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## **Environmental and Organizational Characteristics Associated With a Critical Access Hospital Being Contract Managed or Becoming Acquired**

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ENVIRONMENTAL AND ORGANIZATIONAL CHARACTERISTICS  
ASSOCIATED WITH A CRITICAL ACCESS HOSPITAL BEING CONTRACT  
MANAGED OR BECOMING ACQUIRED

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A DISSERTATION

Submitted to the graduate faculty of The University of Alabama at Birmingham,  
In partial fulfillment of the requirements for the degree of  
Doctor of Science

BIRMINGHAM, ALABAMA

2012



ENVIRONMENTAL AND ORGANIZATIONAL CHARACTERISTICS  
ASSOCIATED WITH A CRITICAL ACCESS HOSPITAL BEING CONTRACT  
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VIRGINIA A. RAZO

D.Sc. PROGRAM IN ADMINISTRATION-HEALTH SERVICES

ABSTRACT

The focus of this research is the relationship between environmental and organizational characteristics and critical access hospitals (CAHs) being contract managed or acquired. The resource dependence theory guided the methodology. Based on this theory, organizations prefer to remain autonomous until key resources become scarce. The scarcity of resources combined with a dynamic external environment causes environmental uncertainty that requires organizations to consider a variety of strategic responses in order to survive.

Given the results of this study, contract managed CAHs were associated with markets that were less munificent and more dynamic with older facilities, relative to independent hospitals. Due to the small sample size of acquired CAHs, results should be considered exploratory. These hospitals were found to be associated with more munificent markets. The organizational characteristics associated with acquired critical access hospitals included less net income, and not-for-profit and government entities.

Keywords: Critical Access Hospital, acquisition, contract management, resource dependence theory

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## TABLE OF CONTENTS

ABSTRACT.....	iii
ACKNOWLEDGEMENTS .....	iv
LIST OF TABLES .....	viii
LIST OF FIGURES .....	ix
CHAPTER 1 .....	1
Introduction .....	1
Purpose of the Study.....	5
Research Questions .....	6
Significance of the Study .....	7
CHAPTER 2 .....	10
Literature Review .....	10
History of Critical Access Hospitals .....	10
CAH Organizational Characteristics .....	10
Organizational Strategic Responses .....	12
Remaining Independent.....	13
Contract Management Agreements .....	14
Acquisitions.....	16
Environmental Characteristics .....	19
Theoretical Framework .....	21
Hypotheses .....	22
CHAPTER 3 .....	24
Methodology .....	24
Research Design .....	24
Study Population .....	24
Data Sources.....	25
Measures.....	27
Dependent Variables .....	27
Independent Variables .....	28
Environmental Variables .....	28
Munificence .....	28
Dynamism .....	30
Complexity.....	31
Organizational Variables .....	32
Control Variables .....	35
Descriptive Analysis.....	37
Multivariate Analysis .....	38
CHAPTER 4 .....	42
Results .....	42
Outlier Analysis.....	42
Multicollinearity Analysis.....	44
Descriptive Analysis.....	45
Multivariate Findings .....	50

Summary of Findings for Logistic Models .....	55
CHAPTER 5 .....	59
Discussion and Conclusions .....	59
Discussion of Hypotheses and Research Questions .....	59
Research Question 1: Munificence .....	60
Research Question 2: Dynamism.....	63
Research Question 3: Complexity .....	64
Research Question 4: Organizational Characteristics .....	64
Research Question 5: Age of Facility .....	65
Research Question 6: Fixed Net Assets .....	65
Research Question 7: Ownership.....	66
Strengths and Limitations of the Study .....	66
Implications of the Research Study .....	69
Research Implications .....	69
Managerial Implications .....	69
Public Implications .....	71
Policy Implications .....	72
Future Research .....	73
Conclusions .....	76
REFERENCES .....	78
APPENDIX.....	88
A IRB DOCUMENTATION .....	88
B LETTER OF PERMISSION.....	90



## LIST OF TABLES

<i>Table</i>	<i>Page</i>
1 Constructs, Variables, Measures, and Source .....	36
2 Descriptive Statistics of Categorical Variables for CAH-Year Observations for the 2003-2009 Study Period (N = 5,765).....	45
3 Descriptive Statistics of Continuous Variables for All CAHs Comparing 2003 to 2009....	47
4 Descriptive Statistics of Continuous Variables for Contract Managed CAH-Year and Independent CAH-Year Observations between 2003-2009 .....	48
5 Descriptive Statistics of Continuous Variables for Acquired CAHs and Independent CAH-Year Observations between 2003-2009 in the South and Midwest .....	49
6 Logistic Regression Results of Contract Managed Critical Access Hospitals between 2003 and 2009 (N = 5,742) .....	51
7 Logistic Regression Results of Acquired Critical Access Hospitals in the South and Midwest between 2005 and 2009 (N = 2,417).....	54
8 Hypothesized Directions and Observed Directions of Relationships of Independent Variables with Dependent Variables in the Models .....	57

