

The Effects of Hospital-Physician Integration Strategies on Hospital Financial Performance

James B. Goes and ChunLiu Zhan

Study Question. This study investigated the longitudinal relations between hospital financial performance outcomes and three hospital-physician integration strategies: physician involvement in hospital governance, hospital ownership by physicians, and the integration of hospital-physician financial relationships.

Data Sources and Study Setting. Using secondary data from the State of California, integration strategies in approximately 300 California short-term acute care hospitals were tracked over a ten-year period (1981–1990).

Study Design. The study used an archival design. Hospital performance was measured on three dimensions: operational profitability, occupancy, and costs. Thirteen control variables were used in the analyses: market competition, affluence, and rurality; hospital ownership; teaching costs and intensity; multihospital system membership; hospital size; outpatient service mix; patient volume case mix; Medicare and Medicaid intensity; and managed care intensity.

Data Collection/Extraction. Financial and utilization data were obtained from the State of California, which requires annual hospital reports. A series of longitudinal regressions tested the hypotheses.

Principal Findings. Considerable variation was found in the popularity of the three strategies and their ability to predict hospital performance outcomes. Physician involvement in hospital governance increased modestly from 1981–1990, while ownership and financial integration declined significantly. Physician governance was associated with greater occupancy and higher operating margins, while financial integration was related to lower hospital operating costs. Direct physician ownership, particularly in small hospitals, was associated with lower operating margins and higher costs. Subsample analyses indicate that implementation of the Medicare prospective payment system in 1983 had a major impact on these relationships, especially on the benefits of financial integration.

Conclusions. The findings support the validity of hospital-physician financial integration efforts, and to a lesser extent the involvement of physicians in hospital governance. The results lend considerably less support for strategies built around direct physician ownership in hospitals, particularly since PPS implementation.

Relevance/Impact. These findings challenge prior studies that found few financial benefits to hospital-physician integration prior to PPS implementation in 1983. The

results imply that financial benefits of integration may take several years after implementation to emerge, are most salient in a managed care or managed competition environment, and vary by hospital size and multihospital system membership.

Key Words. Hospital-physician integration, governance, strategic management, hospital performance

The relationships between hospitals and physicians have attracted growing interest in recent years among researchers and managers of health care organizations. The reasons for this interest in physician relations are obvious. Physicians directly influence up to 80 percent of all expenditures on health care (Chilingerian and Sherman 1990). They control patient admissions, and their clinical decisions affect utilization of services and length of stay. Relations between hospitals and physicians have become particularly important with the advent of prospective payment, recent growth in managed care, increased turbulence in many health care environments, and development of "managed competition" models of delivering care (Shortell 1990; Burns and Wholey 1992; Burns and Thorpe 1993).

Hospital managers have a strong incentive to develop administrative mechanisms that improve the fit between the goals and actions of physicians and administrators. To this end, an array of different hospital-physician integration strategies have been proposed. These include joint ventures (Shortell, Wickizer, and Wheeler 1984), physician involvement on hospital governing boards (Smith, Reid, and Piland 1990), and "strategic alliances" between hospitals and physicians (Gregory 1992; Kaluzny and Zuckerman 1993). Recent interest has focused on physician-hospital organizations (PHOs), management service organizations (MSOs), and integrated delivery system models (Burns and Thorpe 1993). Although experts have trumpeted the benefits of

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such strategies, and providers have stampeded to develop them, there is little empirical evidence in their support. Initial quantitative analyses suggested some variations in performance effects (Smith, Reid, and Piland 1990), but few studies have extensively researched these strategies (Morrisey, Alexander, and Ohsfeldt 1990), and none of them has demonstrated that such strategies have consistent, positive effects on hospital-physician relations or hospital performance. Moreover, empirical studies have generally considered the cross-sectional effects of these strategies on single performance outcomes, with little consideration of trade-offs or longitudinal variation between different benchmarks of hospital performance.

This article reports some results of a longitudinal study of hospital-physician integration strategies, changes in their popularity over time, and their relation to financial performance in 300 California hospitals. We studied three integration strategies: physician membership on hospital boards, physician ownership in hospitals, and the nature and level of financial integration between hospitals and physicians. We found considerable variation in the use of these strategies and in their ability to predict hospital performance. We review these results and discuss their implications for researchers and practitioners.

CONCEPTUAL ROOTS AND EMPIRICAL EVIDENCE

Relations between medical and administrative staffs have often been strained, in part due to diverse goals and interests (Starr 1982). Physicians traditionally regarded hospitals as work sites or cooperatives for providing patient care, teaching, or doing research (Pauly and Redisch 1973). Hospital management, governance, and concern over the bottom line were generally left to professional managers and community trustees. Physician influence on hospital policy was exercised through medical staff organizations, and two parallel but separate firms evolved in most hospitals: one dominated by the medical staff and one by the administrative staff (Smith 1957; Harris 1978; Alexander, Morrisey, and Shortell 1986). Prior to the last decade, physicians were generally regarded as the primary customer of hospitals, and the financial incentives of both groups were mostly in alignment. This "non-cooperative, oligopoly-type game" (Harris 1978, 468) was often uneasy but tenable while financial and human resources were relatively abundant.

The arrival of prospective payment (PPS) for Medicare patients and selective contracting for Medicaid patients in the early 1980s, coupled with

a growing emphasis on other forms of managed and discounted care, disrupted this uneasy balance. Over the decade since PPS implementation, the traditional boundaries between the different players in health care have become increasingly blurred, leading to growing competition between physicians and hospitals (Meyer, Brooks, and Goes 1990). As a result, physicians' decisions regarding the practice of medicine in hospitals have increasingly come under the scrutiny of businesslike considerations (Alexander, Morrisey, and Shortell 1986). Physicians are no longer seen as the primary customer of hospitals (Harris, Hicks, and Kelly 1992), and financial incentives for hospitals have changed dramatically. Declining reimbursements and competition for patients have shifted the focus of hospital managers toward downsizing, diversification, consolidation of unprofitable services, and overall cost containment. Such actions pose a threat to traditional physician autonomy, and have brought the diverse goals of hospitals and physicians into conflict (Glandon and Morrisey 1986; Bettner and Collins 1987).

