HOSPITAL PERFORMANCE: AN EMPIRICAL EXAMINATION OF ORGANIZATIONAL PREDICTORS AND MODERATORS

A Dissertation in
Health Policy and Administration
by
Harry D. Holt

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Doctor of Philosophy

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The dissertation of Harry D. Holt was reviewed and approved* by the following:

S. Diane Brannon  
Professor of Health Policy and Administration  
Dissertation Advisor  
Chair of Committee

Jonathan Clark  
Assistant Professor of Health Policy and Administration

Deirdre McCaughey  
Assistant Professor of Health Policy and Administration

James Thomas  
Dean, Smeal College of Business

Dennis Shea  
Professor of Health Policy and Administration  
Head of the Department of Health Policy and Administration

*Signatures are on file in the Graduate School
ABSTRACT

This dissertation is divided into three distinct but interconnected studies on the factors that impact hospital financial performance. The first study reviews and integrates the empirical literature on the influence of organizational factors on hospital financial performance. The second study assesses the impact of hospital physician joint venture activity on hospital performance using a resource dependence and institutional theory framework. The third and final study assesses the impact of hospital readmissions on the financial performance of hospitals.

The purpose of the first study was to examine five categories of organizational characteristics that research has addressed influence hospital financial performance: ownership, governance, integration, management strategy, and quality. Based on this review I was able to identify a general lack of consistency and conclusiveness across studies in each area. Exceptions were found in the areas of governance (e.g., physician participation and board processes) and integration (e.g., horizontal system centralization). The findings indicate that substantial opportunities for future work, including opportunities for qualitative and exploratory work.

The purpose of the second study was to assess the impact of hospital physician joint venture activity on hospital performance using a resource dependence and institutional theory framework. Hospital performance is measured in general acute care facilities from 2004 through 2006 in the state of Pennsylvania using data from the Pennsylvania Health Care Cost Containment Council, the American Hospital Association Annual Survey, and the Area Resource File. I use cross-sectional ordinary least squares regression models to assess the relationship of joint ventures on performance and occupancy. I also focus on the moderating influence of hospital size and teaching status on occupancy and financial performance measurements. Results indicate that hospital physician joint venture activity significantly impacts occupancy and financial performance. Size moderates the positive association between joint ventures and
performance. Specifically, smaller hospitals experience increases in total occupancy and stronger financial performance at a higher rate than larger hospitals.

The goal of the third study was to study assesses the impact of hospital readmissions on the financial performance of hospitals. I use financial and hospital readmission data from the Pennsylvania Health Care Cost Containment Council for years 2003 through 2009. Market and organizational variables are from the American Hospital Association Annual Survey Database. Hospital Case-mix data is from Center for Medicare and Medicaid Services. The study combines exploratory factor analysis and multiple regression with random effects and clustering. I use a risk adjusted composite score of hospital readmissions in the multiple regression model as the independent variable. Results indicate hospital readmissions for complications or infections have a negative impact on financial performance.

The findings of these studies taken together address a gap in the hospital performance literature. First, this research synthesizes the empirical scholarship examining the relationship between organizational factors on hospital financial performance. It provides suggestions regarding the substantial opportunities for future work, including opportunities for qualitative and exploratory work. Second, provides new insights into the moderating influence of hospital size on the positive association between hospital physician joint ventures and performance. Third, it is the first known study to assess the relationship between hospital financial performance and readmissions due to complications and infections. It provides insights for managers in simultaneously improving quality and reducing unplanned readmissions within a framework of future reimbursement changes that reward performance.
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Chapter 1

Introduction

Generating sustainable financial returns in a constantly changing and turbulent competitive environment is one of the key challenges facing hospital managers. Financial performance has crucial implications for the long-term viability of hospitals. According to the American College of Healthcare Executives (ACHE), financial considerations are the top concern of hospital executives (ACHE, 2011). This dissertation describes predictors of hospital financial performance, and assesses how performance is impacted by joint ventures with physicians and hospital readmissions due to complications or infection.

Organization of Dissertation

This dissertation follows the format of three manuscripts that have been written for an audience of a peer-reviewed journal. The three articles are found in Chapter 2, 3, and 4. A general conclusion that unifies the manuscripts together is found in Chapter 5. Each article is followed by its respective reference section.

Overview of the Three Articles

Study one, Organizing for performance: What does the empirical literature reveal about the influence of organizational and managerial factors on hospital financial performance?, reviews what the empirical literature on hospital financial performance reveals about how
hospital executives can organize and manage their way to more sustainable financial positions. The findings illustrate that, despite the limited agreement across studies regarding the financial impact of organizational factors among hospitals, it did show relatively more consistent results in at least three areas: (1) physician participation in governance, (2) governance processes, and (3) centralization of hospital systems and networks.

Study two, *Physician joint ventures and performance: The contingency impact of organizational characteristics*, assesses the impact of hospital physician joint venture activity on hospital performance. The study focuses on the moderating influence of hospital size and teaching status on occupancy and financial performance measurements. The insights gained from the second study may provide empirical support for managers to initiate joint venture activities with physicians by showing their positive impacts on hospital occupancy and financial performance, especially for smaller hospitals.

Study three, *The Readmission Difference: Pennsylvania Hospitals and the Negative Impact of Hospital Readmissions on Financial Performance*, assesses the impact of readmissions due to infections and complications on financial performance. The results from the study indicate that managers should attempt to implement initiatives along the care continuum that lower unplanned readmission rates and increase overall care quality. The problem of unplanned readmissions may be a bed utilization issue for hospitals and the results indicate that there may be an empirically based business case for improving readmissions due to complications and infections.

These three studies jointly provide an overall assessment of the predictors of hospital financial performance, and two empirical assessments of hospital financial performance with one focusing on physician joint ventures and the other on hospital readmissions. While all the studies focus on financial performance, they differ in approach in several ways. Study two focuses on formal linkages in the form of joint ventures and their impact on performance. Study three
assesses the relationship between financial performance and outcomes of care in the form of readmissions. Together the two studies provide empirically based assessments of key predictors of hospital performance.

Collectively the three studies aim to address the following issues as it pertains to hospital performance:

1. Address key questions by reviewing empirical literature regarding how hospital executives can organize and manage their way to more sustainable financial positions
2. Determine the impact of hospital physician joint ventures on performance and whether this relationship is moderated by organizational sources of legitimacy.
3. To understand the relationship between hospital financial performance and readmissions for complications or infections.
Chapter 2

Organizing for performance: What does the empirical literature reveal about the influence of organizational factors on hospital financial performance?

Abstract

This paper reviews and integrates the empirical literature on the influence of organizational factors on hospital financial performance. Five categories of organizational characteristics that research has addressed are identified and examined as part of the review: ownership, governance, integration, management strategy, and quality. With some exceptions, the review reveals a general lack of consistency and conclusiveness across studies in each area. Exceptions were found in the areas of governance (e.g., physician participation and board processes) and integration (e.g., horizontal system centralization). Despite the lack of conclusive findings across studies, the review suggests substantial opportunities for future work, including opportunities for qualitative and exploratory work. Additional implications for theory and management are discussed.
Generating sustainable financial returns in a constantly changing and turbulent competitive environment is one of the key challenges facing hospital managers. Despite the “not-for-profit” status of the majority of U.S. hospitals, generating sufficient profit is a key part of producing a sustainable financial position. Cash-flow performance has crucial implications for the extent to which hospitals are able to fund continuing operations, maintain existing levels of capital (e.g., replace old property, plant and equipment) and respond to evolving market demands. Not surprisingly, surveys conducted by the American College of Healthcare Executives (ACHE) consistently suggest that these financial considerations are the top concern of hospital executives (ACHE, 2011). Accordingly, a key question concerns how these executives can organize and manage their way to more sustainable financial positions. In this paper, I review what the empirical literature on hospital financial performance reveals about this question.

Over the past several decades, hospitals have faced remarkable changes in their financial and institutional environments. Within this context, the viability of hospitals operating in competitive markets -- particularly those with high shares of patients who are uninsured -- can be fragile (American Hospital Association, 2007). From 1980 through 2002, 903 short-term acute care hospitals in the United States (206 urban and 697 rural) closed (American Hospital Association, 2004). External challenges to hospital sustainability have arisen from three primary segments of the health care industry: government reimbursement and regulation, business or employer demand, and competition (Bazzoli & Andes, 1995).

With respect to government reimbursement and regulation, a majority of hospitals lose money treating Medicare and Medicaid patients. According to MedPAC estimates, hospitals’ overall Medicare margins – including costs of inpatient, outpatient and post-acute care services – reached a 10-year low in 2007 at negative 5.4 percent (Medicare Payment Advisory Commission, 2006). In the future, health reform legislation promises to penalize hospitals for unnecessary readmissions within 30 days of discharge after stays for heart attack, pneumonia, and
congestive heart failure (Carrns, 2010). More conditions will be added to the list and hospitals will face increasing penalties after the first year of enforcement (Carrns, 2010).

With respect to business and employer demand, businesses have increased their involvement in paying for and demanding quality from hospitals, even in the face of decreased reimbursement from third-party payers. Moreover, many employers have supported the rise of managed care with its lower reimbursement rates for hospitals (Tennyson & Fottler, 2000). In the face of these trends, the costs of delivering care have increased an average of five percent annually over the last ten years, all while hospitals continue to experience an increase in the burden of uncompensated care (Bazzoli, et al., 2000).

Finally, with respect to competition, the approximately 4,800 general hospitals in the United States face competition from a variety of sources (United States Government Accountability Office, 2006). For example, many hospitals face growing competition from physician-owned specialty hospitals, physician offices, ambulatory surgical centers, and rehabilitation centers. Specialty hospitals may be of particular concern given their typical focus on relatively more profitable service lines (Guterman, 2006). One estimate suggests that the number of specialty hospitals grew rapidly between 2002 through 2004, from 96 to 144 hospitals (American Hospital Association, 2008).

Despite these environmental trends that threaten to constrain hospitals financially, industry scholars argue that there are organizational and managerial levers available to hospital leaders that may permit them to improve and sustain their financial performance in the face of these volatile and challenging environmental influences (Bazzoli, et al., 2000; Wang, Wan, Clement, & Begun, 2001). Nevertheless, the extant literature on these factors remains somewhat fragmented. In this paper I aim to review and integrate this literature, focusing on the dynamic organizational and managerial factors that research suggests may have financial performance implications.
While there are many factors and initiatives that hospital managers deal with, I focus the review on the empirical literature in an attempt to better understand those organizational areas where research has observed a link with hospital financial performance. Moreover, I recognize that hospital finance is a complex multispective beast, consisting of multiple elements that may be observed and measured. Nevertheless, in focusing on overall financial performance I note that most of these issues (e.g., pricing, reimbursement, capital costs, age of plant, etc.) feed one or both of the elements of the basic profit formula: revenues and costs (Shukla, et al., 1997). Accordingly, the review centers on profit and cash flow as key measures of overall hospital financial performance. In the end, surviving and thriving in an increasingly competitive environment depends on a hospital’s ability to sustain its activities by producing sufficient value for its stakeholders.

Methods

The scope of this review is limited to scholarship published after 1984 and which focuses on United States hospitals and health systems. A literature search was conducted through ProQuest Direct, Google Scholar, PubMed, Ingenta, Science Direct, MedLine, EBSCOhost, Wiley Online Library, and LexisNexis databases for the years 1984 through 2010. These databases were selected as they provide the most comprehensive repository of peer-reviewed scholarship and they are commonly used search tools for finding academic literature. The year 1984 was chosen to capture studies that were published after the implementation of Diagnostic Related Groups (DRGs) as a method of reimbursement for hospitals. Examples of key terms used throughout this iterative process include: hospital financial performance; profitability; cash flow; strategic alliance; quality; governance; hospital competition; vertical integration; horizontal integration; management strategy; product mix; pricing strategy; cost leadership; and health
system membership.

I utilized a matrix method in conducting the literature search to provide more confidence in the methodology (Goldman & Schmalz, 2004). Specifically, the matrix method was used to compare empirical studies across multiple variables such as theoretical background, dependent and independent variables, key findings, and new contributions to the field (Goldman & Schmalz, 2004).

Both forward and backward references of empirical studies were also used to obtain cited works. The empirical studies included in this review (a) are peer reviewed, (b) employ direct measures of hospital profitability or cash flow (e.g., total margin, operating margin, return on assets) as dependent variables, and (c) are quantitative. With respect to this latter characteristic, I explicitly exclude studies that solely conduct qualitative, descriptive studies of the factors influencing hospital financial performance (Bazzoli and Andes, 1995; Cleverly, 1992; McCue and Lynch, 1987). This choice is not intended to devalue the important contributions of qualitative, exploratory, or descriptive research. To the contrary, I believe more of it is needed (see the discussion on the implications of the review for theory). Rather, I choose to focus on quantitative work as a means of limiting the scope of this review to studies that are more likely to reflect a more mature state of conceptual development (Edmondson and McManus, 2007).

**Results**

The review identified five categories of organizational and managerial forces that research has addressed: ownership, governance, management strategy, integration, and quality. These categories were iteratively identified and defined based on the initial review and subsequent analyses of the literature. They are not intended as an exhaustive list of the factors
that may influence financial performance, only as a scheme for capturing the elements that research has addressed empirically.

As a foundation, I begin the review of each of these categories by summarizing the relevant theory underlying the work presented. While only a limited set of the empirical studies I reviewed were motivated by specific theoretical frameworks, the review suggests that among those that are, five emerge most frequently: agency theory, contingency theory, institutional theory, resource dependence theory and strategic management theory. Table 2-1 provides a summary outline of these theories.
Table 2-1: Theories, definitions, and applied studies of hospital financial performance

<table>
<thead>
<tr>
<th>Theoretical Framework</th>
<th>Summary</th>
<th>Applied Studies in Hospital Financial Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agency Theory</td>
<td>Conflicts arise when goals and priorities differ between a principal and an agent. These problems arise primarily because the agent’s actions are difficult to monitor and verify.</td>
<td>Molinari, et al., 1993 Molinari, et al., 1995 Molinari, et al., 1997</td>
</tr>
<tr>
<td>Contingency Theory</td>
<td>There is no single effective management strategy. The optimal management approach depends on the nature of the organization’s tasks and environment.</td>
<td>Mick, et al., 1993 Wang, et al., 2001 Young, et al., 1992</td>
</tr>
<tr>
<td>Institutional Theory</td>
<td>Focuses on institutions or social structures that evolve through cognitive, normative, and regulative processes to influence interactions with each other over the long-term (Scott, 2001). Organizations have incentives to achieve legitimacy through the process of institutionalization. Organizations strive for institutional legitimacy and political power to achieve social and economic fitness.</td>
<td>Tennyson &amp; Fottler, 2000 Bazzoli, et al., 2000</td>
</tr>
<tr>
<td>Resource Dependence Theory</td>
<td>Key to organizational performance is the ability to attract and acquire external resources. Resource dependence suggests that organizations act to ensure access to these resources, while also seeking to increase their autonomy and minimize environmental uncertainty.</td>
<td>Alexander and Morrisey, 1989 Bazzoli, et al., 2000 McCue &amp; Diana, 2007 McCue &amp; Lynch, 1987 McCue &amp; Lynch, 1987 Mick, et al., 1993</td>
</tr>
<tr>
<td>Strategic Management Theory</td>
<td>Managers identify their competitive objectives, choose policies and plans to achieve their goals, and then allocate resources to achieve those targets. Competitive advantage is determined by the activities of the firm and how they relate to those of competitors. Product differentiation, pricing, and low cost leadership are generic strategies that may improve the competitive advantage of firms and improve performance.</td>
<td>Friedman &amp; Shortell, 1988 Mick &amp; Wise, 1996 Molinari, et al., 1993 Molinari, et al., 1995 Molinari, et al., 1997 Trinh &amp; O’Connor, 2000</td>
</tr>
</tbody>
</table>

Ownership

The potential for ownership to influence financial performance may be best conceptualized by agency theory and public choice theory. Public choice theory emphasizes that the priorities of politicians may conflict with hospital efficiency and performance and predicts that a change in ownership from public to private is predicted to reprioritize in favor of efficiency.
and strengthening performance (Cuervo & Villalonga, 2000). Therefore, public choice theory predicts that private for-profit and non-profit hospitals will be stronger performers than publically owned hospitals. Agency theory argues that managers as agents maximize their own priorities and that mechanisms (shared ownership) are needed to align the interests of managers and owners. Since only for-profit organizations have such mechanisms at their disposal (i.e. stock options), agency theory predicts that for-profit hospitals are likely to outperform both non-profit and government-owned hospitals (Cuervo & Villalonga, 2000).

In the empirical studies I reviewed, hospital ownership is generally classified in one of three buckets: government owned, non-profit, and for-profit (or investor owned). The financial implications of these classifications have been examined in two ways: (1) cross sectional comparisons of current ownership status, and (2) longitudinal examinations of ownership conversions. Table 2-2 summarizes the results of empirical studies on hospital ownership and financial performance.

Table 2-2: Summary of Studies Assessing Impact of Ownership on Hospital Financial Performance

<table>
<thead>
<tr>
<th>Area of Focus</th>
<th>Empirical Study</th>
<th>Primary Independent Variable(s)</th>
<th>Primary Dependent Variable(s)</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ownership Status</td>
<td>Gapenski, et al., 1993</td>
<td>For-profit, non-profit</td>
<td>Operating margin and return on assets</td>
<td>Found limited support for for-profit hospitals being more profitable than not-for-profit hospitals.</td>
</tr>
<tr>
<td></td>
<td>McCue, 1995</td>
<td>For-profit, non-profit, government.</td>
<td>Net operating cash flow</td>
<td>Non-profit hospitals have stronger financial performance. Stronger hospitals were able to generate cash flows through controlling operating costs, lowering the length of stay, generating cash from receivables, and raising occupancy rates through marketing.</td>
</tr>
<tr>
<td></td>
<td>Renn, et al., 1985</td>
<td>For-profit, non-profit</td>
<td>Revenues and expenses, markups and profitability, activity and productivity</td>
<td>Found for-profit chain hospitals had significantly higher prices, but also had healthier financial performance than free-standing investor-owned hospitals and non-profit hospitals.</td>
</tr>
<tr>
<td>Area of Focus</td>
<td>Empirical Study</td>
<td>Primary Independent Variable(s)</td>
<td>Primary Dependent Variable(s)</td>
<td>Findings</td>
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<tr>
<td>--------------</td>
<td>-----------------</td>
<td>----------------------------------</td>
<td>--------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td></td>
<td>Shukla, et al., 1997</td>
<td>For-profit, not-for-profit</td>
<td>Operating margin, return on assets</td>
<td>For-profit hospitals have superior financial performance due to their ability to generate inpatient revenue from commercial insurers and private payers. For-profit hospitals also appear to have advantages in generating profits in markets where managed care penetration is low.</td>
</tr>
<tr>
<td></td>
<td>Trinh &amp; O’Connor, 2000</td>
<td>For-profit, non-profit</td>
<td>Operating margin and Return on assets</td>
<td>For-profit facilities have stronger financial performance than non-profits among rural hospitals. This may be due to for-profit rural hospitals being more aggressive in their approach to maximize financial performance.</td>
</tr>
<tr>
<td>Ownership Conversions</td>
<td>Shen, 2003</td>
<td>Ownership change</td>
<td>Total margin</td>
<td>Conversions from non-profit status to government and for-profit ownership status improved financial performance. Conversions to government status resulted in more revenue and conversions to for-profit status resulted in a reduction in operating costs and increases in revenue.</td>
</tr>
<tr>
<td></td>
<td>Thorpe, et al., 2000</td>
<td>Ownership conversions</td>
<td>Total margin</td>
<td>Found hospitals that converted from non-profit to for-profit status experienced stronger financial performance as measured by total margin. Hospitals that converted to for-profit status from non-profit status also reduced the amount of uncompensated care delivered to patients by approximately 13 percent.</td>
</tr>
</tbody>
</table>

Consistent with both agency and public choice theories, in general studies of ownership status and conversion suggest that, on average, for-profit hospitals produce higher financial returns relative to non-profit and government owned hospitals (Renn, et al., 1985; Shukla, et al., 1997; Trinh and O’Connor, 2000; Thorpe, et al., 200; Shen, 2003). A couple of exceptions generate ambiguity. For example, one study suggests that smaller, independent, non-profit
community-oriented hospitals outperform others, and conjectures that this effect may be due to protection from managed care penetration, merger activity, and decreasing government reimbursement (McCue 1995; McCue, 1997). Another study demonstrates that non-profit conversions to government ownership result in improved financial performance (Shen, 2003). This study’s results run counter to theoretical expectations based on agency and public choice theories (Cuervo & Villalonga, 2000). Despite the consistency of findings in favor of for-profit hospitals, these exceptions raise important questions about the circumstances and conditions that drive the influence of ownership on financial performance in the hospital industry. For example, under what conditions do hospitals choose to convert to government (or other) ownership configurations? Moreover, how might size and strategic orientation (and other factors) interact with ownership to determine financial performance?

