

## **The Influence of Vertical Integrations and Horizontal Integration On Hospital Financial Performance**

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### **- Abstract -**

Vertical integration strategy has a positive influence on increasing hospital revenues, while horizontal integration strategy has a negative influence on increasing hospital expenses. horizontal integration and vertical integration strategies have a positive influence on hospital profit. Overall, the study shows that a horizontal integration strategy is more profitable than a clinical integration strategy. Hospitals with any type of integration strategy have more profitable than independent hospitals.

Key Word: Functional Integration Strategy, Clinical Integration strategy, Hospital Revenue, Hospital Expense, Hospital Profit, Regression Model.

### **I . Introduction**

There have been two major trends in the United States health care system over the last decade. The trends are the rise of managed care organizations(MCOs) and the rise of integrated delivery systems(IDSs). Managed care made significant inroads in the private health insurance market during the 1990s. MCOs encompass a variety of mechanisms, including health maintenance organizations (HMOs), preferred provider organizations (PPOs), and point of service (POS). Enrollments in HMOs and PPOs have increased dramatically over the last fifteen years. Estimated HMO enrollment rose from 29 million individuals in 1987 to nearly 67.1 million members by 1997. PPOs enrollments climbed from 12 million in 1987 to slightly over 97.8 million individuals by 1997 in the United State.<sup>1)</sup> Recently, InterStudy's HMO Industry Report <sup>2)</sup> reported that by January 1999, HMO enrollment was 81.3 million. HMO penetration continues to grow slowly in large markets, spreading more rapidly in smaller markets.

### **II . Prior Work and Purpose of The Study**

Many researchers of the health care industry have argued that the growth of managed care would lead to the restructuring of relationships among providers, with a greater emphasis on the efficient provision of high quality care.<sup>3,4)</sup> To be successful in garnering managed care contracts, hospitals and physicians must re-align their incentives to increase efficiency, to attract a larger slice of the shrinking inpatient pie, and substitute effective outpatient care for more costly inpatient services.<sup>5)</sup>

One manifestation of that realignment is the integrated delivery system, which produces horizontal and vertical combinations of providers. H.S. Zuckerman et al.(1995)<sup>6)</sup> called the integrated delivery system an "integrative organizational linkage."

Many researchers, hospital strategists, and policymakers viewed these vehicles as means to contract with managed care firms and to align incentives among parties.

C.A. Mowll (1998)<sup>7)</sup> reported that the effects of increased managed care have retarded hospital utilization rates, and hospitals in areas of high managed care market penetration have experienced diminished fiscal solvency and financial performance.

Although there are studies of hospital integration performance that focused on hospital expenditures, hospital revenue, and hospital profit,<sup>8,9,10,11,12,13,14,15,16)</sup> the literature tends to concentrate on understanding the mechanics and motivations for integration formation rather than determining the impact of the integrated delivery system. Even in the empirical integration studies, the researchers did not consider hospital geographic and demographic variables such as composition of patients, population of hospital catchment area, and hospital operation years.

This study focuses on effectiveness of integration (vertical/horizontal) as a strategy for hospital financial performance controlling hospital internal variables and hospital environmental variables.

### **III. Methodology**

#### **1. Analytic model**

The strategic management perspective emphasizes the importance of positioning the organization relative to its environment and competitors in order to achieve its objectives and assure its survival.<sup>17)</sup> This perspective attempts to link environmental forces and internal organizational design and processes, and the strategy of the organization, suggesting that the organization's strategy needs to be consistent with both the external environmental demands and the organization's internal core capabilities and competencies<sup>18)</sup>.

The strategy is explicitly concerned with issues of organizational performance, which argues that managers and organizational members have discretion in choice strategies, and with structures matching the environment in a way that will enhance the organization's performance. Considering this perspective, The integration types influence a hospital financial performance as strategy to respond to hospital surrounding environmental factors and hospital internal characteristics. The environmental factors include HMO penetration, competition among other hospitals, and population. The internal factors including hospital bed size, occupancy rate, teaching status, ownership types, and inpatient composition such as percent of Medicare and Medicaid, influence a hospital financial performance.