## LIST OF FIGURES

<i>Figure</i>	<i>Page</i>
1 A Continuum of Hospital Interorganizational Relationships.....	13

## **Chapter 1**

### **Introduction**

Developing effective strategic responses to environmental change is crucial to the long-term survival and performance of any organization (Barkema, Baum, & Mannix, 2002; Zajac, Kraatz, & Bresser, 2000). The healthcare environment has been described in the research literature as turbulent, often depicted as rapidly changing, complex, and requiring aggressive change strategies. The dynamic nature of the healthcare industry has compelled hospitals to become more proactive to ensure their long-term survival and to prosper (Barkema et al., 2002; Ginn, 1990; Zajac et al., 2000; Zajac & Shortell, 1989). Thus, there is an urgent need to identify particular environmental and organizational factors that are associated with effective strategic responses to environmental changes in healthcare.

Rural hospitals are particularly vulnerable to such environmental changes because they have fewer strategic options than their large-hospital counterparts. For example, rural hospitals have been found to be at greater risk of closure because they are smaller, have older facilities, have less financial capital, and have fewer opportunities to form strategic alliances with other healthcare organizations (Lutfiyya et al., 2007). Between 1990 and 2000, 208 rural hospitals closed in the United States, representing 7.8% of all such hospitals (Rehnquist, 2003). In 2003, the Office of Inspector General attributed these closures to rising costs and insufficient revenues to sustain operations. Sloan (2002) noted that rural hospitals received more than 40% of their revenue from Medicare, and under Medicare's prospective payment system they were being reimbursed

at a lower rate than urban hospitals. This was primarily due to lower patient volumes in rural areas compared to patient volumes in urban hospitals, driven by a lower population density and a higher percentage of uninsured patients (Harrison, Ogniewski, & Hoelscher, 2009; Sloane, 2002).

Since rural hospitals play a unique role in providing care for residents of rural communities, their closure can have particularly acute effects on access to care and the overall health of individuals residing in these communities. Further, hospital closures have been shown to have a direct, negative effect on economic health of the community when a hospital is the sole provider of healthcare services in the market (Holmes, Corina, & Parson, 2006).

Critical Access Hospitals (CAHs) are rural community hospitals that were introduced through the Medicare Rural Hospital Flexibility Program (Flex Program) as part of the Balanced Budget Act (BBA) of 1997. This program was intended to improve the accessibility of local emergency and short-term inpatient services and improve the financial performance of small rural hospitals, thereby reducing the number of hospital closures (Rosko & Mutter, 2010). Through the Flex Program, hospitals that are eligible to convert to a CAH status receive reasonable cost-based reimbursements for Medicare acute inpatient and outpatient services. Since 1997, more than 1,324 rural hospitals have converted to CAH status (Flex Monitoring, 2010). This change has allowed many hospitals to continue to serve a large portion of the American population rather than close.

Critical Access Hospitals continue to face unique resource and environmental challenges that threaten their financial sustainability (e.g., BBA 1997). The resource

challenges specific to CAHs include: (a) limited access to capital funds with margins that are too low to support investments in critical plant and technological upgrades (Critical Access Hospitals Financial Indicators Team Report, 2006; Gish & Kamholz, 2007); (b) health care provider and workforce shortages that are expected to become more acute (Bailey, 2009; Harrison et al., 2009; National Rural Health Association, 2007); and (c) a payer mix with a high degree of dependency on government payers that includes an older population with a higher prevalence of chronic diseases (Bailey, 2009; National Rural Health Association, 2007).

In addition to the aforementioned resource limitations facing CAHs, the Patient Protection and Affordable Care Act (PPACA) may create environmental challenges likely to impact CAHs. The PPACA legislation is intended to incentivize and encourage greater collaboration between healthcare providers in order to reduce costs, improve access, and enhance quality by improving care coordination between healthcare providers (Brown, Werling, Walker, Burgdorfer, & Shields, 2012; Siberman, Liao, & Ricketts, 2010). One method to accomplish the goals of the PPACA includes forming Accountable Care Organizations (ACOs) (Siberman et al., 2010). ACOs are groups of hospitals, doctors, and other healthcare providers that voluntarily collaborate to provide coordinated high quality care for Medicare beneficiaries. Due to the constraints of ACO models and the CAH environment, these hospitals, which currently enjoy the benefit of cost-based reimbursement, may be particularly challenged to operate within or form their own ACO (Stowell & Puiia, 2011). In previous years, CAHs were not threatened by competition due to the physical distance between themselves and competing facilities. However, as

larger health systems create ACOs, they may attempt to expand their patient base by targeting patients of rural hospitals, including CAH markets.