The corporate literature on ownership suggests that organizational mission represents a potential mediator, particularly when it comes to comparing public versus private ownership configurations (Bozec, et al., 2002). Thus, existing theories and empirical studies may not capture many critical salient yet subjective drivers of performance in hospitals. For example, organizational mission may be a key driver of the priorities adopted and service lines delivered in hospitals. The commitment of hospital leadership to their mission may guide them to provide patient services that do not enhance financial performance, but which necessarily fulfill a strong commitment to the health and well-being of their patient population.

Further, organizational missions are certainly not homogenous within categories of hospital ownership. For example, some non-profit hospitals may behave more like for-profits while others may serve a mission that is more closely aligned with those of government owned hospitals. Moreover, some public hospitals are directly controlled by a government body; while others are led by a governing board with delegated authority. These distinctions may have important implications for the relationship between ownership and financial performance and
represent fruitful opportunities for future research.

**Governance**

Agency theory, strategic management theory, and resource dependence theory each have implications for assessing the relationship between hospital governance and financial performance. Agency theory holds that boards comprised of independent (of the CEO or other insiders) outsiders may serve as better monitors of CEO behavior, protect the interests of stakeholders and perform better (Molinari, *et al.*, 1995). Strategic management theory emphasizes board decision-making and the importance of information in the process, and predicts that smaller boards that include the CEO’s operational and industry expertise have stronger performance. (Molinari, *et al.*, 1997). Finally, resource dependence theory places emphasis on the ability of boards to attract and acquire external resources and predicts that hospitals with large boards and networks that are able to access key resources will perform stronger (Kane, Clark, & Rivenson, 2009).

Studies of the financial performance implications of hospital governance can be described as being of two types: (1) those that examine hospital board composition and (2) those that examine hospital board processes. Table 2-3 provides a summary of the studies assessing the impact of governance on performance.
<table>
<thead>
<tr>
<th>Area of Focus</th>
<th>Empirical Study</th>
<th>Primary Independent Variable(s)</th>
<th>Primary Dependent Variable(s)</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Board Composition</td>
<td>Young, et al., 1992</td>
<td>Board composition &amp; Organizational strategy: Prospector, analyzer, defender, reactor</td>
<td>Return on assets</td>
<td>Find that a fit between board composition (e.g., size, medical staff participation, and skill-mix) and the organization’s generic strategy (Prospector, Defender, Analyzer, Reactor) improves hospital financial performance.</td>
</tr>
<tr>
<td>Goes &amp; Zan, 1995</td>
<td>Hospital-physician</td>
<td>Integration strategies: 1. Physicians on board 2. Physician ownership 3. Financial arrangements between hospital and physicians.</td>
<td>Operating margin</td>
<td>Physician participation on the hospital board was associated with stronger financial performance. The following benefits of physician participation were identified: improve the value of strategic planning by bringing the clinical perspective to key decisions; alignment of incentives and culture for management and the hospital; cooperative decision-making; promotion of a fiduciary responsibility to promote the financial health of the organization.</td>
</tr>
<tr>
<td>Molinari, et al.,</td>
<td>CEO and medical staff</td>
<td>Operating margin and return on assets</td>
<td></td>
<td>Participation on the hospital board by physicians was associated with stronger performance. Medical staff involvement, inside or outside, on the board can enhance operational performance as they provide insights into patient care and service delivery. Physician and CEO participation on the hospital board is associated with stronger financial performance.</td>
</tr>
<tr>
<td>1993</td>
<td>participation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molinari, et al.,</td>
<td>Physician board</td>
<td>Operating margin and return on assets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>participation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molinari, et al.,</td>
<td>CEO board participation,</td>
<td>Operating margin and return on assets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td>presence of CEO employment contract, presence of CEO performance evaluation.</td>
<td></td>
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<tr>
<td>Alexander &amp; Lee,</td>
<td>Governance configuration – a measure of the degree to which a not-for-profit hospital’s governing board</td>
<td>Cash flow (net assets to total assets)</td>
<td></td>
<td>Governing boards that conformed more closely to the corporate model (small size, narrow membership, and use of term limits) were not associated with improved financial performance as</td>
</tr>
<tr>
<td>2006</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Area of Focus</td>
<td>Empirical Study</td>
<td>Primary Independent Variable(s)</td>
<td>Primary Dependent Variable(s)</td>
<td>Findings</td>
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</tr>
<tr>
<td></td>
<td>conformed to the corporate model of governance</td>
<td>measured by cash flow.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Board Processes</td>
<td>Molinari, et al., 1992</td>
<td>Presence of internal and external board education programs</td>
<td>Operating margin, return on assets</td>
<td>Board participation in educational programs was significantly associated with improved financial performance. Investment in the education of directors so that they are better informed and engage in better decision-making is rewarded by stronger financial health.</td>
</tr>
<tr>
<td>Kane, et al., 2009</td>
<td>Board processes and behavioral dynamics</td>
<td>Operating margin</td>
<td>Boards of hospitals that exhibited behavioral dynamics and internal processes such as timely sharing of timely and relevant information, board education, committed board chairs, high degree of interaction with the CEO, and high levels of transparency in decision-making were associated with strong financial performance.</td>
<td></td>
</tr>
</tbody>
</table>
Board Composition

Studies of hospital governance most commonly examine board composition. By composition I refer to the structural characteristics of the board. For example, board size or membership. Studies of board composition consistently suggest that involving physicians in hospital governance improves financial performance (Goes & Zan, 1995; Molinari, et al., 1995). They conjecture that physicians can improve the value of strategic planning by generating tighter coupling of interests and producing more cooperative decision-making (Goes & Zan, 1995). From the resource dependence perspective, outside physician participation on the board, in particular, may improve patient referrals (Molinari, et al., 1995). The effectiveness of physician participation on hospital boards may become increasingly important as hospitals respond to competition from physician-owned specialty hospitals, ambulatory surgical centers, and diagnostic centers (Guterman, 2006).

In addition to physicians, studies of composition also suggest that the presence of the hospital chief executive on the board leads to stronger financial performance (Molinari, et al., 1997). Coupled with the physician findings, this insight suggests that linkages between the board, physicians and managers may be important indicators of hospital success. Nevertheless, despite these findings with respect to physicians and managers, some studies suggest that the overall configuration of hospital boards has little effect on overall financial performance (Alexander and Lee, 2006; Kane, et al., 2009), though it may impact intermediate factors, such as admissions and market share (Alexander and Lee, 2006). For example, Alexander and Lee (2006) suggest that boards characterized by a corporate model—small size, many inside directors, management participation—do not produce better financial returns than boards characterized by a philanthropic model—large size, many outside directors, little or no management participation.
Nevertheless, Young, et al. (1992) find that a strategic fit between board composition and the organization’s generic strategy improves hospital financial performance.

**Board Processes**

In response to the mixed theoretical predictions described above and the mixed empirical findings with respect to composition, some studies have gone beyond composition and structure to examine the impact that board processes have on performance. In examining processes, the emphasis is placed on what boards actually do and how they do it, including group behavioral dynamics. The limited numbers of studies in this area suggest that board processes are important. Statistical findings suggest that the level and type of board education (Molinari, *et al.*, 1992), the level of engagement and effort expended by board chairs and the transparency, inclusiveness and psychological safety in decision-making process (Kane, *et al.*, 2009) all demonstrate strong relationships with hospital financial performance.

Despite these findings, scholars have only scratched the surface with respect to board processes. For example, Kane, *et al.*, (2009) also present a set of propositions grounded in qualitative research that point to the nature of information and knowledge exchange within the governance process and the dynamics of the relationship between board chairs and the hospital CEO as additional, potentially important factors related board effectiveness and hospital performance. Many of these elements overlap and interact in ways that prior research has not captured. Viewed from a structure-process-outcome framework, these process findings generate questions for future work about the relationship between board structure and process. They also leave open questions, and future opportunities for research, on the interaction of governance with other characteristics of the organization and the environment in which hospitals operate. For example, Alexander and Lee (2006), propose that the performance effects of board composition
may be contingent on ownership and system membership. Moreover, the findings of Young, *et al.* (1992) provide some evidence that the impact of governance depends on the degree of fit between the board and the strategy of the organization. Future research should continue to address these important interactions and their implications for hospital performance.

**Integration and Hospital Performance**

Studies of hospital integration examine two types of organizational configurations: vertical integration, which centers on the extent of contractual relationships between hospitals, physicians (and other providers) and health plans; and horizontal integration, which centers on the extent to which hospitals merge or align to form systems or networks. I further find that studies in this latter area fall into two categories: (1) the financial benefits of system membership (versus freestanding), and (2) across systems, the benefits of centralization. Table 2-4 presents a summary of studies on hospital integration.
Table 2-4: Summary of Studies Assessing the Impact of Integration and Hospital Financial Performance

<table>
<thead>
<tr>
<th>Area of Focus</th>
<th>Empirical Study</th>
<th>Primary Independent Variable(s)</th>
<th>Primary Dependent Variable(s)</th>
<th>Findings</th>
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<tbody>
<tr>
<td>System Membership</td>
<td>Clement, et al., 1997</td>
<td>Strategic hospital alliance membership</td>
<td>Operating cash flow per bed</td>
<td>Found no difference in the financial performance of hospitals that joined strategic hospital alliances and those that did not.</td>
</tr>
<tr>
<td></td>
<td>Gapenski, et al., 1993</td>
<td>System affiliation</td>
<td>Pre-tax and after-tax operating margin and return on assets</td>
<td>Did not find that system membership improved hospital profitability. Profitability measurements were used to assess the impact of system membership on performance, but system membership was not found to have an impact.</td>
</tr>
<tr>
<td></td>
<td>Tennyson &amp; Fottler, 2000</td>
<td>System affiliation, national-system affiliation</td>
<td>Operating margin, total margin, return on assets</td>
<td>Found that system membership, in general, did not enhance financial performance in Florida hospitals. But membership in a national system, versus a local one, was consistently and positively related to superior performance.</td>
</tr>
<tr>
<td></td>
<td>McCue, et al., 1999</td>
<td>Strategic hospital alliance</td>
<td>Net operating cash flows</td>
<td>Larger alliances are associated with stronger financial performance. Strategic hospital alliance is two or more hospitals that have come together in the local market to compete for managed care contracts cooperate in other strategic areas.</td>
</tr>
<tr>
<td></td>
<td>Chan, et al., 1999</td>
<td>System size and group economic factors</td>
<td>Operating margin</td>
<td>Study found that the optimal size for financial performance for hospital consortia is approximately 45 members. They found that the benefits of collective action peak with 45 members and then as issues of complexity increase with size, financial performance drops off.</td>
</tr>
<tr>
<td>Area of Focus</td>
<td>Empirical Study</td>
<td>Primary Independent Variable(s)</td>
<td>Primary Dependent Variable(s)</td>
<td>Findings</td>
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<tr>
<td>Centralization of Systems and Networks</td>
<td>Bazzoli, et. al., 2000</td>
<td>The centralization of health network and health system hospitals at four levels 1. Centralized, 2. Moderately Centralized, 3. Decentralized, and 4. Independent network hospitals</td>
<td>Total margin; return on assets</td>
<td>Hospitals in health systems that had unified ownership had better financial performance than hospitals in contractually-based health networks. Hospitals that were members of centralized health networks performed better than hospitals in other types of networks.</td>
</tr>
<tr>
<td></td>
<td>Ginn and Lee, 2006</td>
<td>System centralization</td>
<td>Return on assets</td>
<td>Higher levels of system centralization are significant and positively related with stronger hospital financial performance. Centralized systems enable member hospitals to respond better to uncertainties and challenges when they have available resources and organizational structures.</td>
</tr>
<tr>
<td>Vertical Integration</td>
<td>Wang, et al., 2001</td>
<td>Number of backward and forward integration strategies</td>
<td>Return on assets, operating margin, net cash flow</td>
<td>Hospitals that engaged in more backward integration performed better than hospitals that were relatively more forward integrated. Productivity increases for a hospital when it can provide integrated services such as skilled nursing, intermediate nursing, and rehabilitation services.</td>
</tr>
<tr>
<td></td>
<td>Goes and Zan, 1995</td>
<td>Hospital-physician integration strategies</td>
<td>Operating margin</td>
<td>Financial integration between hospitals and physicians lead to positive performance in hospitals. Greater integration of physicians and hospitals may lead to alignment of interests and physician loyalty and trust in the organization.</td>
</tr>
<tr>
<td></td>
<td>Mark, et al., 1998</td>
<td>Hospital-physician integration strategies</td>
<td>Total margin</td>
<td>Strategies to facilitate hospital / physician integration have a positive impact on hospital performance. Physician participation in hospital decision-making and management, financial incentives, and joint ventures</td>
</tr>
<tr>
<td>Area of Focus</td>
<td>Empirical Study</td>
<td>Primary Independent Variable(s)</td>
<td>Primary Dependent Variable(s)</td>
<td>Findings</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>are positively associated with performance.</td>
</tr>
<tr>
<td></td>
<td>Douglas &amp; Ryman, 2003</td>
<td>Joint-offering of services with physicians</td>
<td>Cash flow margin</td>
<td>Physician-hospital linkages, jointly offered physician services that experts believe play an important role in integration, were weakly associated with better financial performance.</td>
</tr>
</tbody>
</table>

**Horizontal Integration**

Resource dependence theory and strategic management theory (drawn from economic theory) suggests that the benefits of horizontal integration (i.e. system membership) derive from three sources: (1) the ability to gain access to (and internal control over) key resources, (2) economies of scale (cost efficiency benefits), and (3) market position (revenue based benefits). Such benefits are, in theory, expected to reduce costs through administrative efficiencies and bargaining power with suppliers and increase revenues by improving access to key resources, such as capital, and enhancing the bargaining power of hospitals with third party payers and other buyers. Thus, within local markets, horizontally integrated hospitals, in theory, should outperform their free-standing competitors, ceteris paribus.

Despite these theoretical predictions, several studies have reported that hospital membership in a network or system is not associated with stronger financial performance (Clement, *et al.*, 1997; Gapenski, *et al.*, 1993). Nevertheless, other studies find the opposite, reporting that system membership enhances financial performance. Tennyson and Fottler (2000) suggest that while local system membership is not associated with financial advantages, national membership is. In contrast, McCue, *et al.*, (1999) finds that alliances between local hospitals
enhance performance, and suggest that these advantages may derive from enhanced bargaining power with payers. Chan, et al., (1999) suggests a non-linear relationship between system size and performance, demonstrating that the advantages of system membership peak at 45 hospitals.

Collectively, these findings suggest that horizontal integration may not be enough alone, and that factors such as system size (Chan, et al., 1999) and geographic scope (Tennyson & Fottler, 2000) may be part of the equation. Nevertheless, explanations for findings with respect to local systems (McCue, et al., 1999) suggest that the impetus for system formation may play an important role. This highlights the possibility that part of the ambiguity in these collective findings may be explained by the wide and varied reasons why hospitals join systems or form alliances. These may include efforts to enjoy economies of scale, improve bargaining power with payers, increase access to capital, enhance recruitment and retention of physicians, or attract more research funding (Tennyson & Fottler, 2000). Moreover, many of these factors and their benefits may be offset by high transaction costs or a culture clash between member organizations (Tennyson & Fottler, 2000).

Consistent with the idea that health care systems are not created equal, some scholars have examined how alternative system configurations influence the financial performance of system hospitals (Bazzoli, et al., 2000; Ginn and Lee, 2006). These scholars draw on institutional theory (DiMaggio & Powell, 1983) to explain how some hospitals may join systems seeking organizational legitimacy, as opposed to access cost efficiencies or revenue enhancements. The extent to which this varies across hospitals suggests a taxonomy of system centralization from relatively independent systems (i.e. little sharing across hospitals) to centralized systems (central control of system resources). Bazzoli, et al., (2000), found that hospitals that were members of centralized systems with unified ownership provided the strongest evidence for the benefits of horizontal integration, demonstrating stronger performance than hospital systems in which hospitals operate more independently. It is important to note, however, that these findings were
strongest for “moderately centralized” systems, suggesting the need to balance the costs and benefits of centralization. Moreover, among network hospitals, those that were members of more centralized networks had stronger performance than those that were less centralized (Bazzoli, *et al*., 2000). These findings with respect to system centralization have been confirmed by others who suggest that centralization may create slack resources that hospitals use to respond to market turbulence and competition (Ginn & Lee, 2006).

Despite these consistent and encouraging findings with respect to alternative system configurations, the overall ambiguity related to systems suggests the need for a more careful examination of the conditions and circumstances under which horizontal integration is beneficial. For example, scholars have recognized that the benefits of horizontal integration may depend on contextual factors, both internal and external (Bazzoli, *et al*., 2004). Moreover, system membership may interact with other strategies and organizational characteristics in complex ways that influence financial performance. Managers constantly choose among various contingencies which may moderate or modify the impact of hospital integration. Contingency theory argues that managers form organizational structures and select appropriate strategies based on contingency factors (Wang, *et al*., 2001). Such strategic decisions are made in uncertain and instable markets in which competitors are vying for the same patients, physicians, and profits. Thus, research is needed that looks beyond simple main effects and captures the dynamic complexities associated with these interactions as they play out in practice. Moreover, a more detailed understanding of these complexities and the conditions driving the benefits of integration will produce fruitful guidance for hospital leaders.

**Vertical Integration**

Resource dependence theory suggests that vertical integration will improve performance
to the extent that such consolidation enables hospitals to secure internal control of key resources and minimize their dependence on the external environment (Pfeffer & Nowack, 1976; Pfeffer & Salancik, 2003). Since hospitals depend on physicians and other outpatient providers for labor and referrals resource dependence theory may predict that hospitals engaged in vertical or horizontal integration perform stronger than hospitals without such internal control of these key resources. Moreover, strategic management theory suggests that one of the keys to competitive advantage is the internal alignment of activities with the objectives of the organization (Porter, 1996a). Accordingly, some argue that vertical integration with physicians is an effective mechanism for aligning the interests of hospitals and physicians, leading to better performance (Goes & Zahn, 1995; Alexander & Morissey, 1988).

Only a few studies specifically address the financial implications of vertical integration (Goes and Zhan, 1995; Mark, et al., 1998; Wang et al., 2001). Moreover, findings are not conclusive. On the one hand, one study suggests that backward integration with physicians and other outpatient providers is beneficial (Wang et al., 2001). On the other hand, another suggests that joint ownership or financial integration—such as joint ventures—with physicians is associated with lower hospital margins (Goes and Zhan, 1995). Douglas and Ryman (2003), in contrast, present evidence that jointly offering physician services that are considered by experts to be crucial for integration improves financial performance.

In contrast to these studies, which examine the contractual relationships between physicians and hospitals, Mark, et al., (1998) examine the specific methods hospitals use to integrate physicians into the organizations. Examples of these include involvement in capital budgeting, and making physician department heads accountable for profit and loss statements. The study finds only limited support for some of these strategies, including department head accountability for profit and loss and physician participation on the hospital board (Mark, et al., 1998). This latter finding is consistent with the findings presented with respect to hospital
governance, and are similarly supported by Goes and Zhan (1995).

Despite these findings, the preponderance of evidence is not encouraging. There is little doubt that hospital-physician relations are a key organizational factor to consider. Greater integration between hospitals and physicians may lead to alignment of interests between the two groups, increasing trust and loyalty and decreasing conflict and tension. Symbiotic relationships may lead physicians to enter into joint-ventures with hospitals, refer more patients, perform revenue-generating procedures in the hospital, and increase the hospital’s market share. Physicians represent not only a key source of labor and knowledge for hospitals, but they’re also a key source of patients and represent potential competitors. With respect to this latter issue, hospitals that cooperate with physicians to develop service lines and expand revenue may perform better than other hospitals that compete aggressively with physicians in specialty services such as heart, cancer, and orthopedic/spine centers (Berenson, et al., 2007). Thus, it is not surprising that a few studies find that hospitals that integrate vertically with physician groups are stronger financial performers (Wang, et al., 2001).

Nevertheless, the inconsistencies in findings across studies leave open important questions related to vertical integration; many of them similar to those related to horizontal integration (e.g., contextual conditions and circumstances, and interactions with other organizational activities and characteristics). Moreover, the relationship between horizontal and vertical integration and their collective influence on financial performance is an open field. For example, are vertical and horizontal integration complementary strategies? Does engagement with one drive a hospital’s choice to engage with the other? Much of the literature arguing for organized delivery systems would seem to suggest that the answer is yes to these questions (Enthoven, et al., 2007). Future research is needed to address these issues and provide much needed guidance to industry scholars and hospital leadership.
As with the degree of integration (in its own right an important strategic choice), resource
dependence, strategic management and institutional theories provide the conceptual
underpinnings for the performance implications of management strategy. In this context, strategic
management theory suggests that financial advantages are context dependent and that hospitals
seek advantage over their competitors by engaging in their activities in a way that is differentiated
and inimitable (Porter, 1996b). In contrast, resource dependence theory and institutional theory
suggest that such advantage may derive as much from how organizations are differentiated from
one another as the extent to which their strategic choices reduce dependence on the external
environment (Pfeffer & Salancik, 2003) and confer legitimacy on the organization (DiMaggio &
Powell, 1983). This latter benefit may derive from isomorphism rather than differentiation, as
predicted by strategic management theory.