#### **2. Data**

This study uses 1998 American Hospital Association (AHA) Annual Survey Database<sup>19)</sup> from Health Forum, L.L.C. Final observation cases for analysis are 1,971 MSA hospitals in the US, and the unit of analysis in this study is each hospital.

#### **3. Variables in the study**

The study variables are summarized in Table 1. Hospital revenue is defined as net patient revenue. This value reflects the amount of revenue actually realized from existing patient care operations, and includes revenue from both inpatient and outpatient services. Hospital expenses are defined as total operating expenses. This value reflects total cost for operating hospitals. Hospital profit measures the gap between hospital net patient revenue and hospital total expenses. When hospital net patient revenues are higher than hospital total expenses, hospital profit has a plus value. When hospital net patient revenues are less than hospital total expenses, hospital profit has a minus value.

It was necessary to standardize hospital revenue, expenses, and profit because these variables are different by hospital bed size, number of services, and patient severity. This study standardized these variables by number of discharges. Values of hospital revenue, expenses, and profit being used in this study were divided by total hospital discharges from original values. Hospital revenue, expenses, and profit were continuous variables.

In this study, three types divided hospital integration categories. The first category was “no integration.” This category included independent hospitals without any relation to both other hospitals and other providers (not a member of a system, not a member of an alliance, and not a participant in a network). The second category was “horizontal integration.” This category included that hospitals was a member of a system, a member of an alliance, or a participant in a network without relation to other kinds of health providers. The third category was “vertical integration.” This category defined that hospitals was a member of a system, an alliance, or a network with relation to other kinds of health providers. Other kinds of health provider included physician component (e.g., PHO, IPA, PPMC, or physician practice), and other component such as nursing home, home health agency or surgery center.

The average length of stay measure is defined as the ratio of adjusted inpatient days to total discharge. The HMO penetration measure is defined as the percentage of HMO plan enrollees to total health insurance plan enrollees per Metropolitan Statistical Area (MSA). The HMO penetration is a continuous variable. The population measure is defined as the total population from a MSA area from U.S. Census Bureau, and is categorized in populations ranging from: 100,000 - 249,999; 250,000 - 499,999; 500,000 - 999,999; 1,000,000 - 2,499,999; and 2,500,000 and over. Therefore, population is a categorical variable. The competition index measure is defined as one minus the sum of market shares squared  $[1 - \{\text{SUM of (Market Shares)}^2\}]$ , in a MSA. This index is a continuous variable.

The number of services offered in hospital measure is defined as the countable number of services that hospitals provide. The range of this variable is from 0 to 40 services provided by the hospitals. The percentage of Medicare patients measure is defined as the percentage of the number of Medicare patient discharges to the number of total discharges. The percent of Medicaid patients measure is defined as the percentage of the number of Medicaid patient discharges to the number of total discharges. The total bed measure is defined as the countable number of each hospital's total number of beds. The occupancy rate measure is defined as percent of inpatient days to the number of hospital beds times 365 days. Occupancy rate can be either a measure of volume or a measure of productivity, depending on one's view. If this rate has a very high value, costs increases; however, if this rate has a very low value, productivity will be low. The

number of services offered in hospital, percent of Medicare and Medicaid patients, total bed, and occupancy rate are continuous variables in this study. The teaching status of hospitals measure is either teaching hospital or not. This variable is a dichotomous variable. The ownership type measure is categorized in four groups: 1) for-profit hospitals; 2) public hospitals owned by the government; 3) non-for profit hospitals owned by churches and religious groups; and 4) non-for profit hospitals owned by public organizations.