Many experts agree that CAHs must consider a variety of strategies to improve their likeliness of survival (Burik & Callahan, 2010; Gish & Kamholz, 2007; Trinh, 1999). After assessing multiple strategic options, CAHs may conclude that organic growth strategies and the development of additional physician partnerships may not be adequate to ensure viability. One strategic path likely to be considered by CAHs includes partnering with other organizations via interorganizational relationships (IORs), either through contract management agreements (CMAs) or by acquisition (Myers & Lineen, 2009).

Historically, researchers primarily focused on evaluating the financial impact of the Flex Program on CAHs (Ona & Davis, 2010; Schoenman & Sutton, 2008). More recently, researchers have compared quality outcomes and process measures of CAHs to their urban counterparts (Joynt, Harris, Orav, & Jha, 2011). Moscovice and Town (2009) examined 2004-2007 Hospital Compare data and 2005-2006 Medicare cost report data to compare the financial status of CAHs with better quality results and those with poorer quality results. Results indicated that CAHs with poorer financial status to begin with are more likely to have poorer quality results. Despite the potential importance of interorganizational relationships (IORs) for CAH survival, there is a paucity of research regarding IORs as a strategic response relative to environmental and organizational characteristics.

## **Purpose of the Study**

In the face of increasing uncertainty in the healthcare industry, the role and structure of CAHs is likely to change (Ricketts & Heaphy, 2000). This ambiguity is primarily caused by a myriad of actual or potential changes in federal healthcare law. In response to such uncertainty, CAHs, like other hospitals studied in the past, may consider a variety of strategies to improve their chances of survival (Gish & Kamholz, 2007). Strategies may include relinquishing none, some, or all, of their autonomy. The focus of this study was to investigate three strategies undertaken by CAHs in response to environmental uncertainty, specifically: (1) remaining independent, (2) being managed under a contract agreement, or (3) being acquired by another healthcare organization. Strategies were selected because they emphasize distinct choices that vary with respect to the amount of autonomy retained by the hospital. Additionally, CMAs and acquisitions are two well-documented strategic responses that organizations have previously selected in turbulent and uncertain environments (Pfeffer, 1972).

For the purposes of this study, the term “acquisition” is defined as:

A strategy through which one firm buys a controlling, or 100 percent, interest in another firm with the intent of making the acquired firm a subsidiary business within its portfolio. After completing the transaction, the management of the acquired firm reports to the management of the acquiring firm. (Hitt, Ireland, & Hoskisson, 2011)

Contract management has been defined as a situation in which the day-to-day management of a health facility is assumed by a separate contracting organization which reports to the board of trustees of the managed institution (Alexander & Lewis, 1984).

CMAs allow an organization to retain policy control and ownership of assets while management control resides with an outside organization (Alexander & Morrissey, 1989). Hospitals often agree to CMAs or acquisitions to attain scarce resources and manage the uncertainties in their environment and thus improve their chances of survival.

### **Research Questions**

Previous studies that have analyzed CMAs and acquisitions have not focused on CAHs, yet this group of hospitals represents approximately 20% of all hospitals in the United States and 60% of all rural hospitals in the country (Pink, Holmes, Slifkin, & Thompson, 2009). Relative to research on other types of acute care hospitals and their urban counterparts, there is considerably less empirical research that examines CAHs, especially with respect to the relationship between environmental and organizational characteristics and strategic responses. Therefore, the aim of this study was to empirically evaluate the key environmental, organizational, operating, and financial characteristics that are associated with an increased likelihood of being contract managed or being acquired. Using resource dependence theory, this study addressed the following research questions:

1. What environmental characteristics are associated with an increased likelihood of a CAH being contract managed or being acquired relative to remaining independent?
2. What organizational characteristics are associated with an increased likelihood of a CAH being contract managed or being acquired relative to remaining independent?