Since physician practice patterns and styles play such an important role in determining cost, resource use, and admissions (Pauly and Redisch 1973), and by extension hospital financial performance (Feinglass, Martin, and Sen 1991), the need to improve working relationships with physicians has become imperative. Provider networks and managed care systems require seamless integration in the delivery of health services. As hospitals and systems compete for a declining patient dollar, physician loyalty and cooperation are critical. A recent survey of 2,600 health care professionals by Arthur Anderson and the American College of Healthcare Executives found "growing demand for change" in hospital-physician relations, and noted that "greater collaboration among providers will be needed in the marketplace of the future" (1991, 1-2).

As methods for achieving this cooperation and integration between hospitals and physicians, experts have put forth a variety of strategies. Most involve changes in hospital structures and/or financial relationships between hospitals and physicians. Calls for joint ventures with physicians proliferate, both in the trade press and the more academic literatures (Shortell, Wickizer, and Wheeler 1984; Coddington and Moore 1987), although joint venture activity has slowed with limits placed by recent Internal Revenue and Health and Human Services decisions (Burns and Thorpe 1993). Other strategies include physician involvement in hospital governance or program decisions (Smith, Reid, and Piland 1990; Derzon 1988), creation of "value-added partnerships" (Foreman and Roberts 1991), and the development of physician-

hospital networks or organizations (Harris, Hicks, and Kelly 1992; Burns and Thorpe 1993).

Underlying many of these prescriptions for greater cooperation are three core notions. First, advocates believe that greater integration of hospital and physician activities will lead to a tighter coupling of interests and will bond physicians, both psychologically and financially, to the hospital (Alexander and Morrisey 1988; Blair, Slaton, and Savage 1990). Greater affective or social-psychological involvement in hospital decision making is thought to build physician trust and loyalty in integration efforts (Montague 1993), thereby decreasing conflict and turnover (Burns and Wholey 1992). Shortell (1990) suggests that mechanisms like joint ventures enhance physician incentives to refer patients, widen revenue sources, extend the hospital's reach over the continuum of care, and dissuade physicians from undertaking independent ventures that compete directly with the hospital. Similarly, Derzon (1988, 14) argues that "less stressful" relationships between hospital and medical staff result when a hospital is "deliberate in its willingness to legitimize the role of physicians within the organizational fabric of the hospital."

Second, proponents believe that integration enables hospitals to exercise greater control over costs. The failure to recognize that physicians and hospitals are linked by a bond of joint production is the basis of many hospital inefficiencies (Harris 1978). Since physicians control so many patient care decisions that influence costs, hospitals that achieve strong integration of medical and administrative goals should receive greater physician cooperation in containing costs, changing utilization patterns, and limiting expensive procedures. Broyles and Reilly (1988) identify two areas where integration can pay off: in admitting patterns, and in the prescription of drugs and procedures. Smith, Reid, and Piland (1990) argue that involving physicians in hospital governance increases their fiduciary responsibility and exposure to tough financial or administrative decisions, both of which are likely to increase physician sensitivity to hospital costs and financial performance.

Third, proponents of greater integration contend that cooperative ventures create or add value for both hospitals and physicians. This synergy arises from a sharing of common interests (Glandon and Morrisey 1986), shared resources and managerial expertise (Foreman and Roberts 1991), and the meshing of organizational and physician strategic objectives (Shortell 1990). Scott (1982) characterized this as a move from the traditional autonomous model of physician professionalization toward more integrative heteronomous or conjoint models, where physician and administrative decision making is intertwined and power is shared on an increasingly equal basis.

Integration strategies that approach the conjoint model are thought to widen physician focus from strictly clinical to organizational and financial concerns, with the presumption that costly practice behaviors will change accordingly.

Critics have questioned the efficacy of integration strategies. For example, Gill and Meighan (1988) contend that "organizational structuring techniques will not by themselves guarantee more effective governance or transform unresolved conflicts of the past" (p. 512). Indeed, there is little evidence or systematic research available regarding these issues, particularly since PPS implementation. Early efforts to educate physicians about efficient practice styles had little effect on hospital solvency (Schroeder, Myers, and McPhee 1984). A more recent study found that greater hospital-physician integration actually increased hospital costs (Alexander and Morrissey 1988), although much of this effect was explained by variations in hospital type. Integration was shown to positively affect hospital output, but only in rural settings (Morrissey, Alexander, and Ohsfeldt 1990). However, most studies have used cross-sectional data from pre-PPS periods, and focused exclusively on cost and output performance. Given the incentive changes noted above, post-PPS results might differ, as may the effects of integration strategies on other performance benchmarks.

Few other empirical studies have been published in this area. A recent case study found that more integrative Canadian hospitals were somewhat more likely to break even financially than others (Lemieux-Charles and Leatt 1992). Burns, Anderson, and Shortell (1990) found that "control" strategies used by hospitals had minimal effect on physician satisfaction or physician-hospital conflict, and Burns and Wholey (1992) found integration strategies to have had little influence on physician loyalty or commitment.