Table 1. Summary of Study Variables

Variable Classification	Variable Name	Variable Type
Dependent Variables	Revenue Per Discharge	Continuous Variable
	Expenses Per Discharge	Continuous Variable
	Profit Per Discharge	Continuous Variable
Independent Variables	Type of Integration	Categorical Variable
Environmental Factors	Population Size	Categorical Variable
	Competition Rate	Continuous Variable
	HMO Penetration Rate	Continuous Variable
Hospital Demographics	Hospital average length of stay	Continuous Variable
	Hospital Beds	Continuous Variable
	Percent of Medicare Patients	Continuous Variable
	Percent of Medicaid Patient	Continuous Variable
	Number of Services offered in hospital	Continuous Variable
	Occupancy Rate	Continuous Variable
	Teaching Status	Categorical Variable
Ownership Type	Categorical Variable	

#### 4. Models and Statistics

There are two analytic procedures in this study. The first is a descriptive analysis using the mean and the proportion of variables. The last analysis tests the exact amount and relationship between the integrated delivery system type and hospital financial performance, after controlling for external and internal variables.

This study uses a multiple regression test method to measure the exact amounts and relationships between hospital integration type and hospital financial performance including hospital revenue, hospital expenses and hospital profit, after controlling other environmental and internal factors.

### IV. Results

#### 1. Description of research variables

Means and standard deviations for each continuous variable in 1,971 hospitals in this study are tabulated. See Table 2. The means of hospital revenue, expenses, and profits are \$7,130, \$6,775 and \$372, respectively, and the mean of the average length of

stay is 5.99 days. The mean number of beds per hospital is 281, and the means of the percent of Medicare and Medicaid patients are 0.41 and 0.14 respectively. The mean number of services provided per hospital is 28, and the means of the competition rate and the HMO penetration rate are 0.71 and 0.32, respectively. The mean of occupancy rate per hospital is 0.62.

Table 2. Summary Statistics of Continuous Variables (n=1971)

Variables	Mean	Standard Deviation
Revenue per discharge	\$ 7,130.02	6,665.72
Expenses per discharge	\$ 6,775.35	2,897.43
Profit per discharge	\$ 371.57	276.81
Average length of stay	5.99 days	5.61
hospital beds	280.88	198.84
Proportion of Medicare patients	0.41	0.12
Proportion of Medicaid patients	0.14	0.10
Number of services	27.77	4.96
Competition index	0.71	0.19
HMO penetration	0.32	0.16
Occupancy rate	0.62	0.15

Frequencies and percentage for each categorical variable in 1,971 hospitals in this study are tabulated. See Table 3. In the distribution of the population size, over 50% of hospitals are located in areas with population over 1,000,000 populations. Independent hospitals being a member of a system, an alliance, or a network are 44%, 24.7% of hospitals have only functional integration, and 31.3% of hospitals have both clinical and functional integration. Classified by teaching status, the majority of the hospitals are non-teaching hospitals (87.1%). The distribution of hospitals by type of ownership shows a predominance of non-for-profit hospitals owned by organizations: 55.1% of hospitals are non-for-profit hospitals owned by organizations; 17.9% of hospitals are for-profit; 10.6% of hospitals are government owned; and 16.5% of hospitals are non-for-profit owned by churches or religious groups.

Table 3. Summary Statistics of Categorical Variables (n=1971)

Variables	Categories	Percent
Population size	100,000 - 249,999	14.8
	250,000 - 499,999	14.7
	500,000 - 999,999	15.8
	1,000,000 - 2,499,999	27.6
	2,500,000 and more	27.1
Type of hospital integration	No integration	44.0
	Horizontal integration	24.7
	Vertical integration	31.3
Teaching Status	Teaching hospitals	12.9
	Non-teaching hospitals	87.1

Ownership	For-profit	17.9
	Government owned	10.6
	Non-for profit owned by religious	16.5
	Non-for profit owned by public organization	55.1

## 2. Factors Influencing Hospital Financial Performances

Table 4 shows the multiple regression results of hospital revenues per discharge, hospital revenues per discharge, and hospital profits per discharge. The multiple regression model on hospital revenues per discharge is significant; the model explains 60% of variance with independent variables. The hospital revenue per discharge is significantly associated with vertical integration. Hospital integrating vertically with other health providers has significantly more revenue than hospital without integration, while there is no significant difference in revenue between hospital with horizontal integration with other hospitals and independent hospitals without any integration. The revenue of hospital systems with vertical integration is \$679.29 per discharge more than hospitals without any integration.