In the review I found that the specific management strategies examined in studies of
hospital financial performance can be categorized according to four target areas: (1) cost
leadership, (2) product mix, (3) pricing strategy, and (4) market power. These, by no means,
represent an exhaustive list of the strategies employed by hospitals. They are, nevertheless, the
strategic areas that empirical studies have addressed. Table 2-5 provides a summary of the studies
assessing these areas.
<table>
<thead>
<tr>
<th>Area of Focus</th>
<th>Empirical Study</th>
<th>Primary Independent Variable(s)</th>
<th>Primary Dependent Variable(s)</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost Leadership</td>
<td>Cleverly &amp; Harvey, 1992</td>
<td>Cost leadership strategy</td>
<td>Return on assets</td>
<td>Hospitals with superior financial performance successfully controlled labor, non-labor, and capital costs. Hospitals could control cost through managing length of stay, increasing labor productivity, reducing fixed cost, and acquiring labor-saving capital equipment.</td>
</tr>
<tr>
<td></td>
<td>Langabeer, 1998</td>
<td>Cost management</td>
<td>Return on invested capital</td>
<td>Cost management did not influence financial performance in their turbulent marketplace among teaching hospitals. Low-cost strategies do not seem to be the optimal solution if used alone in a highly competitive marketplace.</td>
</tr>
<tr>
<td></td>
<td>Shukla, et al., 1997</td>
<td>Cost management strategies</td>
<td>Operating margin, return on assets</td>
<td>Cost management does not improve performance for hospitals.</td>
</tr>
<tr>
<td></td>
<td>Trinh &amp; O'Connor, 2000</td>
<td>Cost control strategies</td>
<td>Operating margin and return on assets</td>
<td>Cost containment strategies do not affect performance in rural hospitals, perhaps due to the longitudinal design of the study.</td>
</tr>
<tr>
<td>Product Mix</td>
<td>Friedman and Shortell, 1988</td>
<td>Service strategies: &quot;Wild cat&quot; services, &quot;Cash cow&quot; services</td>
<td>Operating margin and total margin</td>
<td>The authors demonstrate that changes in the regulatory and payment environment have an important influence on the effectiveness of hospital strategies. For example, service strategies that emphasize what the authors term “wild cat services” and “cash cow services” had no effect prior to the implementation of Medicare prospective payment, but have strong negative (wild cat services) and positive (cash cow services) relationships with financial performance after implementation.</td>
</tr>
<tr>
<td></td>
<td>Clement, 1987</td>
<td>Related and unrelated diversification into non-inpatient services</td>
<td>Return on assets</td>
<td>Finds that diversification into non-inpatient services (e.g., outpatient services or long term care) is not related to hospital financial performance.</td>
</tr>
</tbody>
</table>

Table 2-5: Summary of Studies Assessing Impact of Management Strategy on Hospital Financial Performance
<table>
<thead>
<tr>
<th>Area of Focus</th>
<th>Empirical Study</th>
<th>Primary Independent Variable(s)</th>
<th>Primary Dependent Variable(s)</th>
<th>Findings</th>
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<tbody>
<tr>
<td></td>
<td>Cleverly &amp; Harvey, 1992</td>
<td>Payer mix; extent of outpatient services</td>
<td>Return on asset investment</td>
<td>An increase in Medicare patients was found to be associated with decreases in profits, while increases in outpatient services was associated with increases in profit.</td>
</tr>
<tr>
<td></td>
<td>Mick, et al., 1994</td>
<td>Diversification and extent of outpatient services</td>
<td>Total margin and liquidity.</td>
<td>Find that specific strategies, including the scope of services (i.e. extent of outpatient services), and diversification (into both health and non-health related ventures), are unrelated to the financial performance of rural hospitals.</td>
</tr>
<tr>
<td></td>
<td>Clement, et al., 1993</td>
<td>Presence of hospital subsidiaries as proxy for diversification</td>
<td>Total margin</td>
<td>The authors find that the extent to which hospitals have subsidiaries (which is likely an indicator of diversification) has no relationship with hospital financial performance.</td>
</tr>
<tr>
<td></td>
<td>Langabeer, 1998</td>
<td>Payer mix and extent of outpatient services</td>
<td>Return on invested capital</td>
<td>An increase in Medicare patient volume was found to be associated with decreases in profits, similarly increases in outpatient volume associated with decreases in profit.</td>
</tr>
<tr>
<td></td>
<td>Douglas &amp; Ryman, 2003</td>
<td>Service mix strategy</td>
<td>Cash flow margin</td>
<td>Offering services that, on average, are perceived as improving the attractiveness of the hospital to physicians and patients is associated with higher financial returns.</td>
</tr>
<tr>
<td>Pricing Strategy</td>
<td>Cleverly &amp; Harvey, 1992</td>
<td>Pricing strategy (mark-ups)</td>
<td>Return on asset investment</td>
<td>Pricing strategy in the form of markups for care services is a critical strategy for superior financial performance. The authors found this to hold true for all hospitals located in large urban areas as well as for rural hospitals using cross-sectional data.</td>
</tr>
<tr>
<td></td>
<td>Langabeer, 1998</td>
<td>Pricing strategy (mark-ups)</td>
<td>Return on invested capital</td>
<td>Pricing strategy was the single most significant competitive strategy for improving performance for academic medical centers operating in turbulent and dynamic markets. Improvement of performance</td>
</tr>
<tr>
<td>Area of Focus</td>
<td>Empirical Study</td>
<td>Primary Independent Variable(s)</td>
<td>Primary Dependent Variable(s)</td>
<td>Findings</td>
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<td></td>
<td></td>
<td>required management of both the cost and pricing options, as neither one alone was associated with strong performance.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shukla, et al., 1997</td>
<td>Pricing strategy</td>
<td>Profits, revenues, costs, efficiency and productivity, community support provided</td>
<td>Stronger performance was due to higher revenues from pricing strategy for for-profit hospitals. Hospitals were able to generate more revenue from higher prices with contracts with commercial insurers and private payers.</td>
</tr>
<tr>
<td>Market Power</td>
<td>Cleverly &amp; Harvey, 1992</td>
<td>Market share</td>
<td>Return on asset investment</td>
<td>Increased market share is associated with stronger financial performance for both rural hospitals and large urban hospitals. Rural hospitals especially enjoy the stronger performance when there is little or no competition, beneficial commercial and private insurance contracts, and low managed care penetration.</td>
</tr>
<tr>
<td></td>
<td>Langabeer, 1998</td>
<td>Market share</td>
<td>Return on invested capital</td>
<td>Hospital market share was not associated with financial performance for teaching hospitals.</td>
</tr>
<tr>
<td></td>
<td>McCue &amp; Diana, 2007</td>
<td>Market share</td>
<td>Cash flow</td>
<td>Higher market share is associated with higher levels of cash flow among free-standing hospitals.</td>
</tr>
<tr>
<td></td>
<td>Trinh &amp; O’Connor, 2000</td>
<td>Market share</td>
<td>Return on assets and operating margin</td>
<td>Strategies to increase hospital revenue through expanding more market share were not significantly related to hospitals’ ability to achieve superior performance, among rural hospitals.</td>
</tr>
</tbody>
</table>

Cost leadership is a generic strategy (Porter, 1985) in which organizations attempt to gain advantage by pushing the envelope of efficiency relative to their competitor. While a few studies have concluded that cost leadership is a key factor in improving hospital financial performance (Cleverly & Harvey, 1992; Gapenski, et al., 1993), several others report finding cost strategies to be unrelated to financial performance (Trinh and O’Connor, 2000; Langabeer, 1998; Shukla, et
al., 1997). These studies highlight differences, however, that point to new opportunities for research on cost management strategies. For example, while Cleverly & Harvey (1992) point to cost control as a key factor in superior financial performance, Langabeer (1998) finds no impact of cost management among academic medical centers. While findings overall are inconclusive with respect to cost leadership, these contrasting studies point to a key tenet of strategic management theory, that context and environment may be important factors in determining the effectiveness of specific strategies.

Product mix strategies may be described as generic differentiation strategies (Porter, 1985) in which hospitals attract business through the set of products and services it offers. The choice of products and services to offer may also be aimed at organizational legitimacy, as the case of the medical arms race suggests (Devers, et al., 2003). These choices may involve the scope of services offered (e.g., diagnoses treated, inpatient versus outpatient services), or diversification into non-acute and other types of care. Studies assessing the impact of scope, however, are mixed. For example, while one study suggests that greater emphasis on outpatient care is associated with higher profits (Cleverly & Harvey, 1992) another finds the opposite (Langabeer, 1998). Mick, et al. (1994) finds that among rural hospitals, a composite of strategies, including the scope of services and degree of diversification, is unrelated to hospital performance. Two additional studies among hospitals of all types similarly suggest that diversification has no influence on financial performance (Clement, 1988; Clement, et al., 1993). An additional study takes a slightly different angle on the issue, suggesting that hospitals offering services perceived as improving the attractiveness of the hospital to physicians and patients generate higher financial returns (Douglas & Ryman, 2003). This latter study points to the idea that it’s not simply what hospitals do, but how their activities relate to the competitive environment that leads to advantage. This possibility is suggested by the findings of Friedman and Shortell (1988), who demonstrate that the effectiveness of specific service strategies depends on the payment and regulatory environment.
One area in which the empirical evidence in the hospital strategy literature appears to be relatively more consistent is pricing strategy (a strategic approach centered on the hospital’s listed prices, or charges, and not the related but distinct payment they actually receive for services). Studies in this area provide strong support for the positive impact that pricing strategy has on financial performance. These studies consistently suggest that hospitals with higher cost-to-charge ratios generally perform better (Cleverly and Harvey, 1992; Langabeer, 1998; Shukla, et al., 1997). It should be noted, however, that such findings may be spurious and not generalizable in the future, given that Medicare payment rates have long been based on aggregate charges across hospitals. Within this context it is not surprising that hospitals efforts to charge higher prices may lead to improved revenues and profit margins (Ginsburg & Grossman, 2005). Future payment methodologies will seek to limit these distortions, and may render these strategies ineffective (MedPAC, 2009).

Closely related to pricing strategy is market power, a factor that may improve bargaining positions and the actual prices that hospitals receive from private payers (as opposed to listed prices, or charges). In practice, however, empirical work on the impact of market power on financial performance is mixed. While two studies report that market share is related to better financial performance (Cleverly and Harvey, 1992; McCue and Diana, 2007), two additional studies report finding no association between market position and financial performance (Langabeer, 1998; Trinh and O’Connor, 2000). More specifically, rural hospitals in markets with low levels of competition (Cleverly & Harvey, 1992) and free-standing hospitals with higher market shares located in markets with more physicians (McCue & Diana, 2007) were associated with stronger performance. In contrast, rural hospitals that aggressively seek greater market share (Trinh & O’Connor, 2000) and teaching hospitals with higher market share (Langabeer, 1998) were not found to be financially stronger.

These findings relative to market power complete a basic pattern of inconclusiveness
among studies of hospital strategy and financial performance. These mixed results, however, point to fruitful opportunities for future research. While strategic management theory, resource dependence theory and institutional theory all point to variance in organizational, institutional and market environments as key factors driving strategic effectiveness, few studies to date examine the interaction between these dynamic contextual factors and specific strategies (one exceptional example is Freidman and Shortell, 1988). Indeed, leading strategy thinkers have long pointed to the idea of strategic fit—not only between the organization and its context, but between its various internal activities—as a key driver of competitive advantage (Grant, 1996; Porter, 1996b). For example, how do the characteristics of patient populations influence the impact of specific product mix strategies on financial performance? Or, in what ways do urban versus rural distinctions impact the advantages of specific cost control strategies? Research is needed that addresses strategic management questions along these lines.

Quality and Financial Performance

Closely related to the discussion of strategy, the quality of care delivered in hospitals may be viewed as a competitive tool. Indeed according to Porter (1985) firms pursue product differentiation through quality as a generic strategy aimed at achieving competitive advantage. In theory, in an industry like health care that has recently been characterized as increasingly indicative of non-price competition, quality of care may enable healthcare organizations to differentiate themselves from competitors, gain market share and improve financial performance.

Donabedian’s quality framework (2003) also provides some implicit theoretical insights into the relationship between quality and financial performance. Quality may be enhanced through changes in structure and process, which impact patient outcomes (Donabedian, 2003). such organizational changes may similarly impact financial performance by encouraging waste
reduction and productivity. Table 2-6 provides a summary of research findings assessing the impact of quality (and quality-related activities) on financial performance.

Table 2-6: Summary of Studies Assessing Impact of Quality on Hospital Financial Performance

<table>
<thead>
<tr>
<th>Area of Focus</th>
<th>Empirical Study</th>
<th>Primary Independent Variable(s)</th>
<th>Primary Dependent Variable(s)</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation of Quality Improvement Initiatives</td>
<td>Alexander, et al., 2006</td>
<td>Measures of QI scope and intensity</td>
<td>Cash flow</td>
<td>Implementation of a greater scope of quality improvement initiatives (QI) over a longer period of time is associated with stronger financial performance. Physician participation in the QI processes was negatively associated with performance. Perhaps physician involvement in QI teams may not be necessary as they may distrust hospital motives and may fear standardization of clinical processes will hinder their ability to meet individual patient needs.</td>
</tr>
<tr>
<td>Market Perception of Quality</td>
<td>Harkey &amp; Vraciu, 1992</td>
<td>Quality as measured by perceptions of quality by patients, physicians, community residents, and employees.</td>
<td>Operating margin</td>
<td>Hospitals with higher market perceptions of quality had better financial performance. Hospitals with higher quality have higher market share and/or have lower costs through more productivity and efficiency as measured by quicker patient recovery.</td>
</tr>
<tr>
<td></td>
<td>Nelson, et al., 1992</td>
<td>Patients' judgments of hospital quality</td>
<td>EBIDTA and Return on assets.</td>
<td>Patients’ perceptions of quality were associated with stronger financial performance</td>
</tr>
</tbody>
</table>

Quality of care and medical errors has recently been at the forefront of hospital improvement efforts. In 2000, the Institute of Medicine (IOM) reported between 44,000 and 98,000 Americans die in hospitals every year as a result of medical errors (IOM, 2000).
authors extrapolated the national costs of adverse events to be $37.6 billion and preventable adverse events to $17 billion. Medication-related errors were estimated to about $2 billion of increased hospital costs for the nation (IOM, 2000).

While a number of studies have considered the relationship between quality and financial performance, many of them examine quality as the dependent variable (Encinosa and Bernard, 2005; Bazzoli, et al., 2007; Bazzoli, et al., 2008). I limit the review to the few studies that examined financial performance as the outcome.

According to Donabedian, (1988), patient perceptions are a critical indicator of the quality of care delivered by a hospital. Two studies have examined the link between patient perceptions of quality and hospital financial performance (Harkey and Vraciu, 1992; Nelson, et al., 1992). Both studies find a strong influence of patient perceptions on the financial performance of hospitals. Beyond patient perceptions, one study has examined the implications of hospital quality improvement activities for financial performance. Alexander, et al., (2006), for example, report that hospitals with broader, more intense baseline quality improvement programs produced better average financial performance over the study period of five years.

Despite these encouraging findings, several limitations should be noted with respect to the literature on quality and financial performance. First, studies have not examined the impact of actual patient outcomes on financial performance. Part of the reason for this may be explained by the multi-dimensionality of quality, and a lack of consensus and measure availability (Jha, 2006). Second, each of the studies reported to date cannot draw conclusions about the direction of causality. Moreover, the collection of studies that examine the relationship in the opposite direction (Encinosa and Bernard, 2005; Bazzoli, et al., 2007; Bazzoli, et al., 2008) suggests that some scholars operate under the assumption that better financial footing leads to better quality. Both may be true. Future research should address these limitations and look to theory for guidance on how the multiple dimensions of quality improve financial performance. For example,
while improvements in the underuse of care may be associated with a reduction in profit margins, especially in a fixed payment environment (i.e. since quality would necessitate more resources), improvements in overuse may show the opposite. Moreover, since misuse is likely related to operational inefficiencies, perhaps the drivers of error reduction may also improve operating margins. Future work is needed to address these issues and further understand how these characteristics of quality interact with the nature of the organization’s tasks and environment to influence financial outcomes.

Discussion

Summary of Findings

This review has examined the empirical literature on the relationship between financial performance and five categories of organizational factors: (1) ownership, (2) governance, (3) integration, (4) management strategy, and (5) quality. With some exceptions (which I discuss below) the review reveals a general lack of consistency across studies. Nevertheless, while the results of this review do not reveal conclusive theoretical or practical managerial frameworks for thinking about the organizational determinants of hospital financial performance, it does suggest that existing work provides a solid foundation for future research opportunities. Specifically, the important foundational studies I have reviewed provide invaluable guidance to industry scholars regarding specific areas (which I have tried to highlight) for potentially fruitful opportunities for future research. For example, interpreting these inconclusive findings through the theoretical perspectives I have described (particularly contingency theory and strategic management theory) suggests substantial opportunities for research aimed at understanding the conditions and circumstances driving the influence of specific organizational factors on hospital financial
performance. I offer this observation in the spirit of a question first posed by Peteraf and Reed (2007) and reiterated by Hill (2010): “Are there any universally beneficial practices or are there only contextually appropriate practices?” Their answer: “Fit trumps best practice” (Peteraf and Reed, 2007; Hill, 2010). A few of the studies I have reviewed offer encouraging findings along these lines; for example, with respect to governance (Young, et al., 1992) and strategy (Friedman and Shortell, 1988).

**Implications for Theory**

From a theory building perspective, the mixed nature of the findings across the studies I have reviewed suggests the potential need to return to more fundamental, exploratory work. Carlile and Christensen (2004) suggest that theory building proceeds up a pyramid from foundational, descriptive, exploratory work, to categorization schemes that capture the relevant variables and eventually to tests of association and causality. However, in building a body of knowledge, when the expectations are not confirmed in the association stage (as the review suggests is the case in many of the areas reviewed), or circumstances are identified that do not fit with expectations, good theory building necessitates a return to descriptive, exploratory, qualitative work (Carlile and Christensen, 2004). Appropriately carried out, such descriptive work may produce rich insights into the complexities of managing hospitals and generating sustainable financial returns. Indeed, given the complexity of managing hospitals in practice, theory would suggest the need for models that capture this complexity. The development of such models necessitates exploring the dynamic ways in which managerial choice, organizational configurations and environmental influences interact to produce financial outcomes.

The theoretical perspectives I have highlighted may provide a useful source of guidance. For example, agency theory was supported by studies assessing the relationships between
performance and hospital board structure (Molinari, et al., 1997; Molinari, et al., 1995).

Contingency and strategic management theories were also supported in a few studies showing that hospital strategies (Friedman and Shortell, 1988) and governance structures (Young, et al., 1992) are dependent upon sets of contingency factors related to the organization and its environment (Wang, et al., 2001). Nevertheless, support for resource dependence theory was mixed (e.g., McCue & Lynch, 1987; Mick, et al., 1993). Furthermore, even where limited support was offered for specific theoretical frameworks, more work is needed in order to understand the specific conditions and circumstances that are unique to the hospital setting and which represent important drivers of hospital financial performance. In addition, my understanding of how the domains of theoretical frameworks fit together to produce financial outcomes is limited. For example, the nature of an organization’s environment, including its resources (resource dependence), the degree of environmental uncertainty (contingency theory) and the competitive climate (strategic management), no doubt interact with the internal activities (strategic management) and structural configurations (agency theory) of the organization.

Exploratory, descriptive work is needed in order to understand these interactions.

Beyond existing theoretical frameworks, there may be additional elements and factors that existing research has not address which nevertheless represent important determinants of hospital financial performance. For example, one of the most critical drivers for an organization may be top management team members. Some scholars have suggested that differences in sense-making characteristics—scanning, processing, and acting—among top management team members provide additional explanatory power to the organizational factors that are assessed in this study (Thomas & McDaniel, 1990). More generally, some of the “softer” organizational factors, such as leadership, culture, sensemaking, mission, and teamwork may have fundamentally powerful implications for the financial health of hospitals. These areas offer many opportunities for future investigation. Specifically, additional work should examine how these
areas moderate the impact of organizational factors such as management strategy, integration, governance, or quality improvement initiatives.

**Implications for Management**

Despite the limited agreement across studies regarding the financial impact of organizational factors among hospitals, my review did find relatively more consistent results in at least three areas: (1) physician participation in governance, (2) governance processes, and (3) centralization of hospital systems and networks.

With respect to physician participation in governance, my review suggests that successful boards find ways to improve alignment between physicians, managers and the board (Goes and Zahn, 1995; Molinari, et al., 1993, 1995, 1997). Such physician participation on hospital boards may be particularly critical as hospitals face competition from physician-driven ventures, such as single-specialty hospitals, ambulatory surgical centers, and diagnostic centers.