These are important issues for health care managers. Hospitals spend considerable financial resources and managerial time to improve relations with physicians. Hospitals are increasingly held accountable for the costs and quality of their services by payers, regulators, patients, and clinicians. Proven integration strategies may provide hospitals and systems with competitive advantages through better coordination and control over the processes of delivering care. As the Anderson/ACHE survey (1991, 42) concludes, two crucial strategies for hospitals in the future are to "improve overall operational efficiency" and to "involve more physicians in leadership roles." It is no coincidence that these two imperatives are intertwined. It is essential to establish the empirical contribution of different integration strategies in improving hospital efficiency and performance through systematic, longitudinal study (Alexander and Morrissey 1988).

RESEARCH QUESTIONS

Part of the dilemma in structuring integration efforts stems from the intrinsic conflict between physicians' motivation to work in their own self-interest and any institutional fiduciary responsibilities or altruistic motivations to work in the hospital's interest. For example, a physician's involvement on a hospital board that is working to contain costs may not override his or her pecuniary interests in the purchase of a new and attractive medical technology. Gregory (1992) and others term this an "agency" problem, and suggest that physician involvement in strategic planning and policymaking holds the greatest promise for aligning hospital and physician interests. Indeed, an ability to overcome such agency-related dysfunctions will be critical to hospital success under a managed competition system.

We studied three strategies that are designed in part to address such agency problems. These are (1) involvement of physicians in hospital governance, (2) physician ownership in the hospital, and (3) the integration of financial arrangements between the hospital and physicians. These strategies are not mutually exclusive and can be used concurrently within a hospital. Our study linked an exploratory approach with hypothesis testing and focused on two primary research questions. First, What is the relative frequency with which these three integration strategies are used by hospitals, and does this frequency vary over time? Second, Do hospitals that use these three strategies subsequently exhibit better financial performance outcomes?

INVOLVING PHYSICIANS IN HOSPITAL GOVERNANCE

Involving physicians in governance and policy level decision making is thought to bring several benefits to hospitals. First, by bringing a clinical perspective to board decisions, physician involvement can improve the quality of strategic planning and capital expansion activities (Morlock, Alexander, and Hunter 1985). Second, involving physicians in hospital governance helps to blend physician and management cultures (Montague 1993), creating a cooperative decision-making environment and building physician commitment to a hospital (Smith, Reid, and Piland 1990). Third, as board members, physicians carry a fiduciary responsibility, and should gain a greater appreciation for the administrative or strategic perspective on financial decisions (Smith, Reid, and Piland 1990). This effect should be particularly pronounced for those physicians directly involved in admissions or major cost decisions. To the extent that board experiences and financial awareness are shared and

translate into less conflict and greater cost consciousness among physicians (Sloan and Becker 1981), financial outcomes should improve. Physicians who are attentive to financial considerations are more likely to adapt their admitting patterns and forgo unnecessary or duplicative tests (Morrisey, Alexander, and Ohsfeldt 1990). However, these cost savings may be partially offset by the expansion of clinical functions or expenditures that can accompany physician membership on hospital boards (Alexander and Morrisey 1988). Because the need for cost containment has grown particularly acute since PPS, physician membership on hospital boards should indicate a pronounced upward trend over the last decade.

Hypothesis 1a. *Physician involvement in hospital governance will increase over time.*

Hypothesis 1b. *Physician involvement in hospital governance will be positively related to hospital profitability and occupancy, and negatively related to hospital costs.*

PHYSICIAN OWNERSHIP AND FINANCIAL INTEGRATION

Another manner by which physicians can be integrated into a hospital is through direct ownership. To the extent that hospitals and physicians share the financial risks associated with ownership, greater integration of goals and objectives should logically follow. Hospitals can also encourage physician buy-in as a way to widen access to capital for hospital expansion at a potentially lower cost. Within the limitations of fraud and abuse standards, hospital efforts to economically link with physicians through ownership should create incentives for physicians to limit costly practice patterns and utilization, which Pauly and Redisch (1973) argue is a necessary condition to achieving cost containment. The growing cost pressures of PPS and managed care in the last decade should increase the incentives for hospitals to develop such ownership linkages with physicians, and these linkages should have a positive influence on performance.

Hypothesis 2a. *Physician ownership in hospitals will increase over time.*

Hypothesis 2b. *Physician ownership will be positively related to hospital profitability and occupancy, and negatively related to hospital costs.*

Aside from direct physician investment, hospitals have used a variety of other strategies to build financial integration with physicians (Glandon

and Morrisey 1986). The options range from lesser integration methods, such as renting facilities or medical offices to physicians or providing billing and accounting functions, to stronger integration devices, such as contracting for services, sharing a percentage of revenues, undertaking jointly ventured services, or directly employing physicians (Sloan and Becker 1981; Shortell, Wickizer, and Wheeler 1984). These strategies are designed to enhance physician practices, bring the financial goals of physicians and hospitals into closer alignment, and increase the ability of administrators to monitor and influence physician behavior (Glandon and Morrisey 1986; Gregory 1992). At the extreme, employment of physicians enables greater administrative control over admissions or utilization patterns, centralizes and coordinates decision making, and provides the hospital greater flexibility in contracting. These benefits are offset by the added costs of monitoring and supervising physicians and joint ventures. When alignment between the goals of the physician and the hospital is achieved, both have stronger incentives to control costs and improve the efficiency of practice patterns, thereby improving their collective financial position.

Hypothesis 3a. *Financial integration between hospitals and physicians will increase over time.*

Hypothesis 3b. *Financial integration will be positively related to hospital profitability and occupancy, and negatively related to hospital costs.*

METHOD

The sample for the study includes all California acute care hospitals for which complete data were available (this number ranged from 345 to 288 across the length of the study).¹ Hospital-physician integration strategies, control variables, and hospital performance were tracked over ten years (calendar years 1981 through 1990). The study relied on secondary data assembled from multiple sources, and was informed by the qualitative results of a longitudinal field study of hospitals in the San Francisco Bay Area.² The quantitative data came from operational indicators collected annually by the California Health Facilities Commission (CHFC).³ Variables selected for this study and operational measures are presented in Table 1.