The environmental factors do not have any influence on hospital revenue. Among hospital characteristics, number of services and teaching status has a positive influence on hospital revenue. The number of hospital beds, percentage of Medicare and Medicaid patients and occupancy rates have a negative influence on hospital revenue. The hospital average length of stay does not have significant influence on hospital revenue.

Table 4. Regression of Hospital Financial Performance on Independent Variables

Variables	Hospital Revenue per Discharge	Hospital Expenses per Discharge	Hospital Profits per Discharge
MSA 100,000-249,999 (Vs 1000000-2499999)	2211.78	31.03	161.55
MSA 250,000-499,999 (Vs 1000000-2499999)	374.87	48.06	286.03
MSA 500,000-999,999 (Vs 1000000-2499999)	152.11	-83.55	206.95
MSA $\geq$ 2,500,000 (Vs 1000000-2499999)	247.57	526.40 <sup>***</sup>	-233.31
Competition rate	1007.07	314.13	663.76
HMO penetration	-973.81	304.43	-1419.86*
Vertical integration (Vs No integration)	679.29 <sup>**</sup>	158.19	507.60*
Horizontal integration (Vs No integration)	444.35	-192.98*	707.77*
Average length of stay	900.21 <sup>***</sup>	270.64 <sup>***</sup>	631.57 <sup>***</sup>
For-profit (Vs public organization)	289.21	259.91	97.62
Government owned (Vs public organization)	205.58	654.87 <sup>***</sup>	-251.66
Non-profit by Church (Vs public organization)	125.88	132.45	-1.06
Hospital beds	-2.07 <sup>***</sup>	2.10 <sup>***</sup>	-4.21 <sup>***</sup>
Proportion of Medicare patient	-6502.28 <sup>***</sup>	293.85	-6635.78 <sup>***</sup>
Proportion of Medicaid patient	-2994.06*	1567.63 <sup>**</sup>	-4554.76 <sup>***</sup>
Number of services hospital providing	65.94 <sup>**</sup>	26.80 <sup>**</sup>	39.13*
Teaching hospital (Vs Non-teaching hospital)	3227.25 <sup>***</sup>	2967.77 <sup>***</sup>	447.30

Occupancy rate	-4082.07***	640.59	-4608.86***
R <sup>2</sup>	0.60	0.56	0.47
Adj R <sup>2</sup>	0.60	0.55	0.46
F-value	154.71***	134.64***	89.97***

#: 0.01 # p-value < 0.05, \*\*: 0.001 # p-value < 0.01, \*\*\*: p-value < 0.001

The multiple regression model on hospital expenses per discharge is significant; the model explains 56% of variance with independent variables. The hospital expenses are significantly associated with horizontal integration. The expense of hospital with horizontal integration is \$192.98 per discharge less than independent hospitals.

Among the environmental factors population size significantly influences hospital expenses. Among hospital characteristics, hospitals owned by government have higher expenses than non-for-profit hospital owned by private organizations. The hospital beds, the percentage of Medicaid patients, and teaching status have a positive influence on hospital expenses per discharge. The hospital average length of stay has a positive influence on hospital expenses per discharge.

The multiple regression model on hospital profit per discharge is significant; the model explains 47% of variance with independent variables. The hospital profits are significantly associated with both of vertical and horizontal integration type. The vertical integrated hospitals with other health providers have significantly more profit than independent hospitals without integration, and horizontal integrated hospitals with other hospitals have significantly more profit than independent hospitals without integration.

The profits of hospital with vertical integration are \$507.6 per discharge more than independent hospitals without integration, and the profits of hospital with horizontal integration are \$707.77 per discharge more than independent hospitals without integration.

Among the environmental factors, HMO penetration rate has a negative influence on the hospital profits. Among hospital characteristics hospital beds, percentage of Medicare and Medicaid patients and occupancy rates have a negative influence on the hospital profit. The hospital average length of stay has a positive influence on the hospital profit.

## V. Discussion and Conclusion

According to the integration type, 44% of the hospitals still remain independent hospitals, 24.7% of hospitals have horizontal integration and 31.3% of hospitals have vertical integration. Over 50% of hospitals are located in relatively large city areas with populations over 1,000,000. 55% of hospitals are not-for-profit hospitals owned by public organizations, 17.9% of the hospitals are for-profit, 10.6% of hospitals are government owned, and 16.5% of hospitals are non-for-profit church or religious groups owned. Twelve point nine percent (12.9%) of hospitals have teaching status.