With respect to governance processes, the review suggests that board leaders should invest sufficient resources in providing appropriate education for their board members (Molinari, et al, 1992). Hospitals are highly complex organizations and board members come from a wide variety of professional backgrounds. While such backgrounds may provide added diversity and expertise from outside the health care industry to solve hospital-related problems, education plays an important part in board members ability to appropriately apply their skills and experience. Along these same lines, research supports the idea that boards should promote decision-making processes characterized by transparency, openness, and a climate of psychological safety (Kane, et al., 2009). These process based findings suggest the need for boards to view themselves as teams, the processes of which have an important influence on performance.
With respect to horizontal integration, several research studies consistently report that more centralized hospital systems and networks exhibit better performance than their more decentralized counterparts (Bazzoli, et al, 2000; Ginn and Lee, 2006). The implication is that managers in multi-hospital systems, in order to realize the benefits of integration, may need to centralize at least some of the planning and management of hospital service delivery, physician arrangements, and insurance contracting. Such centralized planning may have benefits in terms of economies of scale and bolstered negotiating power. It should be noted, however, that these findings were strongest among moderately centralized systems, suggesting the need for managers to balance the costs and benefits of centralization. More work is needed to understand how these findings fit with key circumstantial and strategic contingencies faced by hospitals. Such work has the potential to push us towards the development of unified, practical frameworks for practicing managers.

In discussing these implications I note that there are many other important organizational issues and trends in the hospital industry that have not been empirically examined with respect to their influence on financial performance. These issues are of tremendous practical importance given their salience among both scholars and industry executives, and their possible influence on hospital financial performance. Such strategies may offer future opportunities for research into both their direct and moderating impact on hospital financial performance. In much the same way that scholars have responded to ownership conversions or horizontal consolidation by examining their impact on performance, future research should examine the implications of these trends for hospital financial performance. Examples of these, which I discuss briefly in the paragraphs that follow, include (1) application of lean manufacturing principles in the hospital industry, (2) the management of micro-systems of care, (3) the emergence of centers of excellence and specialty service lines, and (4) accountable care organizations.
Lean manufacturing focuses on reducing costs by eliminating non-value added activities. The practice may be viewed as both a cost containment and quality improvement strategy and comes from the Toyota Production system (Abdulmaleka & Rajgopalb, 2007). Its methods have been applied to the health care industry to improve patient outcomes, increase patient access through flow improvements, reduce the risk of hospital acquired infections, and reduce the turnaround time for ancillary services such as pathology reports (Kim, et al., 2006).

Micro systems of care delivery are small integral units of providers who provide most care to most patients (Nelson, et al., 2002). An emerging view among scholars and practitioners alike is that organizational performance, especially change and transformation, is fundamentally driven at the micro system level (Nelson, et al., 2002).

The emergence of specialty service lines—the offering of services organized and marketed based on specific diseases or organ systems—has coincided with the rise of physician owned single-specialty hospitals (Herzlinger, 1997; 2000). This trend has led to an increasing move towards organizational specialization in the industry. And while scholars have studied the possible implications for the cost and quality of care (Greenwald, et al., 2006), very little work has been done to understand the financial performance implications of this shift.

Finally, given its salience as a component of the Patient Protection and Affordable Care Act (PPACA), accountable care organizations (ACO) are likely commanding considerable attention among hospital leaders. Overall, the ACO model consists of providers who are jointly held accountable for achieving measured quality improvements while reducing spending growth (McClellan, McKethan, Lewis, Roski, & Fisher, 2010). In principle, it is a payment model aimed at achieving the sort of organizational change (i.e. system alignment and integration) that could improve the quality and efficiency of care. Nevertheless, the financial implications of such a model—for both hospitals and physicians—may ultimately determine the model’s fate, much as it did with physicians and managed care in the 1990s. Accordingly, scholars should examine not
only the population level impact on quality and costs, but the impact on provider level financial outcomes. Such study might find theoretical motivation in the prior work on governance, system integration and strategic management.

**Limitations**

As with all papers of this nature, my review comes with several limitations. First, I limited the review to quantitative studies published since 1984. As a result, studies conducted outside of this time frame or that addressed these issues qualitatively were not included. I recognize that excluded studies may offer additional insights into the relationships between organizational activities and performance. Nevertheless, I believe that the focus on quantitative studies appropriately limited the scope of this review to the study of organizational factors that scholars have deemed conceptually mature enough to examine quantitatively. These studies represent those ideas and concepts that have moved to the top of the theory-building pyramid (Carlile and Christensen, 2004).

Second, I chose to limit the review to studies in which financial performance was treated as the dependent variable. As a result, studies in which financial performance was an independent variable, including as a moderator or a mediator variable for other outcomes, were excluded from this review. I recognize that financial performance may be both a product and a determinant of organizational factors. As future work moves forward, empirical methods should be aimed at accounting for this reverse causality (and more generally endogeneity) in a way that isolates the impact of organizational factors on financial performance.

This latter issue points to some of the empirical limitations of the research I have reviewed. For example, the studies in this review measure financial performance using varied
definitions and data. While most of the studies in this review used some measure of profitability (e.g., total margin, operating margin, return on assets), the inconsistency and un-standardized nature of these various measures leaves open questions about the extent to which the inconsistencies in findings may be explained by inconsistencies in financial performance measures.

Related to this issue is the question of data sources. While some studies rely on alternatives, a majority of them use Medicare cost reports. Some industry scholars have argued that the accuracy and adequacy of Medicare Cost Report data is questionable due to the lack of research into the reliability of its indicators (Magnus & Smith, 2000). A limited study supports this concern, suggesting that Medicare Cost Report data gives an incomplete and often inaccurate picture of the financial health of hospitals (Kane & Magnus, 2001). Audited financial statements represent the gold standard and provide a more standardized and complete perspective (Kane & Magnus, 2001). Future work is needed to both provide further assessments of the validity of cost report data and improve the availability of reliable, audited financial performance data. Many states, including California, Massachusetts, Pennsylvania, New Jersey, Washington, and others, collect standardized (and in some cases audited) financial statements. Some of the findings of this review may be explained by the lack of data reliability and future work should take greater advantage of these state data resources.

Finally, one of the assumptions underlying the study of hospital profits (and other related financial measures) as an outcome is that the profit objective is relatively comparable across hospitals. I reiterate that organizational missions differ and as such the profit objective may be meaningfully variable across organizations. While the inclusion of ownership type in my models of financial performance no doubt improves comparability, as the discussion of ownership suggests, even within ownership types organizational missions vary substantially. Thus, unmeasured factors may confound observed relationships between organizational factors and
hospital financial performance. One potential way to account for these unobserved factors may be to construct longitudinal samples that permit the use of hospital fixed (or where appropriate random) effects in regression models. Recognizing that I face trade-offs in doing so, this approach would go a long way towards mitigating concerns about confounding factors related to profit objectives by producing within hospital estimates of the relationship between organizational factors and financial performance. Future work should make an effort to employ these and other methods in an effort to account for unobserved factors.

Despite these limitations, the review provides an integrated perspective on the body of knowledge related to organizational factors and hospital financial performance. Most importantly, the study highlights substantial opportunities for future research related to hospital financial performance and provides a snapshot of the managerial implications this collective body of work offers. The findings suggest the need for future work to focus on improving data and measurement, fine tuning methodology, and incorporating more descriptive, qualitative work as a means of better understanding the complexities of generating sustainable financial returns. I also suggest the need for quantitative models to reflect these complexities by more carefully identifying and examining the conditions, circumstances and anomalies that interact with organizational factors in meaningful ways. Such interactions have crucial implications for the development of managerial frameworks and practical applications. Along these lines, I feel it is important to note that specific theoretical frameworks do not motivate many of the studies in this review. Conceptual and theoretical development is a key component of good theory building. Grounding studies of hospital financial performance in organization theory, or at a minimum clearly specified conceptual frameworks, would improve interpretation across studies and the building of practical frameworks for hospital managers.

As an example, contingency theory offers a useful framework to assess the influence of external factors on the impact of strategic management decisions on hospital financial
performance. In essence, there are situational requirements that may determine the effectiveness of which strategy is used. For instance, hospital managers operate in an uncertain environment of competition, patient loyalty, reimbursement, and regulation. Therefore, managers may have to selectively choose strategies while considering that contingencies exist that may moderate the success or failure of their choices. Future research should pay more attention to identifying these important contingencies.

Finally, I wish to reiterate the need for future research to incorporate the “softer” elements of management and organizations (e.g., leadership, culture, etc.). In my view, omitting these factors risks the same mistake made by the six blind men touching an elephant made famous in the 1873 poetry of Godfrey Saxe. The poem illustrates the pitfalls of taking too narrow a view and trying to comprehend the great beast by taking hold of some small part of it. Key organizational elements such as leadership, decision making, culture, knowledge creation, and learning no doubt play a role in determining the financial outcomes of health care organizations. The key for future research is in determining what that role is and how these factors interact with the “harder” issues the research reviewed here addresses.
References


Chapter 3

Physician joint ventures and performance: The contingency impact of organizational characteristics

Abstract

This study assesses the impact of hospital physician joint venture activity on hospital performance using a resource dependence and institutional theory framework. Hospital performance is measured in general acute care facilities from 2004 through 2006 in the state of Pennsylvania. I use cross-sectional ordinary least squares regression models to assess the relationship of joint ventures on performance and occupancy. I examine the moderating influence of hospital size and teaching status on occupancy and financial performance measurements. Results indicate that hospital physician joint venture activity significantly impacts occupancy and financial performance. Further, smaller hospitals experience increases in total occupancy and stronger financial performance at a higher rate than larger hospitals. The results provide support for resource dependence, institutional theory, and contingency theory as conceptual frameworks to explain the benefits of physician joint ventures for hospitals. I provide implications for managers. Findings provide empirical support for managers to initiate joint venture activities with physicians by showing their positive impacts on hospital occupancy and financial performance, especially for smaller hospitals.
Introduction

Many hospitals face direct competition from competing physicians. Joint ventures are a growing strategy used by hospitals to stem and improve alignment with physicians. Studies report that joint ventures may promote alignment of interests and physician loyalty and trust in the organization, and may be a means for hospitals to provide practice management expertise for physicians and promote greater administrative integration between the hospitals and physicians (Goes & Zan, 1995; Mark, Evans, Schur, & Guterman, 1998). As a result, hospital performance may also be strengthened through joint ventures.

Studies indicate that joint ventures are associated with higher hospital occupancy (Goes & Zan, 1995); higher average length of stay, more diversification of services, lower long-term debt, and more managed care contracts (Harrison, 2006); further, physician participation in hospital decision-making and management, financial incentives, and joint ventures are positively associated with stronger financial performance (Mark, et al, 1998). However, other studies indicate that joint ventures do not provide performance advantages for hospitals (Douglas & Ryman, 2003).

Other mechanisms may exist that enable and improve alignment between hospitals and physicians. For example, legitimacy may improve alignment due to hospital reputation, size, visibility, and brand recognition. Such legitimacy may derive from key organizational characteristics (Bazzoli, Chan, Shortell, & D'Aunno, 2000). For example, small non-teaching hospitals may lack brand recognition, and visibility, and may lack institutional leverage with physicians. The lack of these informal sources of alignment may make the use of formal arrangements such as joint ventures more critical. Accordingly, we might expect that the benefits of joint ventures depend on organizational characteristics that confer legitimacy such as size or teaching status.
The study aims to refine empirical findings on the performance impact of joint venture within the framework of resource dependence, institutional, and contingency theories. Specifically, I examine whether organizational characteristics moderate the relationships between joint ventures and organizational performance.

**Theoretical Framework & Hypotheses**

Organizations interact with other firms to secure access to critical resources while also seeking to maintain autonomy (Pfeffer & Salancik, 2003). Ultimately, organizations seek to acquire control over resources that minimize their dependence on other organizations, and thereby enhancing the firm’s power (Pfeffer & Salancik, 2003). From this perspective, hospitals have incentive to form joint ventures with physicians in order to manage the potential volatility of the physician referrals and leverage the complementary skills of the two groups (Pfeffer & Nowak, 1976). Hospitals may also form joint ventures with physicians to preserve as much of their patient volume as possible rather than losing patients to physician-competitors (Berenson et al., 2007). Hospitals that have formed joint ventures with physicians are the logical choice for referrals from partner physicians due to the financial investment, shared risk, and collaborative decision-making between the two organizations. Based on these expectations I examine the following hypothesis:

**Hypothesis 1a: A positive association exists between joint venture activity and higher hospital occupancy rates.**

Hospitals that increase occupancy rate should also be able to decrease their operating cost, which translates into increased profitability. Past studies show that unused bed capacity costs an estimated $25 billion annually, while increasing utilization of beds lowers hospital costs (Keeler & Ying, 1996). Unused hospital beds are opportunity costs for hospitals, which still must
cover their fixed costs of investment, regardless of whether the bed is filled (Gaynor & Anderson, 1995). An unused hospital bed costs an estimated $36,443 in 1987 dollars (Gaynor & Anderson, 1995); therefore, the cost is most likely higher in 2012 dollars.

A study of rural hospitals reported that hospitals may improve their profits from increasing their occupancy rates (Finch & Christianson, 1981). A cost-minimizing occupancy rate is estimated at 73 percent occupancy (Finch & Christianson, 1981). Hospitals with this occupancy rate have average costs per patient day, which are $5.96 (log specification) to $11.15 (quadratic specification) lower than the average costs in hospitals with 51 percent occupancy rates, if other factors are held constant (Finch & Christianson, 1981).

Further, hospital occupancy rate measures how efficiently the hospital utilizes its staffed beds (Gapenski, 2003). An efficient organization with higher occupancy spreads as much of the fixed costs across more patients and, therefore, increases patient profitability ratios (Gapenski, 2003). As hospital occupancy rates increase and the hospital manages its costs, profitability should also increase (Gapenski, 2003). Therefore, it is proposed:

*Hypothesis 1b: A positive association exists between hospital-physician joint ventures and hospital profitability*

Occupancy and profitability may also be influenced by other key characteristic. For example, size or membership in prominent industry organizations may convey organizational legitimacy (Pfeffer & Salancik, 2003). Firms will adopt similar structures in an effort to achieve legitimacy in their market, improve their competitive position, and increase market visibility (DiMaggio & Powell, 1983). Hospitals operate in highly institutional environments and may possess legitimacy from membership in groups that approve of their structures, staffing, and programs (Ruef & Scott, 1998). Membership in prestigious industry organizations, such as the Council of Teaching Hospitals of the Association of American Medical Colleges (COTH),
conveys legitimacy, salient market power, and added stature for physicians who are aligned with such organizations (Ruef & Scott, 1998).

From an institutional theory perspective, alignment with large academic medical centers may be a source of legitimacy for physicians. Physician alignment enables such hospitals to secure reliable patient referral sources that generate revenue, to strengthen market share, and to invest in technology and service lines that increase occupancy levels. Academic medical centers with organizational legitimacy may experience higher hospital occupancy levels.

Just as large academic medical centers are a source of legitimacy, they also are autonomous and possess resources to compete with rivals, recruit and retain physicians, and develop diverse patient services (Aldrich, 1976). They have stronger competitive positioning, market visibility, and are more attractive to physicians as a source of support and employment in their clinical practice. Physician alignment provides large academic medical centers with additional competitive advantages to secure reliable patient referrals that may increase occupancy levels.

Size may be an additional characteristic that confers similar legitimacy benefits. Size may allow large hospitals to form a proper fit with its environment and its subsystems (Fiedler, 1964). Size may improve a firm’s ability to compete, and larger firms have the advantage when compared with their rivals (Mintzberg, 1979). Large hospitals possess competitive advantages that attract physicians, such as capital to invest in new buildings and medical equipment, information technology systems, and expensive marketing campaigns. Size, market visibility, and brand recognition may be a source of legitimacy for large hospitals. Therefore, it is proposed:

\textit{Hypothesis 2a: A positive association exists between organizational legitimacy (as measured by bed size and teaching status) and occupancy rate}
Hypothesis 2b: A positive association exists between organizational legitimacy (as measured by bed size and teaching status) and financial performance.

While size and teaching status may be a source of legitimacy and physician alignment, the lack of these informal sources of alignment may make the use of formal arrangements such as joint ventures more critical. Accordingly, we might expect that legitimacy, as measured by size and teaching status, moderate the positive relationship between physician joint ventures and occupancy. For example, small non-teaching hospitals may lack similar sources of prestige, competitive advantages, and market visibility (Pfeffer & Salancik, 2003). Many small hospitals may operate in hostile economic conditions with low or erratic patient censuses, and be dependent on government reimbursement sources. They may lack financial capital and talent necessary for implementing state-of-the-art medical technology and infrastructure necessary for physician alignment; particularly with new physicians in emerging specialties who may require the latest technological advancements available only at larger teaching hospitals. Further, a physician shortage may exist in many markets in which small hospitals operate, creating obstacles to integration.

As small hospitals seek to survive by aligning themselves with physicians through joint ventures, they may experience improvements in patient occupancy and financial performance. Alignment may facilitate diversifying patient services to capture more patients along the care continuum. When linked through a joint venture, physicians have a stake in admitting and referring patients to their hospital partner. They may enable smaller hospitals to secure referrals for profitable services, such as ambulatory surgery, cardiac care, orthopedic surgery, and advanced diagnostic imaging (MedPAC, 2008). Such services are both profitable and may increase occupancy levels due to the ancillary services required to deliver them to patients.
Alignment with physicians also may strengthen a small stand-alone hospital’s bargaining position with payers.

From a contingency theory perspective, size is a constraint that bounds a hospital’s ability to align with physicians (Mintzberg, 1979). Joint ventures may provide smaller hospitals with mechanisms to overcome organizational constraints by creating an alignment of financial and clinical interests. Smaller hospitals that form joint ventures may experience a more positive impact on occupancy and financial performance than larger teaching hospitals with pre-existing competitive advantages. Therefore, I expect hospital size and teaching status to moderate the positive impact that joint ventures may have on performance.

_Hypothesis 3a: The positive impact of joint ventures on occupancy is moderated by organizational legitimacy (as measured by bed size and teaching status)._  

_Hypothesis 3b: The positive impact of joint ventures on hospital financial performance is moderated by organizational legitimacy (as measured by bed size and teaching status)._  

**Data and Analytic Methods**

I examined data on all general acute care hospitals in Pennsylvania with joint ventures from 2004 to 2006. Data for this study were drawn from three sources: The Pennsylvania Health Care Cost Containment Council (PHC4) Financial, Utilization and Payer dataset; the American Hospital Association (AHA) Annual Survey Database; and county level market data from the Area Resource File (ARF). The study is limited to hospitals in Pennsylvania to capture uniformly the impact of regulation, reimbursement, and other unique market and demographic characteristics.
Dependent variables

The dependent variables in this study are based on extant literature and measure hospital occupancy and total margin (Gapenski, 2003). Occupancy demonstrates the hospital’s ability to use its fixed assets effectively to produce revenue and its efficiency in utilizing staffed beds (Gapenski, 2003). The goal of the efficient organization is to spread as much of the fixed costs across more patients and, therefore, increase the patient profitability ratio (Gapenski, 2003). Total margin measures the ability of the hospital to control expenses as it is defined as net income divided by total revenues (Gapenski, 2003). Total margin captures the return on operating and non-operating sources of revenues (Cleverly & Cameron, 2007). Operating margin captures core business operations and removes the transitory influence of non-operating sources of revenue and cost, which is often temporary and not related to the core functions of the hospital (Gapenski, 2003).

Independent Variable

The independent variable for this study is joint ventures with physicians as reported by hospitals through the AHA Annual Survey for 2004 through 2006. While hospitals may participate in more than one physician joint venture and in diverse forms of joint ventures, this is not captured in the defined variable (AHA, 2006).

Control Variables

Control variables that could influence the occupancy and performance of hospitals were based on the extant literature. Organizational characteristics include bed size, teaching status,
ownership type, location, and payer mix. Hospital bed size captures the market strength and measures a hospital’s competitive advantages and legitimacy in its market (Goes & Zan, 1995). Bed size is a categorical variable that separates the hospital sample into two groups; group 1 is below the median bed size and labeled as (0), and group 2 is above the median and labeled as (1). I formed these categories to test the moderating impact of hospital size on occupancy for hospitals with joint ventures.

Teaching status is a three-level categorical variable, including (0) non-teaching hospital, (1) teaching hospital affiliated with a medical school, and (2) teaching hospital that affiliated with a medical school and a member of Council of Teaching Hospitals of the Association of American Medical Colleges (COTH), which consists of major teaching hospitals and health systems.

Ownership type captures hospital profit incentives, such as generating maximum profit for shareholders or providing comprehensive care to patient populations due to strong mission objectives (Gapenski, et al., 1993). Hospital location reflects the differences between urban and rural operating costs, wage index, competition, and patient access. Rural is defined by the Center for Rural Pennsylvania based on population density (Center for Rural Pennsylvania, 2010).

Payer mix variables were added since hospitals with high margin reimbursement contracts may be in better financial health and have more access to capital (McCue & Diana, 2007). Hospitals with a payer mix with higher percentages of Medicaid and Managed Care reimbursement may experience poorer performance, which influences incentives to engage in joint venture activity (McCue & Diana, 2007).