## **Significance of the Study**

The goal of this research was to determine the effect of environmental and organizational factors on the likelihood of a CAH being contract managed or being acquired, as compared to remaining independent. The findings of this research may benefit healthcare policy makers, researchers, healthcare executives, and consumers seeking to understand how the changing healthcare landscape influences strategic decisions of CAHs. The results of this study may be especially relevant considering the potential for a dramatic increase in hospital interorganizational relationships by way of mergers and acquisitions due, in part, to the Patient Protection and Affordable Care Act and Health Care and Education Reconciliation Act of 2010, passed in March 2011 (Burik & Callahan, 2010; Myers & Lineen, 2009). Historical trends in the healthcare industry have shown that hospitals are willing to enter into such IORs, relinquishing control and autonomy, in order to maintain access to scarce resources.

In February, 2012, President Obama released a budget outline for FY 2013 that would reduce Medicare spending by approximately \$268 billion over the next 10 years (American Hospital Association, 2012). The proposed changes would reduce CAH payments from 101% to 100% of reasonable costs. Additionally, effective FY 2014, these changes would eliminate the CAH designation for hospitals that are less than 10 miles from the nearest hospitals. Together, the Obama administration estimates that the proposed changes would save approximately \$2 billion over the next 10 years.

According to Cribben (2012), merger and acquisition volume within the healthcare industry is on the rise. The passage of the Patient Protection and Affordable Care Act and the current shortage of physicians have been key drivers behind the trend.

As reimbursements decrease and reporting requirements increase, not-for-profit hospitals are seeking opportunities to collaborate, affiliate, consolidate, acquire, and merge. With the need to modernize facilities, implement electronic health records, and establish Accountable Care Organizations (ACOs), such transactions will continue to escalate.

Based on corporate financial theory, there are a number of strategic options for organizations in financial distress to consider, including: (1) seeking acquisition by a financially stronger organization; (2) remaining independent through bankruptcy protection; and (3) ceasing operations (Bazzoli & Cleverly, 1994; Cameron, Kim, & Whetten, 1987). In the event that CAHs do not proactively seek strategies to reduce uncertainty, bankruptcy and closure are possible consequences. If CAHs close, the effects on the health of rural community residents and the local economy can become an urgent public concern. Specifically, the disappearance of hospitals from communities with aging populations will likely reduce access to critical medical care.

In order to ensure a sustainable healthcare infrastructure for the future, the rising costs of healthcare must be contained; yet strategic responses of hospitals, such as mergers and acquisitions, have previously been associated with increased prices to consumers and reduced quality of services (Vogt & Town, 2006). In order to ensure financial viability without sacrificing continuity of care, it is critical to examine whether environmental and organizational factors are associated with strategic choices made by CAHs. Answers to the aforementioned research questions are intended to enhance the current body of knowledge about strategic choices made by CAHs. Additionally, findings from this investigation may inform policy makers, researchers, healthcare executives, and

consumers of the probability of CAHs remaining independent, being contract managed, or being acquired.

## **Chapter 2**

### **Literature Review**

#### **History of Critical Access Hospitals**

The Medicare Rural Hospital Flexibility Program (MRHFP), also known as the Flex Program, was created by the Balanced Budget Act of 1997, as part of a national initiative to strengthen rural healthcare. In order to participate in the Flex Program, states are required to develop rural healthcare plans. Consistent with their plans, states may designate eligible rural hospitals as Critical Access Hospitals (CAHs).

In order for a hospital to be designated as a CAH, it must be located in a rural area, be more than 35 miles from another hospital (15 miles in areas with mountainous terrain or in locations where only secondary roads are available), and provide 24-hour emergency care services (Rural Assistance Centers, 2011). CAHs must maintain an average length of stay of 96 hours or less for acute patients. Initially, CAHs were limited to 15 acute care beds; however, in 2003 the Medicare Modernization Act (MMA) increased the limit of licensed acute beds to 25 (Oberlin, Thygesen, & Walters, 2010). In return for meeting the federal requirements, CAHs received cost-based reimbursement for inpatient and outpatient services (Rural Assistance Centers, 2011).

#### **CAH Organizational Characteristics**

Although CAHs appear to be relatively homogenous, researchers have demonstrated that there are wide variations in their organizational characteristics (CAH Financial Indicators Report Team, 2010). Based on the CAH Financial Indicator Report (2010), CAHs' organizational characteristics vary from each other in the following ways:

(a) the total number of CAHs in each state ranges from three to 82; (b) the average operating margin percent for all U.S. CAHs was 0.67%, with the range fluctuating from -19.91% to 14.02% by state; (c) the average age of CAH facilities in the U.S. was 10.39 years with the highest state average being 17.91 years and the lowest state average being 5.27 years; and (d) the average daily census for all U.S. CAHs was 4.44 days with the CAH state averages ranging between 0.10 days to 11.88 days. These differences in organizational characteristics reflect substantial variations in demand and capacity for services, thus making strategic and financial planning difficult for CAH leadership and law makers.