Measuring Integration Strategies. *Physician involvement in hospital governance* was measured as the proportion of all board members who were physicians. *Physician ownership* was measured as the percent of hospital stock owned

Table 1: Variables and Measures

<i>Variable</i>	<i>Operational Definition</i>
Hospital-Physician Integration Strategies	
Physician involvement in hospital governance	Proportion of board members who are MDs
Physician ownership	Percent of hospital stock owned by MDs
Financial integration	Level of integration of hospital-physician financial arrangements averaged across hospital departments
Hospital Performance	
Operational profitability	Operating margin
Occupancy	Average daily occupancy
Hospital costs	Operating expenses/1000 patient-days
Control Measures	
Market competition	Inverse of Hirschman-Herfindahl index for hospital discharges (000) by health service area
Market affluence	Average 1980 household income by county (0000)
Rurality	State rural hospital designation
Hospital ownership:	Hospital ownership/control status
Not-for-profit	
Proprietary	
Public	
Church	
Educational costs	Total hospital education expenditures (000)
Multihospital system membership	System affiliation from AHA <i>Guide</i>
Hospital size	Log of average available acute care beds (00)
Outpatient service mix	Outpatient patient revenues/Total patient revenues
Patient volume	Total annual patient-days (0000)
Acuity of case mix	Charge-based case-mix index assigned by state
Medicare intensity	Medicare patient revenues/total
Medicaid intensity	Medicaid patient revenues/total
Managed care	Participants in capitated medical programs (000)

by physicians.⁴ Following Glandon and Morrissey (1986), we conceptualized *financial integration* as a continuum of options from total physician autonomy to complete hospital supervision over physician decisions. This continuum was assessed using a six-point ordinal scale to classify hospital-physician financial arrangements, from the least to the most integrative.⁵ The scale was constructed in the following manner. Hospitals can operate independently from physicians, where no common financial transactions take place (scale

value 0). Hospitals can rent facilities to physicians who independently bill patients and pay the hospital a fee for facilities use (1). Hospitals can act as clearing agents for physicians in billing for services (2). Hospitals can contract with physicians for their services and bill patients directly (3). Hospitals can joint-venture services with physicians, jointly sharing in departmental revenues and costs (4). Finally, hospitals can directly salary physicians (scale value 5).⁶ Values on this scale (0–5) were tracked across hospital departments, and an average integration score was computed for each year. Higher values on this scale indicate a greater meshing of hospital and physician financial interests and fiduciary roles, while lower values imply little effort by hospitals or physicians to integrate their financial activities.

Measuring Performance. The three performance characteristics were assessed using indicators from the CHFC reports. Operational profitability was measured as annual operating margin. Occupancy was measured as average daily occupancy, and hospital costs as total hospital operating expenses per 1,000 patient days. Successful integration requires changes in both the administrator and the physician cultures. Integration can therefore be difficult to implement, and may take several years to have a measurable effect on physician behavior. To capture the longitudinality of these effects, performance measures were lagged two years. Since case mix was directly entered as a control variable, outcomes were not acuity-adjusted.

Control Variables. Thirteen additional measures were included to control for external or organizational factors shown in prior research to be related to hospital performance (cf. Sloan and Becker 1981; Alexander, Morrisey, and Shortell 1986; Alexander and Morrisey 1988). First, three characteristics of hospitals' market environments were used. Market competition was measured as the inverse of the Hirschman-Herfindahl concentration index (Scherer 1980), using hospital discharges as an indicator of market share. We used the health services area (HSA) classifications developed at the National Center for Health Statistics as the geographic unit of analysis for measuring hospital markets (Makuc, Haglund, Ingram, et al. 1991). Market affluence was measured by the average household income by county from the 1980 census. Rurality was established using the rural hospital designation assigned by the CHFC.⁷

The remaining control variables measured organizational characteristics that have been found to predict hospital performance. Dummy variables were used to indicate type of hospital *ownership* and *membership in a multihospital system*, which was gathered from the AHA *Guide*. *Educational costs* were tracked to indicate volume of teaching activity. *Size* was measured as the log

transformation of average available beds, *outpatient service mix* as the ratio of outpatient revenues to total revenues, and *volume* as annual patient days. *Severity of case mix* was measured using the charge-based index compiled by the CHFC.⁸ *Medicare and Medicaid intensity* were the percentage of hospital revenues accounted for by these payment mechanisms. Finally, *managed care* measured the level of hospital participation in HMO-type capitated medical programs by tracking the number of participants in such programs.

Interactions. We also hypothesized several interactions between the three integration strategies and contextual attributes. Multihospital systems have been leaders in integration activities since they can bring more managerial knowledge and resources to the task of integration. Therefore we measured the interaction of system membership with both physician involvement in hospital governance and the financial integration scale. Additionally, since physicians are thought more likely to establish ownership interests in small hospitals, we generated an interaction between size and physician ownership to test for this combined effect.

Data Analysis. The data were pooled over the ten years, yielding a sample size of 3,232. We used a three-step method to analyze the data and test hypotheses. First, descriptive statistics and correlation analyses were generated for all measures to check for normal distribution, outliers, missing data, and multicollinearity. Second, we constructed longitudinal means and distribution plots, and used analyses of variance (ANOVA) to compare the relative frequency with which the different integration strategies were used and their trends over time. Third, we conducted a series of hierarchical multiple regression runs to test the relation between the three integration strategies and hospital performance outcomes. Since preliminary ordinary least squares (OLS) regression analyses indicated a moderate serial correlation problem, we employed a first-order autoregressive time series model using maximum likelihood (ML) estimation (Johnston 1984). Control variables were first entered into the equation, followed by the integration strategy variables. This enabled us to determine whether integration strategies were significantly associated with hospital performance after controlling for the logically prior effects of control variables. Standard tests of significance and checks for multicollinearity and heteroscedasticity were employed (Cohen and Cohen 1983).