Market characteristics such county unemployment rate, per capita income, and market concentration levels capture the overall market demand for the hospital services (Harrison, 2006). Each calendar year is measured with a categorical variable, which captures unobserved trends in occupancy or financial performance due to factors other than those included in the regression models. Table 3-1 provides descriptions of the variable categories, formulas, and data sources.
Table 3-1: Constructs, Variables, Measures, and Data Sources

<table>
<thead>
<tr>
<th>Variable Category</th>
<th>Variable</th>
<th>Measures</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Hospital Performance | Occupancy Rate | \[
\frac{\text{Total Patient Days of Inpatient Care during the Fiscal Year}}{\text{Staffed Beds} \times 365 \text{ Days}}
\] | PHC4, 2006 - 2004 |
| | Total Margin | \[
\frac{\text{Revenue over Expenses}}{\text{Total Operating Revenue + Non-operating Income}}
\] | PHC4, 2006 - 2004 |
| | Operating Margin | \[
\frac{\text{Operating Income}}{\text{Operating Revenues}}
\] | PHC4, 2006 - 2004 |
<p>| <strong>Independent Variable</strong> | | | |
| Hospital Joint-Venture | Hospital Has Joint-Venture with Physicians or Physician Groups | 1 = Hospital with a joint venture with physicians or physician groups. 0 = Hospital without a joint venture with physicians or physician groups. | AHA Annual Survey Database, 2006 - 2004 |
| <strong>Control Variables</strong> | | | |
| Hospital Characteristics | Bed Size Category | 0 = Below the median (50th percentile) for total staffed beds 1 = Above the median (50th percentile) for total staffed beds | AHA Annual Survey Database, 2006 - 2004 |
| | Teaching Status | 0 = Non-teaching hospital 1 = Teaching hospital affiliated with a medical school 2 = Teaching hospital that is a member of Council of Teaching Hospitals of the Association of American Medical Colleges (COTH). | AHA Annual Survey Database, 2006 - 2004 |
| | Hospital Ownership Type | 1 = Not-for-profit hospital 0 = Other ownership | AHA Annual Survey Database, 2006 - 2004 |
| | Hospital Location | 1 = Hospital is located in an urban region 0 = Hospital is located in a rural region | PHC4, 2006 - 2004 |
| | Total commercial share of net patient | Commercial insurers encompass all non-government contracted health insurance plans, including Blue Cross and Blue Shield plans, and hospital and health system plans. | PHC4, 2006 - 2004 |</p>
<table>
<thead>
<tr>
<th>Variable Category</th>
<th>Variable</th>
<th>Measures</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>revenue (NPR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Managed Care Share of Net Patient Revenue</td>
<td>The percentage of net patient revenue that is comprised of reimbursement from managed care payers</td>
<td>PHC4, 2006 - 2004</td>
</tr>
<tr>
<td></td>
<td>Total Medicare share of net patient revenue (NPR)</td>
<td>The percentage of net patient revenue that is comprised of reimbursement from Medicare</td>
<td>PHC4, 2006 - 2004</td>
</tr>
<tr>
<td>Market Characteristics</td>
<td>Market Concentration</td>
<td>Measures the concentration of the hospital market region</td>
<td>AHA Annual Survey Database, 2006 – 2004</td>
</tr>
<tr>
<td></td>
<td>Unemployment Rate</td>
<td>Unemployment rate in the County</td>
<td>ARF, 2006 - 2004</td>
</tr>
<tr>
<td></td>
<td>Per Capita Income</td>
<td>Per Capita Income in the County</td>
<td>ARF, 2006 - 2004</td>
</tr>
<tr>
<td>Year</td>
<td>2006 - 2004</td>
<td>Year categorical variable</td>
<td>AHA Annual Survey Database, 2006 – 2004</td>
</tr>
</tbody>
</table>

Table 3-2 provides descriptive statistics for all variables including means and standard deviations for continuous variables and percentages for categorical variables. I generated a correlation matrix for all covariates and found no indications of collinearity. The study population consists of all non-governmental general acute-care hospitals in Pennsylvania between 2004 through 2006.
Table 3-2: Descriptive Statistics of Variables for General Acute Care Hospitals, 2004 – 2006.

<table>
<thead>
<tr>
<th>Variable Category</th>
<th>Variable</th>
<th>Mean (Standard Deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable</strong></td>
<td>Total Hospital Occupancy Rate</td>
<td>.6632234 (.1427404)</td>
</tr>
<tr>
<td></td>
<td>Total Margin</td>
<td>.023342 (.0591557)</td>
</tr>
<tr>
<td></td>
<td>Operating Margin</td>
<td>.010859 (.0634039)</td>
</tr>
<tr>
<td><strong>Independent Variable</strong></td>
<td>Hospital physician joint venture</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes = 1, N = 96</td>
<td>24.43%</td>
</tr>
<tr>
<td></td>
<td>No = 0, N = 297</td>
<td>75.57%</td>
</tr>
<tr>
<td><strong>Hospital Organizational Characteristics</strong></td>
<td>Bed Size</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Below median (50th percentile) = 0, N = 162</td>
<td>41.22%</td>
</tr>
<tr>
<td></td>
<td>Above median (50th percentile) = 1, N = 231</td>
<td>58.78%</td>
</tr>
<tr>
<td></td>
<td>Teaching Status</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 = Non-teaching hospital, N = 246</td>
<td>62.60%</td>
</tr>
<tr>
<td></td>
<td>1 = Teaching hospital affiliated with a medical school, N = 101</td>
<td>25.70%</td>
</tr>
<tr>
<td></td>
<td>2 = Teaching hospital that affiliated with a medical school and a member of Council of Teaching Hospitals of the Association of American Medical Colleges (COTH), N = 46</td>
<td>11.70%</td>
</tr>
<tr>
<td></td>
<td>Hospital ownership type:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nonprofit =1, N = 366</td>
<td>93.13%</td>
</tr>
<tr>
<td></td>
<td>Other = 0, N = 27</td>
<td>6.87%</td>
</tr>
<tr>
<td></td>
<td>Hospital Location:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Urban = 1, N = 216</td>
<td>54.96%</td>
</tr>
<tr>
<td></td>
<td>Rural = 0, N = 177</td>
<td>45.04%</td>
</tr>
<tr>
<td></td>
<td>Total Commercial Share of Net Patient Revenue</td>
<td>.3791443 (.1049695)</td>
</tr>
<tr>
<td></td>
<td>Total Managed Care Share of Net Patient Revenue</td>
<td>.3481407 (.1789047)</td>
</tr>
<tr>
<td></td>
<td>Total Medicare share of net patient revenue</td>
<td>.438799 (.0935815)</td>
</tr>
<tr>
<td><strong>Market Characteristics</strong></td>
<td>Market Concentration at the System Level</td>
<td>.1815594 (.1352871)</td>
</tr>
<tr>
<td></td>
<td>Unemployment Rate in County</td>
<td>5.38047 (.177336)</td>
</tr>
<tr>
<td></td>
<td>Per Capita Income in County</td>
<td>32864.15 (8057.352)</td>
</tr>
</tbody>
</table>
Variable Category | Variable | Mean (Standard Deviation) N = 393
--- | --- | ---
Year | 2004, N = 137 | 34.86%
| 2005, N = 122 | 31.04%
| 2006, N = 134 | 34.10%

### Models

Cross-sectional linear regression models were computed with the ivreg2 procedure using STATA/IC 11.1 (STATACORP, 2011). I used the ivreg2 procedure to correct the panel data for heteroskedasticity and autocorrelations (Pevalin & Robson, 2009). I used robust standard errors for more efficient estimation of the coefficients of the independent variables and to generate statistics that were robust to both random heteroskedasticity and arbitrary intra-group correlation (Pevalin & Robson, 2009). The assumptions of linearity, normally distributed errors, and uncorrelated errors were checked and met. Means and standard deviations are presented in Table 3-2.

The following formulas were used to test the six hypotheses for the study:

**Hypothesis # 1a [Testing the association between hospital physician joint ventures and hospital occupancy rate]**

\[
\text{Hospital Occupancy Rate}_{2006 - 2004} = \beta_0 + \beta_1 \text{Joint Venture}_{2006 - 2004} + \beta_2 \text{Hospital Characteristics}_{2006 - 2004} + \beta_3 \text{Market Characteristics}_{2006 - 2004} + \epsilon
\]

**Hypothesis # 1b [Testing the association between hospital physician joint ventures and hospital financial performance]**
Hospital Total Margin\textsubscript{2006 - 2004} = \beta_0 + \beta_1 \text{JointVenture}\textsubscript{2006 - 2004} + \beta_2 \text{Hospital Characteristics}\textsubscript{2006 - 2004} + \beta_3 \text{Market Characteristics}\textsubscript{2006 - 2004} + \epsilon \\

Hospital Operating Margin\textsubscript{2006 - 2004} = \beta_0 + \beta_1 \text{JointVenture}\textsubscript{2006 - 2004} + \beta_2 \text{Hospital Characteristics}\textsubscript{2006 - 2004} + \beta_3 \text{Market Characteristics}\textsubscript{2006 - 2004} + \epsilon \\

Hypothesis # 2a [Testing the association between organizational legitimacy and occupancy rate]

Hospital Occupancy Rate\textsubscript{2006 - 2004} = \beta_0 + \beta_1 \text{JointVenture}\textsubscript{2006 - 2004} + \beta_2 \text{Hospital Bed Size} + \beta_3 \text{Hospital Characteristics}\textsubscript{2006 - 2004} + \beta_4 \text{Market Characteristics}\textsubscript{2006 - 2004} + \epsilon \\

Hypothesis # 2b [Testing the association between organizational legitimacy and hospital size and financial performance]

Hospital Total Margin Rate\textsubscript{2006 - 2004} = \beta_0 + \beta_1 \text{JointVenture}\textsubscript{2006 - 2004} + \beta_2 \text{Hospital Bed Size} + \beta_3 \text{Hospital Characteristics}\textsubscript{2006 - 2004} + \beta_4 \text{Market Characteristics}\textsubscript{2006 - 2004} + \epsilon \\

Hospital Operating Margin Rate\textsubscript{2006 - 2004} = \beta_0 + \beta_1 \text{JointVenture}\textsubscript{2006 - 2004} + \beta_2 \text{Hospital Bed Size} + \beta_3 \text{Hospital Characteristics}\textsubscript{2006 - 2004} + \beta_4 \text{Market Characteristics}\textsubscript{2006 - 2004} + \epsilon \\

Hypothesis # 3a [Testing association between joint ventures and occupancy with interaction between teaching status and occupancy rate]

Hospital Occupancy Rate\textsubscript{2006 - 2004} = \beta_0 + \beta_1 \text{JointVenture}\textsubscript{2006 - 2004} + \beta_2 \text{Hospital Bed Size} * \text{Joint Venture}\textsubscript{2006 - 2004} + \beta_3 \text{Hospital Teaching Status} * \text{Joint Venture}\textsubscript{2006 - 2004} + \beta_4 \text{Hospital
Hypothesis # 3b [Testing association between joint ventures and financial performance with interaction between hospital size and teaching status]

\[
\text{Hospital Total Margin Rate}_{2006-2004} = \beta_0 + \beta_1 \text{Joint Venture}_{2006-2004} + \beta_2 \text{Hospital Bed Size}_{2006-2004} \times \text{Joint Venture}_{2006-2004} + \beta_3 \text{Hospital Teaching Status}_{2006-2004} \times \text{Joint Venture}_{2006-2004} + \beta_4 \text{Hospital Characteristics}_{2006-2004} + \epsilon
\]

\[
\text{Hospital Operating Margin Rate}_{2006-2004} = \beta_0 + \beta_1 \text{Joint Venture}_{2006-2004} + \beta_2 \text{Hospital Bed Size}_{2006-2004} \times \text{Joint Venture}_{2006-2004} + \beta_3 \text{Hospital Teaching Status}_{2006-2004} \times \text{Joint Venture}_{2006-2004} + \beta_4 \text{Hospital Characteristics}_{2006-2004} + \beta_5 \text{Market Characteristics}_{2006-2004} + \epsilon
\]
Results

Table 3-3 provides a summary of regression results from testing of the hypotheses in the study.

Table 3-3: Results of Hypothesis Testing with Non-Interaction Model and Interaction Model

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Hypotheses</th>
<th>Results P-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a: Occupancy Rate</td>
<td>A positive association exists between joint venture activity and higher hospital occupancy rates.</td>
<td>Yes***</td>
</tr>
<tr>
<td>H1b: Total Margin and Operating Margin</td>
<td>A positive association exists between hospital-physician joint ventures and hospital profitability (Interaction Models)</td>
<td>Yes**</td>
</tr>
<tr>
<td>H2a: Occupancy Rate</td>
<td>A positive association exists between organizational legitimacy (as measured by bed size and teaching status) and occupancy rate</td>
<td>Yes***</td>
</tr>
<tr>
<td>H2b: Total Margin and Operating Margin</td>
<td>A positive association exists between organizational legitimacy (as measured by bed size and teaching status) and financial performance.</td>
<td>Yes***</td>
</tr>
<tr>
<td>H3a: Interaction Effect of Joint Venture and Bed Size on Occupancy</td>
<td>The positive impact of joint ventures on occupancy is moderated by organizational legitimacy (as measured by bed size and teaching status).</td>
<td>Yes** (Bed Size Only)</td>
</tr>
<tr>
<td>H3b: Interaction Effect of Joint Venture and Bed Size on Total Margin and Operating Margin</td>
<td>The positive impact of joint ventures on hospital financial performance is moderated by organizational legitimacy (as measured by bed size and teaching status).</td>
<td>Yes*** (Bed Size Only)</td>
</tr>
</tbody>
</table>

* = p < 0.10; ** = p < 0.05; *** = p < 0.01

The results of Table 3-4, Column 1 indicates that hospitals with joint ventures are associated with higher levels of occupancy (β =0.04, p < 0.01), these findings support Hypothesis 1a. The results of Columns 5 and 6 indicates that hospitals with joint ventures are associated with stronger financial performance, as measured by total margin (β =0.03, p < 0.05) and operating margin (β =0.03, p < 0.05). These findings support Hypothesis 1b.

The results of Table 4, Column 1 indicate that larger size hospitals, as measured by bed size, are associated with higher occupancy levels (β =0.0674, p < 0.05). These findings support
Hypothesis 2a. The results of Table 4, Column 1 indicate that large academic medical centers are positively associated with higher occupancy levels ($\beta = 0.0773$, $p < 0.01$). These findings support Hypothesis 2a.

Columns 2 and 3 indicate the larger hospitals are associated with stronger financial performance, as measured by total margin ($\beta = 0.03$, $p < 0.01$) and operating margin ($\beta = 0.03$, $p < 0.01$). These findings support hypothesis 2b. Columns 2 and 3 indicate a non-significant trending in the predicted direction indicating a positive association between COTH members and stronger financial performance as measured by total margin ($\beta = 0.01$, $p > 0.10$) and operating margin ($\beta = 0.01$, $p > 0.10$).

The results in Table 4, Column 4, 5, and 6 indicate that size moderates the positive association between small hospitals with joint ventures and higher occupancy and stronger financial performance. Column 4 indicate that smaller hospitals with joint ventures (category 0) are associated with a higher occupancy levels as compared with larger hospitals ($\beta = -0.07$, $p < 0.05$). This supports Hypothesis 3a. Column 4 results, or COTH membership ($\beta = -0.02$, $p > 0.10$), indicates a non-significant trending in the predicted direction signifying that teaching status may moderate the positive association between joint ventures and higher occupancy levels. This provides tentative support for Hypothesis 3a.

The results in Columns 5 and 6 indicate that smaller hospitals with joint ventures are associated with stronger financial performance relative to larger hospitals with joint ventures. Specifically, the results indicate that hospital size moderates the positive association joint ventures and stronger financial performance, as measured by total margin ($\beta = -0.04$, $p < 0.01$) and operating margin ($\beta = -0.05$, $p < 0.01$). This finding supports Hypothesis 3b.

Table 3-4, Columns 5 and 6 further test Hypothesis 3b and the results show there may be a non-significant interaction effect of teaching status on financial performance. The coefficient for teaching hospital affiliated with a medical school for total margin ($\beta = -0.00855$, $p > 0.10$) and
operating margin ($\beta = -0.00432, p > 0.10$) indicate a non-significant trending in the predicted direction. This provides tentative support for Hypothesis 3a.

The results of several control variables are worth noting. Table 3-4, Column 1 and 4 results indicate that nonprofit status is a significant positive impact on occupancy in both the base ($\beta = 0.09; p < .01$) and interaction models ($\beta = 0.09; p < .01$). This may reflect the role that non-profit hospitals play in providing long-term care for patients requiring lengthy average lengths of stay. Column 2 and 5 results indicate a positive relationship between non-profit status and total margin in both the base ($\beta = 0.03; p < .10$) and interaction models ($\beta = 0.03; p < 0.10$).

Column 1 indicates a significant negative association between patient revenue from commercial payers and occupancy ($\beta = -0.18; p < 0.01$). However, columns 2 and 3 indicate a positive impact from commercial reimbursement sources on financial performance, as measured by total margin ($\beta = 0.09; p < 0.05$) and operating margin ($\beta = 0.10; p < 0.05$). These results are mirrored in the interaction model.

Results in columns 2 and 3 indicate a significant positive association between managed care sources of net patient revenue and financial performance, as measured by total margin ($\beta = 0.08; p < 0.01$) and operating margin ($\beta = 0.06; p < 0.01$). However, Medicare as a source of net patient revenue was negatively associated with occupancy ($\beta = -0.30; p < 0.01$) in both the base and interaction models.

The results in columns 1 and 4 indicate that less market competition, or higher levels of market concentration at the system level, is negatively associated with occupancy ($\beta = -0.19; p < .01$) and in column 3 with stronger financial performance, as measured by operating margin ($\beta = 0.04; p < 0.05$). This may indicate that hospitals in more concentrated markets are able to generate higher revenue and profits from lower occupancy levels due to their negotiating power with payers.
Results in columns 2 and 3 indicate that the unemployment rate has a marginally significant negative impact on financial performance, as measured by total margin ($\beta = -0.02; p < 0.01$) and operating margin ($\beta = -0.02; p < 0.01$). This may reflect the influence of employer-sponsored insurance on the financial strength of local hospitals.
Table 3-4: Cross-Sectional Model Results: Impact of Hospital Physician Joint Ventures on Hospital Occupancy, Total Margin, and Operating Margin

<table>
<thead>
<tr>
<th>Variable Category</th>
<th>Variable</th>
<th>(1) Hospital Occupancy</th>
<th>(2) Total Margin</th>
<th>(3) Operating Margin</th>
<th>(4) Hospital Occupancy</th>
<th>(5) Total Margin</th>
<th>(6) Operating Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Independent Variable</strong></td>
<td>Hospital Physician Joint Venture</td>
<td>0.0369*** (0.0142)</td>
<td>-0.00364 (0.00570)</td>
<td>-0.00672 (0.00589)</td>
<td>0.105*** (0.0316)</td>
<td>0.0285** (0.0124)</td>
<td>0.0302** (0.0149)</td>
</tr>
<tr>
<td><strong>Hospital Organizational Characteristics</strong></td>
<td>Bed Size 1</td>
<td>0.0674*** (0.0179)</td>
<td>0.0258*** (0.00763)</td>
<td>0.0283*** (0.00843)</td>
<td>0.0732*** (0.0196)</td>
<td>0.0296*** (0.00799)</td>
<td>0.0332*** (0.00892)</td>
</tr>
<tr>
<td></td>
<td>Bed Size 1 x Joint Venture (Bed Size 0 omitted)</td>
<td>-0.0727** (0.0360)</td>
<td>-0.0366*** (0.0139)</td>
<td>-0.0452*** (0.0170)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Teaching Status 1</td>
<td>0.0155 (0.0153)</td>
<td>-0.0141* (0.00785)</td>
<td>-0.0192** (0.00814)</td>
<td>0.0202 (0.0193)</td>
<td>-0.00976 (0.00988)</td>
<td>-0.0158 (0.0103)</td>
</tr>
<tr>
<td></td>
<td>Teaching Status 2</td>
<td>0.0773*** (0.0214)</td>
<td>0.00851 (0.00946)</td>
<td>0.00794 (0.0101)</td>
<td>0.0855*** (0.0273)</td>
<td>0.00367 (0.0123)</td>
<td>0.000780 (0.0134)</td>
</tr>
<tr>
<td></td>
<td>Teaching Status 1 x Joint Venture (Teaching Status 0 omitted)</td>
<td>-0.00686 (0.0287)</td>
<td>-0.00855 (0.0128)</td>
<td>-0.00432 (0.0136)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Teaching Status 2 x Joint Venture (Teaching Status 0 omitted)</td>
<td>-0.0177 (0.0354)</td>
<td>0.0146 (0.0153)</td>
<td>0.0220 (0.0154)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hospital Ownership Type: Nonprofit vs Other</td>
<td>0.0942*** (0.0352)</td>
<td>0.0277* (0.0156)</td>
<td>0.0203 (0.0265)</td>
<td>0.0930*** (0.0358)</td>
<td>0.0272* (0.0154)</td>
<td>0.0198 (0.0261)</td>
</tr>
<tr>
<td></td>
<td>Hospital Location: Rural vs Urban</td>
<td>0.0152 (0.0211)</td>
<td>-0.0173** (0.00809)</td>
<td>-0.0132 (0.00869)</td>
<td>0.0141 (0.0209)</td>
<td>-0.0181** (0.00792)</td>
<td>-0.0144* (0.00855)</td>
</tr>
<tr>
<td></td>
<td>Total Commercial Share of NPR</td>
<td>-0.183** (0.0841)</td>
<td>0.0943** (0.0387)</td>
<td>0.0965** (0.0392)</td>
<td>-0.188** (0.0842)</td>
<td>0.0909** (0.0390)</td>
<td>0.0922** (0.0393)</td>
</tr>
<tr>
<td></td>
<td>Total Managed Care Share of NPR</td>
<td>0.0442 (0.0496)</td>
<td>0.0792*** (0.0219)</td>
<td>0.0646*** (0.0218)</td>
<td>0.0458 (0.0501)</td>
<td>0.0783*** (0.0220)</td>
<td>0.0645*** (0.0219)</td>
</tr>
<tr>
<td></td>
<td>Total Medicare share of NPR</td>
<td>-0.303*** (0.0997)</td>
<td>-0.0691 (0.0574)</td>
<td>-0.0888 (0.0603)</td>
<td>-0.300*** (0.102)</td>
<td>-0.0708 (0.0585)</td>
<td>-0.0924 (0.0610)</td>
</tr>
<tr>
<td><strong>Market Characteristics</strong></td>
<td>Market Concentration at the System Level</td>
<td>-0.186*** (0.0671)</td>
<td>0.0295 (0.0219)</td>
<td>0.0440** (0.0209)</td>
<td>-0.179*** (0.0690)</td>
<td>0.0314 (0.0227)</td>
<td>0.0448** (0.0215)</td>
</tr>
<tr>
<td></td>
<td>Unemployment Rate in County</td>
<td>0.000201 (0.00789)</td>
<td>-0.0170*** (0.00415)</td>
<td>-0.0152*** (0.00460)</td>
<td>-0.000353 (0.00783)</td>
<td>-0.0174*** (0.00413)</td>
<td>-0.0156*** (0.00460)</td>
</tr>
<tr>
<td></td>
<td>Per Capita Income in County</td>
<td>0.00000198 (0.00000150)</td>
<td>0.00000139** (0.000000653)</td>
<td>-0.000000741 (0.000000810)</td>
<td>0.00000199 (0.00000153)</td>
<td>-0.00000132** (0.000000647)</td>
<td>-0.000000656 (0.000000810)</td>
</tr>
<tr>
<td>Year (2004 omitted)</td>
<td>Base Models</td>
<td>Interaction Models</td>
<td></td>
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</tr>
<tr>
<td>2005</td>
<td>0.00208 (0.0132)</td>
<td>-0.000237 (0.00609)</td>
<td>0.000395 (0.0133)</td>
<td></td>
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<tr>
<td></td>
<td>-0.00103 (0.00510)</td>
<td></td>
<td>-0.00197 (0.00509)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>-0.000237 (0.00609)</td>
<td></td>
<td>-0.00133 (0.00608)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>-0.00997 (0.0156)</td>
<td>-0.0141* (0.00831)</td>
<td>-0.00956 (0.0156)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.0106 (0.00715)</td>
<td></td>
<td>-0.0111 (0.00710)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>-0.0141* (0.00831)</td>
<td></td>
<td>-0.0147* (0.00828)</td>
<td></td>
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</tbody>
</table>