The hospital revenue per discharge of the hospitals with vertical integration strategy is significantly higher than independent hospitals without any integration strategy. There is not significant difference in the revenue per discharge between hospitals with horizontal integration strategy and independent hospitals without any integration strategy. This result shows that the revenue per discharge for hospitals with

vertical integration strategy is \$679.29 higher than hospitals without any integration strategy. Therefore vertical integration strategy has a positive influence on increasing hospital revenue.

This result is very unique. Most researchers, such as L.R. Burns et al. (1990, 1998)<sup>20,21</sup>, S.M. Shortell et al. (1996)<sup>22</sup>, and G.J. Bazzoli et al. (1999)<sup>10</sup>, report that horizontal integration and vertical integration do not have influence on revenue increase. They insist that integration has some influence on profit increases through reducing expenses. In addition, this result differs from the results of J.P. Clement et al. (1997)<sup>23</sup>, who reports that horizontal integration has influence on revenue increases. However, the results of this study are very close to the results of D. Dranove et al. (1996)<sup>24</sup> and T.L. Mark et al. (1998)<sup>25</sup>. They report that revenue and profit of hospitals with vertical integration could increase through a one-stop-shopping strategy.

The average length of stay has a positive relationship with all hospital financial performance indexes revenue, expenses and profit. Among hospital characteristics, the number of hospital beds has a positive impact on expenses per discharge, while the number of hospital beds has a negative impact on hospital profit per discharge. This means that there is no cost reduction impact by spreading fixed cost. The increase in the number of Medicaid patients has a positive impact on hospital expenses, while the increase of Medicare patients has no impact on hospital expenses. And the percentage of Medicare and Medicaid patients has a negative impact on hospital profit per discharge. The number of services has a positive impact on the hospital expenses per discharge.

The HMO penetration rate has a negative impact on hospital profit per discharge. This is true because HMO plans have a strong mechanism to reduce hospital resource consumption and hospital revenue, as previous studies show. The average length of stay has a positive influence on the hospital profit per discharge. Hospital (health care) markets are not a cost center market concept, but rather a revenue center concept.

Occupancy rate has a negative impact on hospital profit. This result is explained by the increase of occupancy rate related to low hospital operation efficiency, and this low efficiency affects hospital profit. This result is supported by J. Zwanziger et al. (1994)<sup>26</sup> who reported that when occupancy rate was 50% or more, hospital profit decreases.

Finally, the hospitals with both functional and clinical and the hospitals functional integration strategies have positive influence on hospital profit and/or operation. However, there is difference mechanism in increasing hospital profit between two kinds of integration. The hospitals with both clinical and functional integration strategy have impact on increasing hospital revenue, while the hospitals with only functional integration strategy have impact on reducing hospital expense. Totally, this study shows that the hospitals with only functional integration are more profitable than the hospitals with both clinical and functional integration, because the hospitals with both clinical and functional integration requires more money to develop or maintain networks and operate the networks.

## **VI. Study Limitations**

This study has some limitations. This study is cross-sectional rather than longitudinal. Therefore, the study does not control previous periods. For example,

hospital performance is related to previous years. Conspicuously missing from the models is a variable representing physician characteristics in the integration strategy. Physicians' collaboration is essential for management of hospital performance. Physicians are important to hospitals because the patients are brought to the hospital through their referrals, and treatment decisions are made by them.<sup>26,27)</sup>

This study used HMO penetration rate, market competition rate, and population size as environmental characteristics surrounding hospitals. These variables came from MSAs where a hospital was located. Therefore, there was the possibility of ecological bias.

Even with these limitations, results of this study are much more meaningful than prior studies that looked only at overall hospital performance by integrated delivery system. The functional integration strategy reduces hospital expenses, and increases hospital profit. The clinical and functional integration strategy increases hospital revenue, and increases hospital profit.