RESULTS

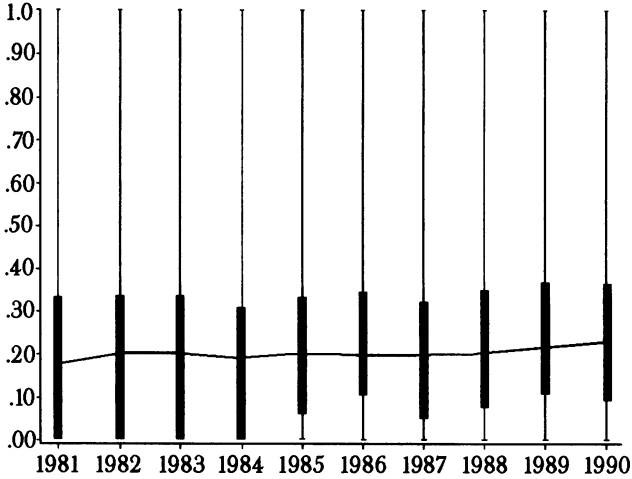
Our first research question asked: What is the relative frequency with which integration strategies are used by hospitals, and does this frequency vary

over time? We formalized this question in three hypotheses, which predicted that physician involvement in hospital governance (H1a), physician ownership (H2a), and hospital-physician financial integration (H3a) would all show increasing trends over time. These predictions were generally not supported in analyses of longitudinal means and distribution plots and ANOVA results. Figure 1 presents longitudinal Fisher box-plots for the governance and financial integration strategies.¹⁰ Hypothesis 1a received only weak support. Average physician membership on hospital boards ranged from a low of 21.5 percent in 1984 to a high of 25.9 percent in 1990. This is a somewhat lower percentage of physician board involvement than is reported in much of the trade literature. ANOVA tests and pairwise comparisons indicated significant differences between 1990 and the years 1982 and 1984; other years were not significantly different. Hypotheses 2a and 3a were soundly rejected. Physician ownership peaked in 1982 at 2.3 percent, declining to .72 percent by 1989. Financial integration also declined from a high of 2.05 in 1982 to a low of 1.52 in 1990. ANOVA comparisons showed significant decreases in financial integration between the 1981–1984 period and the 1987–1990 period. In sum, we found little support for our expectation that integration strategies would increase in popularity during the 1980s.

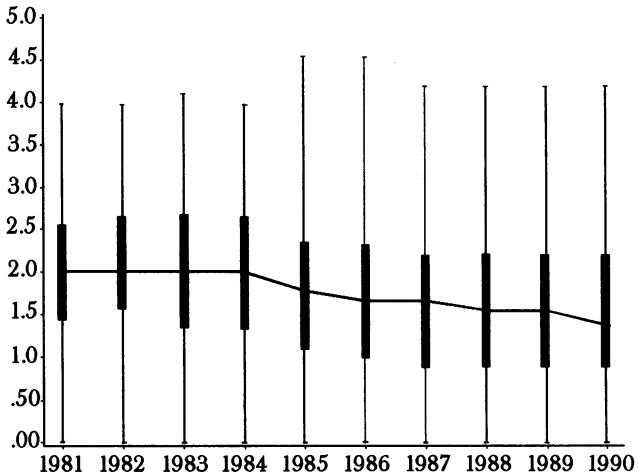
The second research question asked: Do hospitals that adopt physician integration strategies tend to exhibit better performance outcomes? This question generated three hypotheses, which predicted that physician involvement in hospital governance (H1b), ownership (H2b), and greater financial integration (H3b) would be positively related to profitability and occupancy, and negatively related to hospital costs. We tested these hypotheses in a multivariate fashion through a series of hierarchical, ML regression models. In the first model, control variables were first entered into the hierarchical regression, followed by integration variables in the second step. Statistical interaction terms were added to the equation in the second model. We expected integration strategies to have time-dependent effects on performance, and a two-year lag in the performance outcomes consistently provided the best fit with the data. Summarized results of these analyses are presented in Tables 2 and 3. For each of the performance measures, the tables list unstandardized ML regression coefficients and significance levels, adjusted coefficients of determination (R^2) for the full model, squared semipartial correlations (ΔR^2) for changes in explained variance attributable to adding integration variables and interactions to the control model, and final Durbin-Watson statistics. Following Cohen and Cohen (1983), we used a Model I F -statistic to test the significance of adding the integration variables in step 2. Overall F -tests were significant for all three dependent performance outcomes.