* p < 0.10; ** p < 0.05; *** p < 0.01. For all Models: N = 393; Groups = 151
Discussion

Hospitals are seeking tighter alignment with physicians, and joint ventures represent an opportunity to share risk and align incentives with physicians. The results indicate that they offer hospitals potential benefits, including increasing occupancy and stronger financial performance, especially for smaller hospitals. However, such relationships are exceptionally complex. Due to the complexity and costs associated with alignment strategies, managers should assess their unique organizational characteristics when choosing among integration approaches with physicians.

Benefits that accrue to small hospitals through forming joint ventures derive from the disadvantages they may face from lack of legitimacy in institutional fields. Small hospitals that lack legitimacy should consider formal alignment mechanisms in the form of joint ventures as a means to increase occupancy and strengthen financial performance. Financial strength may be critical to forming joint ventures with physicians as it may provide additional resources to invest in infrastructure and technology. Diminishing margins and physicians partnering with larger competitors, along with hostile economic conditions may be signals for smaller hospitals to initiate physician alignment efforts through joint ventures. The results indicate that smaller hospitals experience a significant positive impact in occupancy and financial performance from joint ventures.

The findings indicate that larger hospitals, such as academic medical centers, may find that other physician alignment strategies may provide more advantages. Large hospitals that possess diverse sources of legitimacy, such as size, teaching status, medical technology, and
industry prestige, may benefit from focusing on other alignment strategies. CEOs may want to focus on a broad range of strategies that, when used in conjunction with one another, leverage legitimacy to align with physicians. For instance, large hospitals may use their information technology superiority to provide physicians with timely access to patient information, test results, and diagnostic imaging (Bates & Gawande, 2003). Such technology structures allow referring physicians to admit patients, and then monitor their care by other specialists and hospitalists. Enhancing a large hospital’s reputation for care quality may establish the facility as the premier place for physicians to practice and patients to receive care (Bates & Gawande, 2003). Fostering a reputation for clinical excellence may also enable large hospitals to differentiate themselves from their competition and increase bargaining power with insurers over reimbursement rates.

Involving physicians in active involvement in the management of the hospital through board membership or medical directorships may provide further alignment potential. Physician involvement in hospital governance has consistently shown to improve financial performance (Goes & Zan, 1995; Molinari, et al., 1995). Physicians may improve the value of strategic planning by aligning interests and producing more cooperative decision-making (Goes & Zan, 1995). Specifically, board participation by outside physicians may improve patient referrals (Molinari, et al., 1995).

Direct employment, particularly among physicians providing primary care, may be another source of alignment, enhance hospital efficiency, and care quality. Size may assist in establishing professional service agreements to provide emergency call coverage that may alleviate ER over-crowding and enhance patient flow productivity. Hospitalists may provide large hospitals enhanced patient throughput and efficiency by providing emergency call coverage. Such structures can potentially enhance alignment with community physicians as it allows them to remain focused on their office practice wherein their highest revenue potential is.
In summary, my results shed new light on the role of legitimacy as a moderator of the occupancy and financial performance benefits of joint ventures. They bring additional clarity to the findings of Goes and Zan (1995), who found that joint ventures associated with higher hospital occupancy rates. Specifically, joint venture formation enables smaller hospitals with fewer sources of legitimacy to align themselves with physicians and improve their performances.

**Study limitations**

I recognize there are considerations other than occupancy and financial performance that managers should consider when aligning with physicians. The hospital’s mission, access to capital, governing board position, and physician relationships all are critical in strategy formation.

Pennsylvania hospitals provide a wealth of performance data that may be applied to other markets (PHC4, 2006). While the study is confined to Pennsylvania hospitals, single-state financial assessments are frequent in the extant literature (Gapenski, Vogel, & Langland-Orban, 1993; Langland-Orban, Gapenski, & Vogel, 1996; Wang, Wan, Falk, & Goodwin, 2001). However, Pennsylvania hospitals possess characteristics that may not be fully generalizable to other states. For instance, Pennsylvania has a high percentage of non-profit hospitals, many rural counties, and state hospital reimbursement levels that may differ from other states (PHC4, 2006). Only three years of data were available to determine the impact of physician joint ventures on performance. Additional data could be used to provide an assessment of long-term impact of joint ventures on performance, macro economic cycles, changes in federal and state reimbursement policy, as well as changes in regulations.

Data are not available to capture whether hospitals participate in more than one joint venture. The data show only that the hospital participates in the physician joint venture, not the
nature of the joint venture such as ownership or contractual models (Cohn, Thomas, Rosenfield, & Schwartz, 2005).

The study did not include data on joint venture type, case-mix, wage-index, and consumer price index for all of the hospitals and counties over the three years. The joint venture variable is dichotomous and does not reflect the variation in types of joint ventures. Case-mix captures the complexity of the patients who are treated at the hospitals, and the county wage-index captures the variation in price for hospital staff. The consumer price index captures price inflation changes across time, and inflation is reflected in the prices that hospitals pay for supplies and cost of patient operations.

**Conclusion**

The results indicate that the benefits experienced by small hospitals from joint ventures may derive from the disadvantages they face in terms of legitimacy. Larger hospitals with other sources of alignment may not find joint ventures to be as beneficial. Larger hospitals may find more benefits from focusing on other alignment mechanisms such as size, teaching status, medical technology.

Future scholarship may focus on additional contingencies that impact the success of joint ventures as a means for physician alignment, such as the entry and exit of other market competitors. The varied types of joint ventures may impact the performance of hospitals differently based on incentives for physicians to refer patients to their partner hospitals. Additional contingency factors such as executive leadership, corporate mission, community focus, and culture may be assessed in future empirical studies of hospitals and joint ventures.
References


http://www.rural.palegislature.us/rural_urban.html


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Chapter 4

The Readmission Difference: Pennsylvania Hospitals and the Negative Impact of Hospital Readmissions on Financial Performance

Abstract

This study assesses the impact of hospital readmissions on the financial performance of hospitals. Understanding the determinants of hospital performance is one of the most important issues for managers of hospitals and policy makers. Hospital readmissions are a key driver of bed productivity and financial performance. Therefore, the study sought to assess the impact of readmissions due to infections and complications on financial performance. I use financial and hospital readmission data from the Pennsylvania Health Care Cost Containment Council for years 2003 through 2009. Market and organizational variables are from the American Hospital Association Annual Survey Database. Hospital Case-mix data is from Center for Medicare and Medicaid Services.

The study combined exploratory factor analysis and multiple regression with random effects and clustering. I use a risk adjusted composite score of hospital readmissions in the multiple regression model as the independent variable. Hospital readmissions were found to have a negative impact on operating margin in both the random effects model ($\beta = -0.788, p < 0.01$) and in the fixed effects model ($\beta = -0.576, p < 0.10$).

The results of this study suggest contrary to conventional wisdom, readmissions from complications and infection have a strong negative impact on the financial performance of hospitals. I discuss implications from the findings for management and policy.
Introduction

Understanding the determinants of hospital performance is one of the most important issues for managers of hospitals and policy makers. Bed productivity is one the primary drivers of hospital performance (Gapenski, 2003). Hospital readmissions have an important impact on both productivity and reimbursement and are the focus of this study.

Discharge from the hospital is a critical and risky juncture in the care continuum for patients. They may suddenly face the responsibility of their own recovery with limited or misunderstood information. According to a Dartmouth Atlas Report, almost 1 in 5 discharged Medicare patients are readmitted within 30 days and those with congestive heart failure are readmitted approximately 21 percent of the time, according to data from 2004 through 2009 (Goodman, Fisher, & Chang, 2011).

Readmissions are a key source of Medicare spending increases as it represents an annual cost of $17 billion (Jencks, Williams, & Coleman, 2009). The Medicare Payment Advisory Commission (MedPAC) (2007) identified readmissions as a key driver of Medicare spending when 17.6% of hospital admissions resulted in readmissions within 30 days of discharge, 11.3% within 15 days, and 6.2% within 7 days. While many treatments require continued readmission, only 10 percent of the Medicare hospital readmissions in 2009 were planned (Jencks, Williams, & Coleman, 2009).

It is perhaps not surprising that hospitals might be reluctant to adopt interventions to reduce readmissions when they are paid on a FFS basis, even when the intervention is proven to be effective (Chollet, Barrett, & Lake, 2011). However, further changes in hospital reimbursement structure places increased importance on addressing clinical care quality. The prospect of value-based purchasing (VBP) starting in October 2012 presents hospitals with
financial incentives to reduce readmissions and improve quality standards. Medicare incentive payments will be based on improvement in patient satisfaction and clinical outcomes. At least one of the quality performance measurements addresses an important factor for heart failure patients: the quality of their discharge instructions (Center for Medicare and Medicaid Services, 2011).

There is a lack of empirical research on the relationship between hospital readmission and performance. In this study, I examine the impact of hospital readmissions on hospital financial performance. I sought to determine the degree to which variations in 30-day readmission rates due to complications or infection after discharge from acute care explain financial performance. This study is the first to examine empirically the impact of readmissions on hospital financial performance.

**Background and Framework**

A systematic review reported a link between early hospital readmissions for patients with diabetes, heart failure, and lung disease and poor quality of inpatient care (Ashton, Kuykendall, Johnson, Wray, & Wu, 1995). From a management perspective, unplanned hospital readmissions are costly and reflect suboptimal quality of inpatient care (Epstein, Jha, & Orav, 2011). Common reasons for hospital readmission include unclear communication between doctors, staff, patients, caregivers, and families at discharge; inappropriate instructions from hospital discharge staff regarding diet, mobility, medication and general care; lack of family support to provide informal home care; missing key symptoms that signal a need for readmission; limited resources for care at home, lack of transportation and patient advocacy; and, lack of professional care supervision at home and resulting noncompliance (Chollet, Barrett, & Lake, 2011; Stone & Hoffman, 2010). High rates of hospital readmissions may also indicate unacceptable levels of hospital-acquired
infections, premature discharge, failure to reconcile medications, inadequate communication with patients and community providers responsible for post-discharge care, or poor transitional care (Chollet, Barrett, & Lake, 2011).

Unplanned readmissions are costly, as MedPAC reported that 13.3% of 30-day hospital readmissions were potentially preventable and cost an additional $12 billion, based on 2005 Medicare data (MedPAC, June 2007). Jencks, et al. (2009) found that 19.6% of Medicare fee-for-service beneficiaries who had been discharged from a hospital were readmitted to the hospital within 30 days, 34.0% within 90 days, and more than half (56.1%) within one year of discharge. Such readmissions were could potentially be prevented as approximately half of readmitted patients do not received follow-up care from a physician after discharge (Jencks, Williams, & Coleman, 2009).

According to Goodman, et al., (2011), from 2004 through 2009 the national 30-day readmission rates remained essentially static among Medicare patients, despite progress in medical technology and quality improvement efforts. Epstein, et al. (2011) found a significant relationship between hospital referral regions’ (HRR) rates for initial admission and the rates of readmissions for congestive heart failure and pneumonia. Regional referral rates were derived from the Dartmouth Atlas Project and based on travel distances to hospitals for tertiary care (Epstein, et al., 2011).

From a regional perspective and specific to Pennsylvania, the PHC4 reported that there were 21,688 readmissions within 30 days due to a complication or infection in 2009, which translated into $1.1 billion in charges and 150,000 hospital days (PHC4, 2011).

For the purposes of this study, readmissions are admissions within 30 days of discharge due to a complication or infection in Pennsylvania acute care hospitals and reported to the Pennsylvania Health Care Cost Containment Council (PHC4). These are distinct from medically
appropriate readmissions for patients with chronic conditions associated with multiple readmissions along the disease trajectory.

Each hospital admission represents additional revenue for hospitals paid on a fee-for-service (FFS) basis. Medicare reimburses hospitals for each admission unless the patient has been discharged and readmitted to the same hospital for the same Medicare Severity - Diagnosis Related Groups (MS-DRG) within 24 hours (Stone & Hoffman, 2010). MS-DRGs are Medicare payment group codes linked to a fixed payment amount based on the average cost of patients in the group. Patients are assigned to a MS-DRG based on their diagnosis, surgical procedures, age and other information. The MS-DRG codes are linked to a fixed payment amount based on the average cost of patients in the group (Department of Health and Human Services, 2012).

**Theoretical Framework**

Hospital readmissions may reflect intrinsic organizational mechanisms that contribute to poor quality of care and weak financial performance. High readmission rates may be a sign of poor care and business processes that are intrinsic to the organization and produce weak financial performance and poor quality (Jencks, et al., 2009). However, Alexander, et al., (2006) found that quality improvement efforts have a direct positive impact on financial performance. For example, hospitals with broader, more intense quality improvement programs experienced stronger financial performance (Alexander, et al., 2006).

Further, high-quality care is usually less costly and quality and costs improve simultaneously when implementing best practices, including process protocols, technologies, drugs, and other state of the art initiatives (Porter & Teisberg, 2006). Simultaneous improvement in financial performance and quality may be possible when medical mistakes are eliminated and care is provided correctly the first time (Porter & Teisberg, 2006). Therefore, I propose that
efforts to improve overall hospital quality of care may simultaneously reduce hospital readmissions and strengthen hospital financial performance.

H1b: *Hospitals with higher levels of readmissions are associated with weaker financial performance.*

Nevertheless, there are competing perspectives offered on the financial impact of hospital readmissions. Payers reimburse hospitals for each readmission and higher readmission rates translate into additional patient revenue. Generally, for hospitals reimbursed on a FFS basis, each readmission represents additional revenue, which may improve hospital financial performance, assuming all else constant. If the cost of care and reimbursement level for each patient is constant, higher patient volume due to readmissions may be associated with stronger financial performance. The following hypothesis is also tested:

H1b: *Hospitals with higher levels of readmissions are associated with stronger financial performance.*

**Data and Analytic Methods**

I examined data on all general acute care hospitals in Pennsylvania for the years 2003 through 2009. Data for this study were drawn from four primary sources: The Pennsylvania Health Care Cost Containment Council (PHC4); the American Hospital Association (AHA) Annual Survey Database; the hospital case mix was drawn from the Centers for Medicare and Medicaid Studies (CMS) Inpatient Prospective Patients System, and county level market data from the Area Resource File (ARF). The study is limited to hospitals in Pennsylvania to capture uniformly the impact of regulation, reimbursement, and unique market and demographic characteristics.
Dependent variables

The dependent financial performance variables in this study are based on extant literature and measure performance with operating margin and total margin (Gapenski, 2003). The goal of the efficient organization is to spread as much of the fixed costs across more patient beds and therefore increase the patient profitability ratio (Gapenski, 2003). Operating margin is defined as operating income over operating revenues and captures core business operations by removing the transitory influence of non-operating sources of revenue and cost (Gapenski, 2003). Defined as net income divided by total revenues, total margin measures the ability of the hospital to control expenses and captures the return on operating and non-operating sources of revenues (Gapenski, 2003).

Independent Variable

The independent variable is a composite score of nine severity risk adjusted 30-day readmissions due to complication or infection for Pennsylvania hospitals from 2003 through 2009. Readmission rates were risk adjusted to account for the fact that hospitals within the sample had differing levels of patient acuities. Readmissions were due to complications or infection after an initial diagnosis of abnormal heartbeat, chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF), diabetes with medical management, kidney and urinary tract infection, infections pneumonia, stomach and intestinal bleeding, stroke non-hemorrhagic, and hip fracture with surgical repair. I chose these nine conditions based on data availability and to ensure comprehensiveness. I used risk adjusted hospital readmission rates in exploratory factor analysis with varimax rotation to identify loading factors (Kremelberg, 2011). I identified one factor with an eigen value greater than 1 (2.99253), variables were assigned to the factor with a
loading score of at least 0.5 (Kremelberg, 2011). Principal factor analysis supported the construction of a single scale, which showed reasonably good reliability ($\chi^2 = 1353.43$) (Kremelberg, 2011).

**Control Variables**

I used control variables to capture organizational and market factors that may influence the readmission rates of hospitals. I obtained data from the American Hospital Association (AHA) Annual Survey Database for organizational characteristics including ownership, teaching status, Council of Teaching Hospitals (COTH) membership, system centralization, and intensity of healthcare information technology. Ownership type captures profit incentives, such as generating maximum profit for shareholders or providing comprehensive care to patient populations due to strong mission objectives (Gapenski, et al., 1993). Hospital ownership is coded as governmental equal to zero, non-profit equal to one, and for-profit equal to two. I coded teaching status as zero for non-teaching hospital, one for hospital affiliated with a medical school, and coded as two for major academic medical centers that are members of the Council of Teaching Hospitals (COTH). Teaching status captures the hospitals’ patient mix and acuity for patients referred to tertiary and quaternary care centers.

The system centralization variable captures whether the hospital network or system is centrally organized hospital for service delivery, physician arrangements, and insurance product development (Bazzoli, et al., 2000). Centralization is on a 6-category scale ranging from 1 (centralized) to 5 (decentralized) with 6 assigned to non-system members. The index captures the integration of care services across the continuum and the potential impact of centrally planned discharge or transfer to other providers. Highly centralized systems may experience reduced readmissions through monitoring and management of patients by highly coordinated providers.
Technical complexity index captures the state of the hospital clinical information systems and medical technology. Hospitals providing tertiary care to acute patients implement information technology systems to support their clinical decision-making and business processes. Such systems may enable hospitals to reduce complications through enabling clinicians to access and monitor their referred patient’s data in a timely and convenient manner.

To access payer mix characteristics, I obtained data from PHC4. Uncompensated care as a percentage of net patient revenue (NPR) captures payer-mix characteristics for the hospital. Hospitals with high percentages of uncompensated care as a percentage of NPR may experience high readmission rates of patients unable to pay for services. Uncompensated care is composed of bad debt and charity care. Hospitals provide charity care without charge because the patient is unable to pay for their care (PHC4, 2011). Bad debt represents the lost revenue for care in which the hospital initially anticipated payment, extended credit to the patient, but later determined it to be uncollectable (PHC4, 2011). Patients without ability to pay for their care may have higher readmission rates if they are unable to afford follow-up care, therapy, and pharmaceutical prescriptions. High readmission rates for such patients may also weaken a hospital’s financial performance.