## References

1. Managed Care Digest, HMO-PPO edition. Kansas City, MO: Hoechst, Marion, Roussel, Inc. 1998
2. InterStudy. HMO Industry Report. *The HMO industry report 9.2*. Minneapolis, MN: InterStudy Publications, 1999
3. Agency for Health Care Policy and Research. Clinical Classification for Health Policy Research: Discharge Statistics by Principal Diagnosis and Procedure. (AHCPR Pub. No. 93-0043). Rockville, MD: U.S. Department of Health and Human Services, 1993
4. L.R. Burns and D.P. Thorpe. Managed Care and Integrated Health Care. *Health Care Management* 2, no. 1 (1995): 101-8
5. M.A. Morrissey et al. The Effects of Managed Care on Physician and Clinical Intergration in Hospitals. *Medical Care* 37, no. 4 (1999): 350-361
6. H.S. Zucherman et al. Alliances in health care: What we know, wat we think we know, and what we should know. *Health Care Management Review* 20, no. 1 (1995): 54-64
7. C.A. Mowll. Assessing the Effect of Increased Managed Care on Hospitals. *Journal of Healthcare Management* 43, no. 1 (1998): 68-80
8. I. Moscovice et al. Rural hospital networks: implications for rural health reform. *Health Care Financ Review* 17, no. 1 (1995):53-67.
9. E. Nauenburg et al. Network Structure and Hospital Performance in New York State: 1991-1995. *Medical Care Research and Review* 56, no. 4 (1999):415-39
10. G.J. Bazzoli et al. A Taxonomy of Health Networks and Systems: Bringing Order Out of Chaos. *Health Services Research* 33, no. 6 (1999):1683-1717
11. R.H. Miller and H.S. Luft. Managed care plan performance since 1980. A literature analysis. *JAMA* 271, no. 19 (1994):1512-9.
12. R.H. Miller and H.S. Luft. Does managed care lead to better or worse quality of care? *Health Affairs* 16, no. 5 (1997):7-25.

13. R.M. Mullner and D.G. Whiteis. A review of the literature. In rural hospital closure; Management and community implications. Chicago, Ill.: American Hospital Association, 1989
14. J. Child. Organizational structure, environment and performance: The role of strategic choice. *Sociology* 6, (1972):1-22
15. S.M. Shortell et al. Strategic choices for America's Hospitals: Managing Change in turbulent times. San Francisco, California: Jossey-Bass, 1990
16. M.J. Succi et al. Effects of market position and competition on rural hospital closures. *Health Services Research* 31, no 6 (1997): 679-699
17. M.E. Porter. Competitive Advantage: Creating and sustaining superior performance. New York, NY: Free Press; 1985.
18. D.E. Schendel and C.W. Hofer. Strategic management: A new view of business policy and planning. Boston, Mass: Little, Brown;1979
19. AHA. 1998 AHA Annual Survey. Health Forum, LLC. Chicago, Ill. 2000
20. L.R. Burns et al. Managed Care and Processes to Integrate Physicians/Hospitals. *Health Care Management Review* 23, no 4 (1998):70-80
21. L.R. Burns et al. Managed Care and Processes to Integrate Physicians/Hospitals. *Health Care Management Review* 23, no 4 (1998):70-80
22. S.M. Shortell et al. Remarking Health Care In America. San Francisco: Jossey-Bass. 1996
23. J.P. Clement et al. Strategic Hospital Alliances: Impact on Financial Performance. *Health Affairs* 16, no. 6 (1997): 193-203
24. D. Dranove et al. Are multihospital systems more efficient? *Health Affairs* 15, no. 1 (1996): 100-104
25. T.L. Mark et al. Hospital-physician relations and hospital financial performance. *Medical Care* 36, no. 1 (1998): 67-78
26. J. Zwanziger et al. California providers adjust to increasing price competition. In: Helms RB (ed) Health Policy Reform: Competition and Controls. Washington, DC: American Enterprise Institute, 1994
27. L. Shi. Patient and Hospital Characteristics Associated with Average Length of Stay. *Health Care Management Review* 21, no. 2 (1996): 41- 61