant at the .01 level, while the capital structure variable was significant at the .05 level. These results are similar to those reported in Table 1.

The partial correlation coefficient values coincide with the previous probability values. The age component variable had the highest partial correlation coefficient (.244). The second highest partial correlation coefficient came from the size variable (-.242). The third and fourth highest contributing component variables were the profitability and capital structure variables with values of -.197 and -.136, respectively, while the liquidity and patient-mix variable provided no contribution to the model. Thus, based on the significance of the beta coefficients and the partial correlation coefficients, age, profitability, capital structure, and size are considered the key variables in determining the probability that a hospital will be acquired.

The difference in the means of the deductible ratio was significant in the univariate model, but the coefficient for the deductible ratio, as used as a proxy for patient mix, was insignificant in the multivariate model. A significant part of deductibles consists of contractual adjustments. Contractual adjustments are measured by multiplying the ratio

of charges to allowable costs times the percent of reimbursement from cost-based payers. However, the ratio of charges to allowable costs is reflected in the profitability ratios. Therefore, the deductible ratio measured patient mix *and* profitability in the univariate model, but in the multivariate model the ratio of charges to costs is incorporated in the profitability ratios and the deductible ratio measures only patient mix.

To interpret the impact of the significant independent variables, it is essential to analyze the signs of the beta coefficients. For the capital structure variable, the negative beta coefficient indicates that the lower the amount of equity relative to debt, or conversely the higher the amount of debt relative to equity, the more likely the hospital will be acquired. The positive beta coefficient of the age variable suggests that the older or more fully depreciated the assets of the facility are, the greater chance it has of being acquired. The negative profitability beta coefficient indicates that hospitals with lower profitability are more likely to be acquired. The negative sign for the size variable indicates that the smaller the hospital the greater the chance of a takeover. In sum, small hospitals that presented a financial profile of low equity capital (or conversely large amounts of long-term debt), old and depreciated facilities, and poor profitability had a higher probability of being acquired.

CLASSIFICATION ABILITY

The ability of the logit model to classify correctly those hospitals that were acquired and those that were not acquired is summarized in Tables 4 and 5. The model correctly classified 88 percent (44 of 50) of the nonacquired hospitals and 86 percent (43 of 50) of the acquired hospitals (Table 4). However, our sample probabilities of being acquired (50 percent) are not equal to the probability of being acquired in the overall population, which can lead to a distortion of the results. One method of determining the prior probability of being acquired is to determine the percent of hospitals owned by investor-owned and not-for-profit chains as compared to the percent of hospitals that remain single-unit hospitals. During the time period studied, approximately 19 percent of the hospitals in the nation were affiliated by lease or ownership with investor-owned or not-for-profit chains, and 81 percent were freestanding single-unit hospitals. Using these prior probabilities, the classification matrix in Table 5 is produced.

With the sample probabilities set equal to the approximate population probabilities, the ability to classify correctly the nonacquired

Table 4: Classification of Acquired and Nonacquired Hospitals Using Logistic Regression Model and Prior Probabilities of .50

		Classified Group		
		Nonacquired hospitals	Acquired hospitals	Total
Actual Group	Nonacquired hospitals	44	6	50
	Acquired hospitals	7	43	50
	Total	51	49	100

Table 5: Classification of Acquired and Nonacquired Hospitals Using Logistic Regression Model and Prior Probabilities of .19 and .81

		Classified Group		
		Nonacquired hospitals	Acquired hospitals	Total
Actual Group	Nonacquired hospitals	48	2	50
	Acquired hospitals	20	30	50
	Total	68	32	100

hospitals improves to 96 percent (48 of 50), but the ability to classify correctly the acquired hospitals declines to only 60 percent (30 of 50). Generally speaking, using the population prior probabilities makes it more difficult to classify the acquired hospitals correctly. However, the 60 percent correct classification rate compared to the 19 percent probability by chance does indicate a model with considerable classification power.

To test for the stability of the coefficients of the logit model, a split-sample technique was utilized. The procedure involves constructing the model on the first 50 observations of the original sample and classifying the remaining 50 observations. With the prior probabilities set equal to the sample frequency (50 percent), the model correctly classi-

fied 68 percent (17 of 25) of the nonacquired hospitals and 72 percent (18 of 25) of the acquired hospitals. This compares to the previous correct classification rates of 88 percent and 86 percent for the nonacquired hospitals and acquired hospitals, respectively. Using the prior probabilities of the population (19 percent and 81 percent, respectively) resulted in correct classification of 80 percent (20 of 25) of the nonacquired hospitals and 48 percent (12 of 25) of the acquired hospitals compared to the previous correct classification rates of 96 and 60 percent. This decline in classification power provides evidence of some bias. However, the results also indicate that the coefficients are reasonably stable and that the model has considerable predictive power.

SUMMARY AND IMPLICATIONS

Overall, the results provide empirical evidence that investor-owned hospital systems tend to purchase small hospitals with common financial characteristics. These characteristics include relatively low profitability, relatively old and depreciated assets, and a thin equity position. A possible explanation is that, in the years preceding acquisition, the purchased hospitals were unable to generate an operating profit, which led to a deteriorating equity position and a reliance on debt capital to finance operations or the routine replacement of equipment. Then, at a time when capital was needed most, the institutions were unable to generate sufficient capital to replace their assets. At this point they became likely targets for a takeover by an investor-owned chain. This explanation is consistent with the findings by Alexander and Lewis [17] in their study of hospitals prior to coming under contract management.

The results reported here have very important policy implications as we move rapidly into the new competitive environment. Investor-owned hospital chains now own well over 12 percent of the hospitals in the United States. The new competitive market and declining occupancy rates may cause more and more single-unit not-for-profit hospitals to experience a decline in profitability, which will reduce the rate of growth in equity and ultimately will reduce the ability of these institutions to replenish their assets.

Alternatives available to single-unit not-for-profit hospitals, aside from selling to investor-owned chains or entering contract management, include merger with other not-for-profit hospitals or acquisition by not-for-profit chains. In addition, if the financial condition of the hospital makes it an unattractive merger or acquisition candidate, it

can always close its doors. An excellent discussion of the issue of hospital closures appeared in a series of articles in an earlier issue of this journal [29]. The series included a discussion of the possible causes of closures, the potential socioeconomic impact of closed hospitals, and possible strategies to help avoid the closing of needed facilities.

The future of single-unit not-for-profit hospitals is also clouded by potential changes in our tax laws which would eliminate the use of tax-exempt hospital revenue bonds. These tax-exempt revenue bonds have been a major source of capital for not-for-profit hospitals over the last decade. If these provisions are passed, the ability of small not-for-profit hospitals to survive in the new competitive environment will be further reduced. Faced with competitive pressures that will reduce net income, the primary source of equity capital, and the loss of tax-exempt revenue bonds, the primary major source of debt capital, the boards of many not-for-profit hospitals may have no alternative but to opt for contract management, sell their facilities, merge, or close. It appears that selling to investor-owned chains has been a popular option in the past and will continue to be in the future.

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