I used the Area Resource File (ARF) to obtain market characteristics such as county per capita income, number of ambulatory surgical centers, total number of hospitals, and population over 65 years of age. Such variables capture the overall market demand and supply for hospital services (Harrison, 2006). Higher levels of care services and patient access may translate into fewer readmissions due to complications or infections.
Models

In the multiple regression equation, the independent variable is the hospital readmission composite score. I compared models with fixed effects and random effects and used the Hausman Test to determine that random effects were appropriate to use in the multiple regression model. Based on the Hausman Test results ($\chi^2 = 14.32$, $p < 0.2158$), I was not able to reject the null hypothesis that both random and fixed effects were consistent methods to estimate the coefficients (Balagia, Bresson, & Pirotte, 2003). The random effects model allowed us to control for hospital organizational factors, such as teaching status, ownership, technical complexity, and centralization (Littell, Stroup, & Freund, 2002). The multiple regression equation used random effects, clustering by AHAID, with a composite risk-adjusted hospital readmission score as the independent variable. The readmission score is regressed directly on the outcome performance variable and not time lagged because reimbursement for each readmission would most impact operating margin and total margin during the current quarter or year.

Therefore the models to test Hypotheses 1a and 1b are:

Hospital Total Margin $\text{2003 - 2009} = \beta_0 + \beta_1 \text{Hospital Readmissions 2003 - 2009} + \beta_2 \text{ Hospital Characteristics 2003 - 2009} + \beta_3 \text{ Market Characteristics 2003 - 2009} + \epsilon$

Hospital Operating Margin $\text{2003 - 2009} = \beta_0 + \beta_1 \text{Hospital Readmissions 2003 - 2009} + \beta_2 \text{ Hospital Characteristics 2003 - 2009} + \beta_3 \text{ Market Characteristics 2003 - 2009} + \epsilon$
Results

Table 4-1 provides descriptive statistics for the dependent and control variables including means and standard deviations for the independent and dependent variables of the study. The study population consists of all hospitals in Pennsylvania between 2003 through 2009.

Descriptive Analyses

I initially examined each of the hospital financial performance and readmission variables for hospitals in Pennsylvania from 2003 - 2009. This allowed for an assessment of which readmission diagnosis was the highest and its impact on hospital financial performance. The descriptive analyses for financial performance measures and risk adjusted readmission scores are as follows in Table 4-1.

Table 4-1: Descriptive Statistics of Continuous Variables, 2003 – 2009.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Margin, N = 980</td>
<td>2.26</td>
<td>6.07</td>
<td>-35.45</td>
<td>25.61</td>
</tr>
<tr>
<td>Operating Margin, N = 980</td>
<td>1.59</td>
<td>6.51</td>
<td>-37.60</td>
<td>24.23</td>
</tr>
<tr>
<td>Hospital readmission composite score index, N = 980</td>
<td>-0.04</td>
<td>0.97</td>
<td>-2.58</td>
<td>4.40</td>
</tr>
<tr>
<td>Risk Adjusted CHF Readmission Score, N = 1062</td>
<td>24.84</td>
<td>4.86</td>
<td>8.38</td>
<td>38.09</td>
</tr>
<tr>
<td>Risk Adjusted Kidney Readmission Score, N = 1008</td>
<td>23.02</td>
<td>7.4</td>
<td>0</td>
<td>59.7</td>
</tr>
<tr>
<td>Risk Adjusted COPD Readmission Score, N = 1067</td>
<td>21.07</td>
<td>5.14</td>
<td>0</td>
<td>35.01</td>
</tr>
<tr>
<td>Risk Adjusted Diabetes with medical management, N = 1053</td>
<td>16.83</td>
<td>6.43</td>
<td>0</td>
<td>45.58</td>
</tr>
<tr>
<td>Risk Adjusted Pneumonia Readmission Score, N = 1069</td>
<td>16.65</td>
<td>4.11</td>
<td>0</td>
<td>34.7</td>
</tr>
<tr>
<td>Risk Adjusted Stomach and Intestinal Bleeding, N = 1069</td>
<td>15.90</td>
<td>5.76</td>
<td>0</td>
<td>47.12</td>
</tr>
<tr>
<td>Risk Adjusted Abnormal heartbeat, N = 1061</td>
<td>15.62</td>
<td>4.78</td>
<td>0</td>
<td>46</td>
</tr>
<tr>
<td>Risk Adjusted Hip Fracture With Surgical Repair, N = 1002</td>
<td>15.02</td>
<td>6.42</td>
<td>0</td>
<td>63.52</td>
</tr>
<tr>
<td>Risk Adjusted Stroke Readmission Score, N = 1047</td>
<td>14.43</td>
<td>5.51</td>
<td>0</td>
<td>43.59</td>
</tr>
</tbody>
</table>

Risk adjusted readmission scores for CHF was the highest (Mean = 24.84) and the mean for the stroke (Mean = 14.43) readmission score was the lowest among the nine assessed diagnoses. The mean financial performance measurements of total margin (Mean = 2.26, Std. Dev. = 6.07) and operating margin (Mean = 1.59, Std. Dev. = 6.51) had relatively high standard
deviations, indicating the representative mixture of hospitals with diverse levels of financial performance.

**Statistical Analysis**

Multiple regression analyses were used to examine the effects of hospital readmissions on the two financial performance measures. I used random effects, substantiated by comparing to fixed effects using the Hausman test, but present the result of both in Table 4-2. The random effects model allowed us to control for hospital organizational factors, such as teaching status, COTH membership, ownership, technical complexity, payer mix, and system centralization factors. Fixed effects confirmed the findings and allowed me to capture within hospital time invariant factors from 2003 through 2009 (Littell, Stroup, & Freund, 2002). I found a statistically significant negative impact of readmissions on performance for both models. This provides support for Hypothesis 1b and by default a lack of support for Hypothesis 1a. Columns 1 - 4 indicate that for random and fixed effects models, the impact on financial performance was negative, with p-value levels ranging from less than 0.10 to less than 0.01.

Table 4-2, columns 1 and 2 indicate that hospital readmissions had a negative impact on operating margin ($\beta = -0.788$, $p < 0.01$) and total margin ($\beta = -0.839$, $p < 0.10$) in the random effects model. The results of this finding support Hypothesis 1b. To examine the robustness of using random effects, I additionally report the results in columns 3 and 4. Columns 3 and 4 indicate that hospital readmissions also had a negative impact on operating margin ($\beta = -0.576$, $p < 0.10$) and total margin ($\beta = -0.610$, $p < 0.05$) in the fixed effects model. The results of this finding support Hypothesis 1b.

The results in columns 1, 2, and 4 indicate that Uncompensated Care as a Percentage of net patient revenue (NPR) is a statistically significant control variable worth noting given its
negative impact on financial performance. Uncompensated care percentage of NPR differs from performance indicators as it captures hospital payer mix characteristics verses marginal profitability. The variable was significant in both the random effects models in column 1 and 2 and in the fixed effects models in column 4. Its impact on operating margin was \( \beta = -0.726, p < 0.10 \) and on total margin \( \beta = 0.642, p < 0.05 \) in the random effects model. Uncompensated care percentage of NPR was checked as a moderator of financial performance and not found to be significant.

In addition, in columns 1 and 2 the hospital Technical Complexity Index has a positive impact on Operating Margin \( \beta = 0.754, p < 0.10 \) and on Total Margin \( \beta = 0.844, p < 0.01 \) in the random effects model.
Table 4-2: Impact of Risk-adjusted Hospital Readmission Rates on Operating Margin and Total Margin

<table>
<thead>
<tr>
<th>Column Number Model Type</th>
<th>(1) Random Effects N = 980 Operating Margin</th>
<th>(2) Random Effects N = 980 Total Margin</th>
<th>(3) Fixed Effects N = 980 Operating Margin</th>
<th>(4) Fixed Effects N = 980 Total Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Readmissions</td>
<td>-0.788*** (0.301)</td>
<td>-0.839*** (0.273)</td>
<td>-0.576* (0.319)</td>
<td>-0.610** (0.285)</td>
</tr>
<tr>
<td>Hospital Ownership Type</td>
<td>1.263 (2.909)</td>
<td>1.517 (1.853)</td>
<td>0.307 (4.238)</td>
<td>-0.545 (2.738)</td>
</tr>
<tr>
<td>Teaching Status</td>
<td>-0.0978 (0.833)</td>
<td>-0.242 (0.757)</td>
<td>-0.130 (1.130)</td>
<td>-0.236 (1.148)</td>
</tr>
<tr>
<td>COTH Membership</td>
<td>0.965 (0.864)</td>
<td>0.896 (0.880)</td>
<td>-0.290 (1.320)</td>
<td>0.194 (1.209)</td>
</tr>
<tr>
<td>Centralization:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Category 1 is omitted)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category 2</td>
<td>-2.018 (1.856)</td>
<td>-0.804 (1.549)</td>
<td>-1.549 (1.861)</td>
<td>-0.446 (1.598)</td>
</tr>
<tr>
<td>Category 3</td>
<td>-1.479 (1.666)</td>
<td>-1.239 (1.415)</td>
<td>-0.512 (1.691)</td>
<td>-0.406 (1.496)</td>
</tr>
<tr>
<td>Category 4</td>
<td>-0.160 (2.273)</td>
<td>-0.164 (1.733)</td>
<td>1.139 (2.324)</td>
<td>0.950 (1.801)</td>
</tr>
<tr>
<td>Category 5</td>
<td>-4.893* (2.532)</td>
<td>-4.109* (2.446)</td>
<td>-2.871 (2.832)</td>
<td>-1.919 (2.719)</td>
</tr>
<tr>
<td>Category 6</td>
<td>-1.698 (1.778)</td>
<td>-1.060 (1.428)</td>
<td>-0.356 (1.848)</td>
<td>-0.0166 (1.499)</td>
</tr>
<tr>
<td>Technical Complexity Index</td>
<td>0.754* (0.418)</td>
<td>0.844*** (0.325)</td>
<td>-0.0453 (0.565)</td>
<td>-0.0224 (0.504)</td>
</tr>
<tr>
<td>Uncompensated Care as a Percentage of NPR</td>
<td>-0.726* (0.401)</td>
<td>-0.642** (0.315)</td>
<td>-0.721 (0.488)</td>
<td>-0.677* (0.359)</td>
</tr>
<tr>
<td>Total Ambulatory Surgery Centers</td>
<td>0.145 (0.135)</td>
<td>0.0783 (0.117)</td>
<td>0.152 (0.161)</td>
<td>0.133 (0.155)</td>
</tr>
<tr>
<td>Total Hospitals</td>
<td>-0.153 (0.166)</td>
<td>-0.110 (0.153)</td>
<td>-0.115 (0.403)</td>
<td>-0.0821 (0.370)</td>
</tr>
<tr>
<td>Population Over 65 Years Of Age</td>
<td>0.000000235 (0.0000259)</td>
<td>0.000000459 (0.0000243)</td>
<td>0.0000122 (0.000107)</td>
<td>0.00000710 (0.000096 4)</td>
</tr>
<tr>
<td>Per Capita Income</td>
<td>0.00000924 (0.0000780)</td>
<td>0.00000662 (0.0000669)</td>
<td>0.000183 (0.000238)</td>
<td>0.0000767 (0.000194)</td>
</tr>
</tbody>
</table>

* p < 0.10; ** p < 0.05; *** p < 0.01

Table 4-3 allows us to determine if the overall impact is driven by individual diagnoses.

Seven of the nine readmission scores had a negative impact on hospital financial performance as measured by operating margin. These findings represent an overall negative impact on hospital
financial performance. Specifically, strong negative influences include readmissions due to complications or infection from COPD ($\beta = -0.106, p < 0.05$), congestive heart failure ($\beta = -0.0833, p < 0.10$), and diabetes with medical management ($\beta = -0.0797, p < 0.05$).

There were, however, some inconsistencies in the results relative to the influence of individual readmission diagnoses. I found that readmission from complications or infection for patients initially diagnosed with cardiopulmonary obstructive disease (COPD) had the strongest ($\beta = -0.106, p < 0.05$) negative impact on operating margin and kidney and urinary track disease had a weak positive ($\beta = 0.0359, p < 0.05$) impact in operating margin. A possible explanation for this impact may be that renal dialysis is profitable hospital service line. Patient readmissions due to infections and complications from renal dialysis may be assigned the same DRG classification as patients receiving routine dialysis services. Additional study is needed to fully assess the implications of this anomaly. Overall, the results for the nine individual readmission diagnoses were consistent with the composite results.
<table>
<thead>
<tr>
<th>Conditions</th>
<th>All</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 980</td>
<td>N = 1061</td>
<td>N = 1067</td>
<td>N = 1062</td>
<td>N = 1053</td>
<td>N = 1008</td>
<td>N = 1069</td>
<td>N = 1059</td>
<td>N = 1047</td>
<td>N = 1002</td>
</tr>
<tr>
<td>Readmissions</td>
<td>-0.788*** (0.301)</td>
<td>-0.0282 (0.0362)</td>
<td>-0.106** (0.0464)</td>
<td>-0.0833** (0.0492)</td>
<td>-0.0797*** (0.0357)</td>
<td>0.0359** (0.0183)</td>
<td>-0.0548 (0.0438)</td>
<td>-0.0423 (0.0581)</td>
<td>0.00130 (0.0393)</td>
<td>-0.0497 (0.0359)</td>
</tr>
<tr>
<td>Hospital Ownership Type</td>
<td>1.263 (2.909)</td>
<td>1.415 (2.934)</td>
<td>1.321 (2.909)</td>
<td>1.360 (2.882)</td>
<td>1.259 (2.901)</td>
<td>1.255 (2.981)</td>
<td>1.377 (2.926)</td>
<td>1.366 (2.949)</td>
<td>1.388 (2.914)</td>
<td>1.410 (2.921)</td>
</tr>
<tr>
<td>Medical School Affiliation</td>
<td>-0.0978 (0.833)</td>
<td>-0.187 (0.816)</td>
<td>-0.0972 (0.819)</td>
<td>-0.210 (0.828)</td>
<td>-0.170 (0.827)</td>
<td>-0.0328 (0.819)</td>
<td>-0.222 (0.816)</td>
<td>-0.200 (0.825)</td>
<td>-0.182 (0.829)</td>
<td>-0.170 (0.807)</td>
</tr>
<tr>
<td>COTH Membership</td>
<td>0.965 (0.864)</td>
<td>1.211 (0.864)</td>
<td>1.148 (0.886)</td>
<td>0.962 (0.820)</td>
<td>0.874 (0.817)</td>
<td>1.218 (0.865)</td>
<td>1.224 (0.854)</td>
<td>1.215 (0.856)</td>
<td>0.922 (0.818)</td>
<td>0.804 (0.818)</td>
</tr>
<tr>
<td>Centralization:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Icluster_2</td>
<td>-2.018 (1.856)</td>
<td>-1.511 (1.792)</td>
<td>-1.279 (1.661)</td>
<td>-1.373 (1.726)</td>
<td>-1.393 (1.790)</td>
<td>-1.971 (1.863)</td>
<td>-1.457 (1.748)</td>
<td>-1.388 (1.719)</td>
<td>-1.982 (1.866)</td>
<td>-2.125 (1.853)</td>
</tr>
<tr>
<td>Icluster_3</td>
<td>-1.479 (1.666)</td>
<td>-1.304 (1.625)</td>
<td>-1.042 (1.491)</td>
<td>-1.166 (1.571)</td>
<td>-1.258 (1.608)</td>
<td>-1.533 (1.704)</td>
<td>-1.227 (1.582)</td>
<td>-1.212 (1.559)</td>
<td>-1.594 (1.706)</td>
<td>-1.668 (1.678)</td>
</tr>
<tr>
<td>Icluster_4</td>
<td>-0.160 (2.273)</td>
<td>0.190 (2.182)</td>
<td>0.434 (2.070)</td>
<td>0.401 (2.129)</td>
<td>0.216 (2.170)</td>
<td>0.151 (2.299)</td>
<td>0.262 (2.145)</td>
<td>0.265 (2.145)</td>
<td>-0.301 (2.235)</td>
<td>-0.481 (2.198)</td>
</tr>
<tr>
<td>Icluster_5</td>
<td>-4.893* (2.532)</td>
<td>-4.164 (2.565)</td>
<td>-4.048* (2.373)</td>
<td>-4.222* (2.382)</td>
<td>-4.207 (2.570)</td>
<td>-4.731* (2.674)</td>
<td>-4.147* (2.508)</td>
<td>-4.118* (2.452)</td>
<td>-4.813* (2.565)</td>
<td>-4.757* (2.565)</td>
</tr>
<tr>
<td>Icluster_6</td>
<td>-1.698 (1.778)</td>
<td>-1.295 (1.722)</td>
<td>-1.083 (1.575)</td>
<td>-1.173 (1.651)</td>
<td>-1.272 (1.718)</td>
<td>-1.760 (1.793)</td>
<td>-1.248 (1.670)</td>
<td>-1.185 (1.646)</td>
<td>-1.875 (1.794)</td>
<td>-1.814 (1.783)</td>
</tr>
<tr>
<td>Technical Complexity Index</td>
<td>0.754* (0.418)</td>
<td>0.710* (0.400)</td>
<td>0.726* (0.386)</td>
<td>0.802** (0.388)</td>
<td>0.878** (0.387)</td>
<td>0.679* (0.411)</td>
<td>0.753* (0.390)</td>
<td>0.730* (0.399)</td>
<td>0.748* (0.397)</td>
<td>0.830** (0.415)</td>
</tr>
<tr>
<td>Uncompensated Care as a Percentage of NPR</td>
<td>-0.726* (0.401)</td>
<td>-0.522 (0.383)</td>
<td>-0.597 (0.369)</td>
<td>-0.571 (0.374)</td>
<td>-0.453 (0.378)</td>
<td>-0.731* (0.408)</td>
<td>-0.620* (0.372)</td>
<td>-0.514 (0.382)</td>
<td>-0.509 (0.391)</td>
<td>-0.815** (0.396)</td>
</tr>
<tr>
<td>Total Ambulatory Surgery Centers</td>
<td>0.145 (0.135)</td>
<td>0.0977 (0.137)</td>
<td>0.0986 (0.133)</td>
<td>0.109 (0.134)</td>
<td>0.0980 (0.137)</td>
<td>0.172 (0.137)</td>
<td>0.0983 (0.135)</td>
<td>0.104 (0.134)</td>
<td>0.144 (0.137)</td>
<td>0.136 (0.133)</td>
</tr>
<tr>
<td>Total Hospitals</td>
<td>-0.153 (0.166)</td>
<td>-0.193 (0.175)</td>
<td>-0.203 (0.172)</td>
<td>-0.187 (0.172)</td>
<td>-0.199 (0.174)</td>
<td>-0.153 (0.170)</td>
<td>-0.195 (0.173)</td>
<td>-0.195 (0.173)</td>
<td>-0.161 (0.177)</td>
<td>-0.219 (0.175)</td>
</tr>
<tr>
<td>Population Over 65 Years Of Age</td>
<td>0.00000235 (0.0000259)</td>
<td>0.00000918 (0.0000274)</td>
<td>0.0000122 (0.0000227)</td>
<td>0.00000787 (0.0000227)</td>
<td>0.00000975 (0.0000225)</td>
<td>-0.00000336 (0.0000227)</td>
<td>0.00000979 (0.0000227)</td>
<td>-0.000000122 (0.0000228)</td>
<td>-0.000000106 (0.0000227)</td>
<td>-0.000000106 (0.0000227)</td>
</tr>
<tr>
<td>Per Capita Income</td>
<td>0.00000924 (0.0000780)</td>
<td>0.00000820 (0.0000791)</td>
<td>0.00000824 (0.0000776)</td>
<td>0.00000852 (0.0000777)</td>
<td>0.00000942 (0.0000786)</td>
<td>0.00000662 (0.0000786)</td>
<td>0.00000804 (0.0000780)</td>
<td>0.00000803 (0.0000784)</td>
<td>0.00000861 (0.0000784)</td>
<td>0.0000834 (0.0000787)</td>
</tr>
<tr>
<td>Condition(s)</td>
<td>All</td>
<td>1 = Abnormal Heartbeat</td>
<td>2 = COPD</td>
<td>3 = CHF</td>
<td>4 = Diabetes With Medical Management</td>
<td>5 = Kidney and Urinary Tract Infection</td>
<td>6 = Infections Pneumonia</td>
<td>7 = Stomach And Intestinal Bleeding</td>
<td>8 = Stroke Non-Hemorrhagic</td>
<td>9 = Hip Fracture With Surgical Repair</td>
</tr>
</tbody>
</table>

*p < 0.10; **p < 0.05; ***p < 0.01
Discussion

To examine the effects of readmissions on the financial performance of hospitals, this study examines the effect of nine high-volume readmission diagnosis for Pennsylvania hospitals. The results of this study suggest, contrary to conventional wisdom, readmissions from complications and infection have a strong negative impact on the financial performance of hospitals. I discuss the implications of these findings below.

Hypothesis Testing and Interpretation

Table 4-4 presents a summary of results from testing of the hypotheses in the study.