Figure 1: Fisher Box-Plots of Integration Strategies over Time

Average Physician Membership on Hospital Boards (proportion)



Average Financial Integration Score



The relationships between control measures and performance were largely consistent with prior findings. Operating margins were higher for large, proprietary, urban, nonteaching hospitals that provided less acute

Table 2: Maximum Likelihood Regression Results (Unstandardized Coefficients)—Effects of Integration Strategies on Hospital Performance

Variable/Model†	Operating Margin		Occupancy		Hospital Costs	
	1	2	1	2	1	2
Constant	0.09	0.13*	0.75***	0.74***	-0.28	-0.28
Market competition	-0.40***	-0.40***	-0.63***	-0.63***	1.49**	1.47**
Market affluence	-0.06**	-0.06**	-0.01	-0.01	0.16*	0.16*
Rurality	-0.05**	-0.05***	-0.13***	-0.13***	-0.05	-0.05
Nonprofit ownership	0.02	0.02	-0.05***	-0.05***	0.01	0.01
Public ownership	-0.03	-0.03	-0.03*	-0.03*	-0.16*	-0.16*
Proprietary ownership	0.05**	0.05**	-0.13***	-0.13***	0.20**	0.20**
Educational costs	-0.01*	-0.01*	-0.02***	-0.02***	0.05*	0.04*
MH System membership	0.02*	-0.05**	-0.01	0.01	-0.04	-0.06
Hospital size	3.50***	2.99**	-3.37***	-2.97***	-1.80	-1.72
Outpatient service mix	-0.09	-0.09	-0.37***	-0.38***	4.19***	4.18***
Patient volume	0.01	0.01	0.02***	0.02***	0.02	0.02
Case-mix acuity	-0.12***	-0.11***	0.01	0.01	0.12	0.12
Medicare	0.05	0.06	-0.01	-0.01	0.12	0.12
Medicaid	-0.38***	-0.37***	0.04	0.04	-0.33	-0.33
Managed care	-0.07	0.05	-1.70	-1.74	0.67	0.78
Governance	0.05**	0.03	0.08***	0.08*	-0.05	-0.02
MD ownership	-0.07*	-0.77***	-0.05***	0.49***	0.12	0.21
Financial integration	-0.01	-0.02***	0.01**	0.01**	-0.04**	-0.05*
Governance × MHS		0.03		-0.01		-0.06
MD ownership × size		0.19***		-0.15***		-0.03
Financial integration × MHS		0.03***		-0.01		0.02
R^2	0.39	0.40	0.43	0.43	0.41	0.41
ΔR^2 ‡	0.00	0.01*	0.01**	0.01**	0.00	0.00
F	92.3***	81.7***	108.1***	107.8***	99.6***	84.4***
d.f.	18, 2453	21, 2450	18, 2453	21, 2450	18, 2453	21, 2450
D-W	2.06	2.07	2.01	2.01	2.44	2.44

* $p < .05$; ** $p < .01$; *** $p < .001$.

†Model 1 includes control and hospital-physician variables; model 2 adds interaction terms. For sake of clarity, standard errors are not included (they are available from the authors).

‡Change in R^2 from the base (control variable) model.

services and served fewer Medicaid patients in less competitive or affluent markets. Occupancy was greatest in small, urban, high-volume, inpatient-oriented religious hospitals in uncompetitive markets. Costs were higher in proprietary, outpatient-oriented teaching hospitals in competitive, affluent markets.

Turning to the integration variables, Hypothesis 1b received moderately strong support. Physician membership on hospital boards was associated

with higher operating margins and consistently higher occupancy (model 1). However, physician participation in hospital governance had no significant effect on costs. Physician governance involvement in multihospital systems did not have a significant interactive effect on performance; however, an interaction between system membership and financial integration was highly significant, and possibly diluted the direct effect of physician governance on operating margins (model 2). This implies that financial ties with physicians have a more potent effect on operating margins than governance ties, and that multihospital systems may be at the forefront of financial integration efforts.

Hypothesis 2b was not well supported among California hospitals. Contrary to our predictions, physician ownership had a negative direct effect on hospital margins and occupancy, and no significant effect on hospital costs (model 1). However, this contrary finding was clarified by inclusion of an interaction between size and physician ownership in model 2. Physician ownership in large hospitals was strongly associated with higher operating margins, while ownership in small hospitals had strong negative effects on margins. Ownership in small hospitals, however, was associated with higher occupancy than in larger hospitals.

Hypothesis 3b was strongly supported, most notably after the inclusion of interactive effects. Financial integration was positively related to occupancy and negatively related to hospital costs (model 1). An interaction between financial integration and multihospital system membership had strongly positive effects on operating margins (model 2). Hospitals that combined system membership with greater financial integration outperformed nonintegrated system hospitals or integrated hospitals that were not system members.

Although the three integration strategies were each significantly related to the performance indicators, their contributions to the overall regression equations were not equal. As noted in Table 2, changes in R^2 attributable to the block of integration variables were significant only for operating margin (after adding interactions) and occupancy. Governance, ownership and financial integration collectively made no significant contribution to explaining the variability in hospital costs, over and above the logically prior effects of market and hospital characteristics. Only financial integration had significant independent effects on costs.

Our findings were somewhat at odds with the largely insignificant results of other integration studies conducted on pre-PPS hospital data (cf. Alexander and Morrisey 1988; Morrisey, Alexander, and Ohsfeldt 1990). We were curious about what effect PPS implementation might have on the effects of integration strategies. Since the data bracketed PPS implementation (in

Table 3: Maximum Likelihood Regression Results (Unstandardized Coefficients)—Effects of Integration Strategies on Hospital Performance by PPS Period