Table 4-4: Results of Hypothesis Testing

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Hypotheses</th>
<th>Results &amp; P-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a: Financial Performance</td>
<td>H1a: Hospitals with higher levels of readmissions are associated with stronger financial performance.</td>
<td>Not supported</td>
</tr>
<tr>
<td>H1b: Financial Performance</td>
<td>H1b: Hospitals with higher levels of readmissions are associated with weaker financial performance.</td>
<td>Negative***</td>
</tr>
</tbody>
</table>

* = p < 0.10; ** = p < 0.05; *** = p < 0.01

The results shed new light on the relationship between readmissions and financial performance. The following example, using the same medical and surgical conditions examined in the study illustrates this relationship. In Figure 4-1, Scenario 1 presents Average Revenue and Average Costs for a patient admitted for a stomach procedure involving bleeding or MS-DRG 328 and then readmitted for a post-operative infection without an operating room procedure and assigned MS-DRG 856. Scenario 1 illustrates the net loss (3030) a hospital experiences from filling a bed with the same patient through readmission due to a surgical site infection.
Figure 4-1, Scenario 2 presents an alternative in which the patient in Scenario 1 does not need readmission and the bed can thus be filled with an additional patient requiring stomach services. Scenario 2 illustrates the net profit (4,488) earned by a hospital through providing care to multiple patients admitted for stomach treatment without readmission. As Figure 4-1 suggests, the difference in net profits between Scenario 1 and 2 is $7,518.

<table>
<thead>
<tr>
<th>Scenario 1</th>
<th>Average Revenue</th>
<th>Average Cost</th>
<th>Net Reimbursement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient 1, Episode 1 Stomach Procedure</td>
<td>$9,361</td>
<td>$7,117</td>
<td>$2,244</td>
</tr>
<tr>
<td>Patient 1, Episode 2 Readmission due to surgical site infection</td>
<td>$31,852</td>
<td>$37,126</td>
<td>$(5,274)</td>
</tr>
<tr>
<td>Total Hospital Profit</td>
<td></td>
<td></td>
<td>$(3,030)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scenario 2</th>
<th>Average Revenue</th>
<th>Average Cost</th>
<th>Net Reimbursement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient 1, Episode 1 Stomach Procedure without complication</td>
<td>$9301</td>
<td>$7,117</td>
<td>$2,244</td>
</tr>
<tr>
<td>Patient 2, Episode 1 Stomach Procedure without complication</td>
<td>$9301</td>
<td>$7,117</td>
<td>$2,244</td>
</tr>
<tr>
<td>Total Hospital Profit</td>
<td></td>
<td></td>
<td>$4,488</td>
</tr>
</tbody>
</table>

Profit Difference:

| Scenario 1 | $(3,030) |
| Scenario 2 | $4,488 |

Source: Medicare Cost Reports Compiled by the American Hospital Directory, 2009

As illustrated in Figure 4-2, I replicated the above scenario using 2009 Medicare Cost Report data for a hip fracture requiring surgical repair or MS-DRG 482. In Figure 4-2, Scenario 1, the hospital experiences a loss of $5,748 in net profits from treating the same patient over two episodes of care due to surgical site infection. In Scenario 2, the same hospital experiences a loss ($948) in net profits by treating two hip fracture patients in one episode of care without readmission due to surgical site infection. The difference between the two scenarios ($4,800) indicates that the hospital experienced less of a profit loss in Scenario 2 when compared with Scenario 1.
### Hip Fracture, Surgical Repair (MS-DRG 482)

<table>
<thead>
<tr>
<th>Scenario 1</th>
<th>Average Revenue</th>
<th>Average Cost</th>
<th>Net Reimbursement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient 1, Episode 1 Hip Fracture, Surgical Repair</td>
<td>$9,058</td>
<td>$9,532</td>
<td>$(424)</td>
</tr>
<tr>
<td>Patient 1, Episode 2 Readmission due to surgical site infection</td>
<td>$31,952</td>
<td>$37,126</td>
<td>$(5,224)</td>
</tr>
<tr>
<td><strong>Total Hospital Profit</strong></td>
<td></td>
<td></td>
<td><strong>$(5,748)</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scenario 2</th>
<th>Average Revenue</th>
<th>Average Cost</th>
<th>Net Reimbursement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient 1, Episode 1 Hip Fracture, Surgical Repair, without complication</td>
<td>$9,059</td>
<td>$9,532</td>
<td>$(474)</td>
</tr>
<tr>
<td>Patient 2, Episode 1 Hip Fracture, Surgical Repair, without complication</td>
<td>$9,059</td>
<td>$9,532</td>
<td>$(474)</td>
</tr>
<tr>
<td><strong>Total Hospital Profit</strong></td>
<td></td>
<td></td>
<td><strong>$(948)</strong></td>
</tr>
</tbody>
</table>

**Loss Difference:**
- Scenario 1: **$(5,748)**
- Scenario 2: **$(948)**
- Total: **$4,800**

**Source:** Medicare Cost Reports Compiled by the American Hospital Directory, 2009.

Figure 4-2. Hip Fracture, Surgical Repair Bed Productivity Example, 2009
Based on bed productivity, multiple episodes without complications generate more profits than filling beds with readmitted patients due to post-surgical infections and complications (Hollenbeak, Murphy, Koenig, Woodward, Dunagan, & Fraser, 2000; Hannan, et al., 2003). The two medical conditions in Scenario 1 and 2 are the same as the ones assessed in the study and I use them to illustrate the impact of surgical site infection and longer length of stay on bed productivity and profits. The respective DRG codes and treatment process used in the scenario was confirmed by hospital managers responsible for inpatient coding. Hospital revenue and cost figures are from Medicare Cost Reports from 2009 as compiled by the American Hospital Directory (American Hospital Directory, 2012).

The results are consistent with Alexander, et al (2006) in supporting the idea that quality improvement leads to improvements in financial performance. The results indicate and the above scenario illustrates that hospitals profit from providing treatment for patients who experience no complications or infection and subsequent readmission. The findings are also consistent with arguments made by Porter and Teisberg (2006), who urged that eliminating mistakes and providing care correctly the first time reduces costs and improves quality simultaneously, also support this example. The benefit from reducing complications and infections are significant due to the high costs of care, slower recovery, and the need for readmission for repeated treatments (Porter & Teisberg, 2006).

Management Implications

Managers should attempt to implement initiatives along the care continuum that lower unplanned readmission rates and increase overall care quality. If you view the problem of readmissions from the perspective of bed utilization, the results indicate that the business case for improving readmissions may already be in place. I note, as others have, that improving quality
and reduce readmissions will require implementation along the care continuum—before, during, and after the initial hospital admission (Minott, 2008).

More specifically, given the negative impact of readmissions, particularly for patients admitted with chronic conditions, managers should dedicate resources that focus on the unique issues that patients at risk for multiple readmissions represent (Soeken, Prescott, Herron, & Creasia, 1991; Marcantonio, et al., 1999). Managers may find opportunities in focusing on a subset of conditions that result in high readmission volume, such as CHF and COPD, and effective strategies for reducing their readmission rates through targeted strategies. Specific strategies may include (1) improve care processes within the hospital, especially those associated with the possibility of infection, (2) enhancing patient compliance with care instructions; (3) improving follow-up care from post-acute by long-term care providers; (4) and monitoring the patient’s clinical condition to intervene if deterioration is detected (Stone & Hoffman, 2010).

**Infection**

Ashton, et al, (1997) reported that early readmission was directly related to the inpatient care processes. Low quality inpatient care processes that contribute to surgical site infection after discharge may be responsible for high cost remedial or corrective procedures, along with medication. Infections resulting in readmission may be caused by surgical errors that can increase the likelihood of infection, deterioration of the patient’s physical condition, and medical complications (Encinosa & Hellinger, 2008). One study found that surgical patients who suffered post-surgical adverse advents were more likely to experience post-discharge hospital readmission, die in the hospital, and incur higher inpatient costs (Encinosa & Hellinger, 2008).

Specific to CABG patients, surgical site infection is the primary cause of readmissions (Hollenbeak, et al., 2000). Adverse outcomes from these infections also include significant
higher length of stay (20 additional hospital days), hospital costs (costing on average $20,012 more in the first postoperative year), and mortality (22% of patients who developed deep chest surgical site infection died within one year). The cost of care for patients who subsequently died as a result of the surgical site infection incurred an additional cost of $60,546, compared with patients who survived (Hollenbeak, et al., 2000).

Therefore, while not all surgical site infections that cause readmissions may be eliminated, managers may target their efforts at strategies to minimize such infections with their associated cost implications. A reduction in adverse patient events for surgical patients may also improve the overall quality of care and may reduce long-term health care costs for hospitals.

**Compliance with care instructions**

Hospital managers may reduce unplanned readmissions through providing clearly understood information and advice to prevent problems that might lead to readmissions. For instance, hospitals can use specially trained nurses or pharmacists to follow up by telephone to confirm that patients or caregivers have received clear discharge instructions, that patients did not receive duplicate or contraindicated prescriptions, and they prepared to prevent future problems or complications, such as schedule physician follow-up visits (Chollet, Barrett, & Lake, 2011).

**Improving follow-up care**

Patients being discharged may not be receiving adequate follow-up primary care to prevent complications and infections. Jencks, et al., (2009) found that half of Medicare patients who were readmitted within 30 days of discharge had not seen a primary care physician.
up care may be especially important for heart failure and surgical patients, which research has shown to respond to intensified care after discharge (Göhler, et al., 2006; Jencks, et al., 2009).

**Monitoring the patient’s clinical condition**

Jencks et al. (2009) found in a quarter of the hospitals studied, about 25 percent of the admissions were readmissions within 30 days of discharge and less than half of patients readmitted within 30 days of discharge had visited a primary care physician. Yet readmissions are less likely if patients see a primary care or specialty clinician within the first two weeks after discharge (Goodman, Fisher, & Chang, 2011).

Bodenheimer (2008) found serious quality concerns in transitional care for elderly patients with chronic conditions. Specifically, many elderly patients were found to lack ambulatory care before readmission, primary care physicians of hospitalized patients were not notified of their discharge, and discharge summaries contained insufficient information or never reached the primary care practice (Bodenheimer, 2008). Hospital managers and physicians could dedicate additional resources to enhancing communication across the continuum of care with primary care physicians and mid-level providers upon discharge. This presents hospital managers and physicians with opportunities to reduce readmissions through promoting visitation of a primary care physician soon after discharge, particularly for chronically ill patients who visit multiple providers and specialists.

Investing in remote monitoring technology may provide managers with additional tools to address transitional care concerns. Remote patient monitoring technologies and telehealth devices provide an unobtrusive method for reporting the patient’s vital signs including blood pressure and weight; biometric data including pulse oximetry and blood glucose levels; and subjective data including disease signs and symptoms, medication, and/or diet compliance.
Providers can monitor patients and intervene before a patient’s condition becomes more serious than can be managed in a home care environment (DelliFraine & Dansky, 2008).

In summary, the results indicate that there is a significant negative financial impact from hospital readmissions due to complications. For example, conditions such as COPD, CHF, and diabetes all had negative influences on performance. For that reason, hospitals and physicians have a financial stake in collaboration through communication, coordination, and discharge planning in reducing readmissions.

Policy Implications

The results have implications for the development of policy. In March 2010, the Patient Protection and Affordable Care Act (PPACA) was enacted, which empowers the Center for Medicare and Medicaid Services (CMS) to hold hospitals accountable for their 30-day readmission rates. Specifically, CMS is empowered to adjust hospital payments in 2013 according to their rate of “excess” verses “expected” Medicare readmissions for pneumonia, acute myocardium infarction (AMI), and heart failure (HF). The base inpatient payment for hospitals with actual readmission rates higher than their Medicare-calculated expected readmission rates will be reduced by an adjustment factor. Hospitals will be subject to public reporting for 30-day readmission rates and decreased reimbursement from CMS (Axon & Williams, 2011). Unfortunately, I was unable to include AMI and HF in the study due its unavailability through PHC4, the source for readmission data.

Relative to financial performance, hospital readmission rates represent an important, if imperfect, proxy measure for poor-quality of inpatient and outpatient care. Linking hospital readmission rates to reimbursement is a complex issue that may have unintended or negative
consequences (Axon & Williams, 2011). I found a negative impact from readmissions for complications due to infection or complications. From this perspective and assuming such results are generalizable, hospitals may experience a negative financial impact from readmissions due to infection and complications.

From a tactical perspective, few hospitals may respond to insufficient incentives or those facing financial pressures may be unable to improve quality when reimbursement is reduced. Policy makers may also face questions about implementing financial accountability measures that have the possibility of negative or unintended consequences. In particular, a policy that links payment to performance without adjusting for important organizational characteristics runs the risk of unfairly reducing payments to hospitals caring for a high proportion of minority or economically disadvantaged patients (Axon & Williams, 2011). Economically disadvantaged patients have poorer overall health status, fewer community resources, and poorer access to primary care, all of which potentially increase their likelihood of readmission (Axon & Williams, 2011).

Further, on one hand few hospitals may not respond to payment incentives if the magnitude of incentives is insufficient. On the other hand, many hospitals, including those that disproportionately serve disadvantaged populations, may not have the financial or staff resources to respond to reduce readmissions. In either case, payment incentives might produce less change than desired and, further, might harm the financial viability of the hospitals that serve disadvantaged populations (Chollet, Barrett, & Lake, 2011).

Payment reform efforts aim to increase the financial benefit to hospitals that reduce their readmission rates. For instance, the PPACA aims to reduce Medicare payments to hospitals with relatively high preventable readmissions rates. Other provisions test improvements to patient care for people with chronic illnesses during the initial hospital stay, as patients transition out of the hospital, and while patients reside in home, community-based, Medicare post-acute care, and
long-term care settings (Stone & Hoffman, 2010). Savings from reducing hospital readmissions may be considerable; however, it remains to be determined whether the design and implementation of the proposals to reduce them will be effective.

**Conclusion**

**Limitations**

As with almost all studies, limitations were associated with the current study. One limitation was that the sample of hospitals is only from Pennsylvania, which has a high percentage of elderly persons living in rural areas served by freestanding non-profit hospitals. However, examining hospitals in one state allowed us to control for differences regulations and market factors among states.

Better access to primary care and better continuity of care may reduce the number of readmissions (Jencks, et al., 2009). For instance, controlling for variables that may also affect readmission rates, such as access to a medical home where a primary care coordinators for all patient care, hospice services, palliative care, nursing homes, home care, and clarity of patient – provider communication, would add more thoroughness to the analysis.

**Future Research**

The findings presented here highlight areas in need of future research. Future research could focus on identifying mechanisms or care processes that lead higher readmissions. Studies have reported that higher readmission rates are a symptom of poor hospital quality (Chollet, et al., 2011). Identification of underlying care processes that may contribute to both higher
readmissions and poor quality and financial performance would provide managers with crucial tools for improving hospital care (Porter & Teisberg, 2007).

A sample of hospitals from multiple states may allow for confirmation of the results across diverse market, payer-mix, case mix, regulatory, and competitive environments. At a minimum, perhaps the findings reported in this study will serve to inform managers and policy makers on the impact of readmissions due to complications and infections on performance.
Appendix A

Factor analysis / correlation

Number of observations = 1005

Method: principal-component factors

Retained factors = 1

Rotation: orthogonal varimax (Kaiser off)

Number of params = 9

Factor1 Variance = 2.99253

Factor1 Proportion = 0.3325

LR test: independent vs. saturated: chi2 (36) = 1353.43    Prob > chi2 = 0.0000

Table 1 Results of the Factor Analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Factor1</th>
<th>Uniqueness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Adjusted Abnormal heartbeat</td>
<td>0.53</td>
<td>0.71</td>
</tr>
<tr>
<td>Risk Adjusted COPD Readmission Score</td>
<td>0.68</td>
<td>0.54</td>
</tr>
<tr>
<td>Risk Adjusted CHF Readmission Score</td>
<td>0.76</td>
<td>0.42</td>
</tr>
<tr>
<td>Risk Adjusted Diabetes with medical management</td>
<td>0.46</td>
<td>0.79</td>
</tr>
<tr>
<td>Risk Adjusted Kidney Readmission Score</td>
<td>0.47</td>
<td>0.78</td>
</tr>
<tr>
<td>Risk Adjusted Pneumonia Readmission Score</td>
<td>0.72</td>
<td>0.49</td>
</tr>
<tr>
<td>Risk Adjusted Stomach and Intestinal Bleeding</td>
<td>0.47</td>
<td>0.78</td>
</tr>
<tr>
<td>Risk Adjusted Stroke Readmission Score</td>
<td>0.50</td>
<td>0.75</td>
</tr>
<tr>
<td>Risk Adjusted Hip Fracture With Surgical Repair</td>
<td>0.51</td>
<td>0.74</td>
</tr>
</tbody>
</table>
References


Chapter 5

Conclusion

Physician alignment and its impact on hospital performance may be one of the most important issues facing hospital decision-makers. While many hospitals face direct competition from physicians, while others may align their financial and organizational interests (Berenson, Ginsburg, & May, 2007). One important mechanism for alignment is joint ventures and they are a growing strategy used by hospitals to stem and improve alignment with physicians. Joint ventures may promote alignment of interests and physician trust in the organization, and may be a means for hospitals to provide practice management expertise for physicians and promote greater administrative integration between the hospitals and physicians (Goes & Zan, 1995; Mark, Evans, Schur, & Guterman, 1998).

Physician alignment may also play an important role in hospitals’ quality of care and readmission rates. From a performance perspective, physicians are crucial to deliver high-quality and cost-effective care, as well as patient referrals and contribute to the development of clinical services and future strategies (Sandrick, 2009). In a joint venture, both the hospital and the physicians have an ownership share and therefore have an alignment of business interests (Sandrick, 2009). From a quality of care perspective, physicians are critical for improving standards of care and reducing readmissions all along the care continuum—before, during, and after the initial hospital admission (Minott, 2008).

Within this context, the author presented three interrelated studies of predictors of hospital financial performance. The first study provided overview of what the hospital financial performance literature reveals about how hospital executives can organize and manage their way to more sustainable financial health. Study two assessed the relationship between hospital
physician joint ventures and performance, specifically noting the moderating impact of
organizational sources of legitimacy. Study three identified a negative association between
readmissions due to complications and infections and hospital profitability.

Regarding physician alignment as a tool to improve performance, I found that smaller
hospitals that may lacked other sources of organizational legitimacy, benefit relatively more from
joint ventures in terms of occupancy and performance. This is the first empirical study to
examine the moderating impact of organizational sources of legitimacy on the relationship
between performance and joint ventures.

Regarding physician alignment as a means to improve quality, previous empirical work
has focused almost exclusively on predictors of hospital readmissions for specific disease
diagnosis. Study three is the first to examine the empirical relationship between hospital
readmissions for complications and infections and their impact on hospital financial performance.
The results provide support for managers to focus on quality improvement initiatives that
improve quality and financial performance simultaneously.

As highlighted in the study one, throughout the dissertation I focused reviewing empirical
studies in which the outcome variable was hospital financial performance. In studies two and
three the variables and methods were motivated by organizational theory and the extant empirical
literature. This focus was not due to the diminished importance or credibility of qualitative
assessments, but conversely there are significant insights that could be generated from the
descriptive qualitative investigations into key factors that impact performance, such as hospital
leadership teams, mission, board processes and composition, and quality improvement
mechanisms. Further, triangulation with qualitative and empirical methods provides additional
explanatory power to inform the implications of empirical findings (Denzin & Lincoln, 2005).

The findings of this research have implications for policy and practice. The findings
apply to both the health care industry and to other organizations and systems. This research
indicates that alignment of interests and incentives among key stakeholders in production processes is critical to deliver high quality care. Specific to the health industry, alignment between hospitals and physicians is crucial to ensuring high quality care and long-term financial viability for hospitals. Physician alignment is critical for the success of hospitals as commitment from physician leaders is crucial to deliver high quality patient-centered care, secure patient referrals, and develop clinical services (Sandrick, 2009). In a hospital physician joint venture, both parties have an ownership share and therefore have an alignment of financial and clinical interests (Sandrick, 2009). In an effort to reduce unplanned readmissions, physicians are critical at every stage of the care continuum in reducing infection and complications. Physician alignment is especially critical for hospitals due to increased emphasis on value based purchasing (VBP) and savings through Accountable Care Organizations (ACO).
References


VITA
Harry D. Holt

EDUCATION

THE PENNSYLVANIA STATE UNIVERSITY
Doctor of Philosophy in Health Policy and Administration; Management and Organization Track

CASE WESTERN RESERVE UNIVERSITY
Juris Doctorate
Masters of Business Administration
Concentrations in Health Law & Health Systems Management

INDIANA UNIVERSITY OF PENNSYLVANIA
Bachelor of Arts. Economics/Pre-law & Political Science/Pre-law

RESEARCH INTERESTS

My research focus is assessing predictors of superior financial performance for hospitals and health systems. Efforts include assessing the relationship between financial performance and strategy, organizational and local market structure, strategic alliances, and the expertise of executive management teams.

SELECTED PUBLICATIONS


RESEARCH GRANTS

Project Title: Analysis of Rural Hospital Financial Conditions (PSU IRB Approval #27292)
Role: Co-investigator. Award Amount: $42,500. Source of Funding: Center for Rural Pennsylvania
Duration of Funding: January 2008 – April 2009

PROFESSIONAL EXPERIENCE

CAP GEMINI ERNST & YOUNG, LLC
Senior Health Care Delivery Consultant

FIRST CONSULTING GROUP
Senior Health Care Provider and Payer Consultant

ERNST & YOUNG, LLP
Health Care Provider and Payer Consultant

THE CLEVELAND CLINIC
Division of Regional Health Affairs