Variable/Period†	Operating Margin		Occupancy		Hospital Costs	
	1	2	1	2	1	2
Constant	0.05	0.12	0.78***	0.66***	0.22*	-0.35
Market competition	-0.58**	-0.28	-0.59***	-0.64***	0.61**	2.05**
Market affluence	-0.04	-0.06*	-0.02	0.01	0.09**	0.18
Rurality	-0.03	-0.06**	-0.15***	-0.12***	0.01	-0.09
Nonprofit ownership	0.02	0.02	-0.03	-0.05**	0.01	-0.02
Public ownership	-0.05	-0.01	-0.02	-0.03	-0.01	-0.24*
Proprietary ownership	0.05	0.04	-0.11***	-0.14***	0.07*	0.26*
Educational costs	-0.03*	-0.01	-0.03***	-0.01**	0.05***	0.01
MH System membership	-0.04	-0.04*	0.08**	-0.01	0.05	-0.24*
Hospital size	4.55**	2.45	-4.74***	-1.21***	-2.10	-4.50
Outpatient service mix	0.18	-0.21***	-0.13	-0.40***	1.01***	5.56***
Patient volume	0.01	0.01	0.03***	0.02***	-0.01	0.04**
Case-mix acuity	-0.10*	-0.14***	0.02	-0.03	0.12**	0.24
Medicare	-0.05	0.20***	-0.05	0.06	0.11*	-0.22
Medicaid	-0.47***	-0.28***	-0.05	0.06	-0.14*	0.06
Managed care	0.53	0.15	-5.38	-1.33	10.60*	-0.36
Governance	0.07*	-0.01	0.10***	0.06*	-0.05	-0.22
MD ownership	-2.14***	-0.09	-0.46	0.88***	2.67***	-1.15
Financial integration	-0.02**	-0.01	0.03***	0.01	0.01	-0.09**
Governance × MHS	-0.03	0.07	-0.02	0.02	-0.01	0.08
MD ownership × size	.52***	0.06	0.10	-0.24***	-0.65***	0.32
Financial integration × MHS	.04**	0.01	-0.03**	0.01	-0.01	0.07
R^2	0.38	0.52	0.40	0.47	0.45	0.41
$\Delta R^2‡$	0.05***	0.01	0.03***	0.02**	0.06***	0.00
F	35.1***	78.4***	31.7***	64.6***	46.8***	51.4***
d.f.	21, 972	21, 1477	21, 972	21, 1477	21, 942	21, 1477
D-W	1.93	2.31	2.02	2.01	2.00	2.37

* $p < .05$; ** $p < .01$; *** $p < .001$.

†Pre-PPS period 1 (1981–1983), post-PPS period 2 (1984–1990).

‡Change in R^2 from the base (control variable) model.

mid-1983), we split the sample into pre- and post-PPS subsamples and replicated the full model (model 2) analyses on each subset. These results are presented in Table 3. They indicate substantial variations in the effectiveness of integration strategies before and after PPS. While the three strategies (and interactions) had significant effects on hospital operating margins prior to PPS, they had no effect on margins after PPS. The influence of financial integration

on occupancy faded after PPS, although physician governance continued to have occupancy benefits. The positive influence of physician ownership in small hospitals on occupancy shows up primarily after PPS implementation, while the effect of ownership on hospital costs after PPS was insignificant. Finally, financial integration had the greatest negative effect on hospital costs after PPS. Collectively, the three integration strategies did a better job of predicting variance in performance outcomes prior to 1983 than after PPS implementation.

DISCUSSION

Proponents of hospital-physician integration strategies have long and vociferously championed their benefits, but few empirical studies of the performance effects of these strategies have been done. This study was an attempt to investigate the popularity and performance implications of three of these integration strategies. Before discussing the implications of our results, several brief caveats are in order.

First, our findings generalize only to the strategies we could measure in the California data (governance, ownership, and financial integration). More sophisticated integration strategies such as physician-hospital organizations (PHOs) or integrated systems (Burns and Thorpe 1993) may yield stronger effects on hospital performance. Second, our measures of integration and performance were inevitably limited by the nature of the secondary data. For example, the physician ownership variable was limited to stock holdings, which may only capture a portion of physician financial interests in hospitals. Reported costs are often arbitrary given the difficulty of cost finding in hospitals, and the beneficial effects of ownership and financial integration on hospital costs may therefore be overstated in these results. Moreover, we focused exclusively on financial outcomes, and integration may have different effects on such nonfinancial indicators as quality or employee turnover.

Additionally, the unique characteristics of the California setting are important to recognize and may limit the generalizability of these results. California hospitals are notably competitive (witness the strong influence of market competition on performance). Regulation of California hospitals has undergone dramatic change in the last decade, including selective contracting for Medicaid patients and elimination of certificate of need. California has also experienced greater managed care penetration than other states. Hospitals, therefore, have more incentive in California to control costs, and this may spark more interest in integration.

Nonetheless, these findings have important theoretical and methodological implications for research on hospital-physician integration, and might provide some indication of how integration strategies will function under the "managed competition" type of system envisioned by various reform plans. We found considerable variation in the popularity and impact of the three integration strategies. Our results for physician involvement in hospital governance were generally supportive of the pro-integration prescriptions in the trade literature, and somewhat at odds with prior empirical work. Physician involvement in hospital governance increased significantly from 1981 through 1990, topping out at about 26 percent by 1990. Possibly California hospitals adopted this strategy earlier than we expected (i.e., prior to 1980). Perhaps they also found a limit to the benefits of physician involvement at about 30 percent of the board complement. Once physician representation on boards is well established, hospital executives may trade off further physician participation on hospital boards against the desire to maintain administrative control over policy decisions. These results may also be consistent with the trend to increase the number of directors with financial or business rather than clinical backgrounds (Starkweather 1988).

Physician involvement in governance was a strong predictor of increased margins (prior to PPS implementation) and occupancy (both periods). These findings suggest that board involvement may help to overcome the agency problems identified in hospital-physician relations (Gregory 1992), thereby bringing hospital and physician goals into greater alignment. However, if this alignment did take place, it did not directly translate into lower hospital costs, a finding similar to that of Alexander and Morrissey (1988). Our results imply that involving physicians in hospital governance may have the greatest influence on physicians' admitting patterns (possibly reflected in higher occupancy rates), rather than on costly practice choices or utilization of expensive technologies or procedures.

In contrast to the governance strategy, physician ownership and financial integration strategies both declined in popularity in the 1980s. In particular, ownership, which peaked in 1982, underwent a major decline over the next three years. This may reflect regulatory pressures for cost containment, which hit California hospitals hard in 1982 and 1983 through selective contracting for Medicaid patients and PPS implementation. Facing new cost constraints, hospital executives may have been substituting governance involvement for other forms of physician integration as a way to cut costs or reestablish administrative control. Perhaps physicians were also more reluctant to invest in hospitals given the regulatory and market uncertainty

facing hospitals in the 1980s, and the overall environmental turbulence of the period. Similarly, physicians may have grown skeptical of integrative arrangements like joint venture or salary in the presence of greater cost pressures and increased regulatory oversight of some joint activities (Burns and Thorpe 1993).

Physician ownership was unexpectedly associated with lower operating margins and occupancy, and not associated with hospital costs. This outcome may explain why ownership declined in popularity. Perhaps California hospitals experimented with and discarded this strategy when it failed to generate consistent financial or efficiency benefits or to overcome many of the agency problems implicit in hospital-physician relations. Alternatively, hospitals that employed this strategy may have been performing more poorly to begin with. We found that small hospitals that had higher rates of physician ownership experienced higher occupancy but lower margins after PPS implementation. Clearly, there is an interactive relationship between size and ownership, and this effect varies across performance outcomes.

Despite a surprising decline in the popularity of the financial integration strategy (as we measured it), this strategy was the only one of the three that was associated with lower hospital costs (primarily after PPS implementation). This finding suggests that some hospitals seeking greater control over their costs may have been migrating from governance or ownership to financial integration, and perhaps sacrificing occupancy for cost control, over the last decade. This is a relevant and encouraging finding for policy advocates of more sophisticated "managed competition" models of hospital-physician integration, such as PHOs and vertically integrated community or health system models (cf. Burns and Thorpe 1993). Such new designs attempt to increase the integration of financial and clinical activities between hospitals and physicians in a more formally organized manner, and may coopt physicians and overcome agency problems through financial rather than governance means. Our results indicate that further rigorous, empirical study of the performance effects of these more ambitious integrated designs is sorely needed.

Substantial differences in the collective effect of integration strategies were also evident. Occupancy was most consistently affected by integration strategies, while the effects of integration on margins and costs were less robust after PPS. These differences highlight important trade-offs between integration options and performance outcomes. Glandon and Morrissey (1986) note that physicians often face conflicting financial and altruistic incentives. Such conflicts may not be entirely or even mostly overcome through initial

attempts at integration, such as placing physicians on hospital boards. The results imply that only by placing physicians at direct financial risk can hospitals compel substantive changes in costly behaviors.

For managers and decision makers in health care organizations, these findings should both enlighten practical efforts to build hospital-physician partnerships and suggest caution as well. Involving physicians in hospital governance seems to have the greatest potential for improved occupancy, while financial integration may be the best strategy for containing hospital costs. However, a strategy of encouraging direct physician ownership in hospitals comes with substantial performance risks attached, and this may be the reason California hospitals are rapidly abandoning the strategy. Moreover, the attractiveness of the strategic options varies depending on hospital characteristics like size or system membership. Larger hospitals that encourage physician ownership apparently enjoy higher margins and lower costs, but may sacrifice occupancy in the process. Physician governance seemingly provides greater benefits among hospitals linked to networks or systems. Managers should consider carefully their operating context and which outcomes they desire most to influence, and they should adjust their strategic choices accordingly.

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NOTES

1. Variations in the number of sample hospitals were due to entry and exit, reporting date and, in a few cases, missing or incomplete data. No systematic pattern of missing or incomplete data was evident.
2. The questions addressed in this article were part of a larger study that drew upon data assembled over a 14-year period using a variety of methods: structured interviews with hospital executives and industry experts; naturalistic observations; responses to mailed surveys; inspection of organizational documents; and extensive analyses of newspaper accounts, census reports, and other secondary data.
3. In 1988 the CHFC was reorganized as the Office of Statewide Health Planning and Development (OSHPD). The data come from mandatory annual hospital financial disclosure reports.

4. About 32 percent of the sample was composed of proprietary, investor-owned hospitals.
5. This scale was designed to measure the level of commonality between hospital and physician fiduciary interests. Given the limitations of the secondary data, we cannot precisely determine the point at which financial investment by physicians begins or physician and hospital financial commitment are equal. The ownership strategy variable was designed to elicit this element of direct financial commitment.
6. About 2–3 percent of sample hospitals had salary arrangements with physicians.
7. The state defines a rural hospital as one that is outside an MSA, has a service area population of less than 15,000, has a staff of fewer than 10 active physicians and 50 or fewer beds, and is the only general acute care hospital in the area (CHFC Report IV-82-16, "Hospital Peer Grouping for Efficiency Comparison").
8. The DRG-based CHFC case-mix index measures the relative resources used to treat inpatient cases in a particular hospital compared to statewide averages. The index is quite similar to the HCFA case-mix index in construction. Statewide charge-based resource weights are computed for each DRG, and each hospital's all-payer DRG mix is then applied to the resource weights. This provides a measure of the expected charge per case, given the hospital's mix of cases. The result is then divided by state averages to derive a specific case-mix index for each hospital. Higher values indicate that a hospital serves a more acute patient population (CHFC Report: "Case Mix Indices for California Hospitals"). Although this index provides a good picture of the all-payer case mix, it is limited by its DRG basis and focus on hospital charges rather than other, potentially better indicators of resource usage and patient acuity.
9. Due to space limitations, descriptive statistics are not presented here; they are available from the authors.
10. The physician ownership variable did not generate a meaningful box-plot; however, a longitudinal means plot indicated a significant downward trend in physician ownership. We also conducted subsample analyses on the three integration variables for only those hospitals present in all ten years of data. No significant deviations from the full-sample results were evident.

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