As noted in the research literature, type of ownership is one variable that might predict a hospital's strategic choice (Harrison, McCue, & Wang, 2003; Luke & Begun, 1988; Shortell, Morrison, Hughes, Friedman, & Vitek, 1987). Shortell et al. (1987) demonstrated that ownership type influenced the provision of diversified services. Additionally, Luke and Begun (1988) noted that strategic behavior of acute care hospitals was related to type of ownership. Finally, Harrison et al. (2003) documented that for-profit hospitals were more likely to be acquired than not-for-profit hospitals. Interestingly, to date, there is no empirical evidence that segregates CAHs to determine if their ownership types are related to CAHs' strategic choice.

With regard to hospital size, Alexander, Anderson, and Lewis (1985) showed that the number of beds in a hospital was positively associated with profitability. Further, Shortell et al. (1987) noted that hospital size positively influenced the provision of diversified services. In other analysis, profitability has been correlated with a CAH's size (Pink, 2011). Therefore, if the size of a hospital is associated with the profitability and

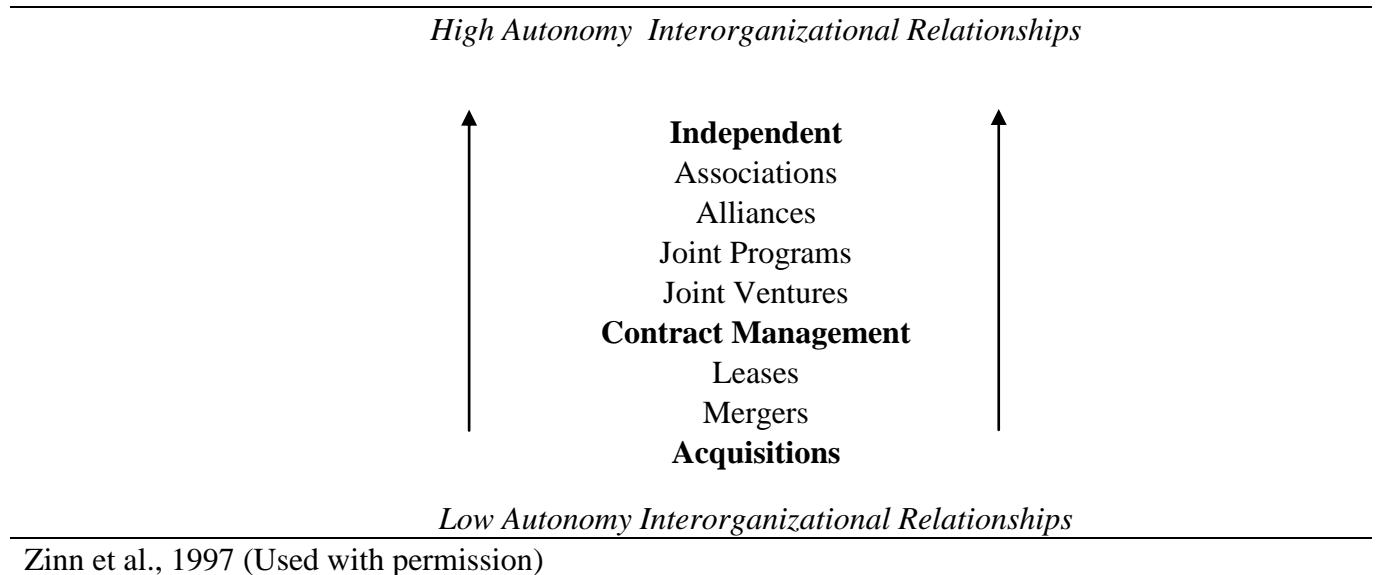
provision of diversified services, the size of a CAH could be a valid measure of its likelihood to have a contract management agreement or be acquired, as strategic responses to environmental uncertainty.

### **Organizational Strategic Responses**

There are a number of strategic responses an organization may consider that span a continuum from high/complete autonomy to low/complete loss of autonomy. Based on the resource dependence theory, organizations select the least-constraining strategy that minimizes uncertainty and dependence and maximizes autonomy (Pfeffer & Salancik, 1978). Khandwalla (1972) argued that the greater the uncertainty facing an organization, the greater the needs to reduce uncertainty and increase organizational relationships. On a continuum, these interorganizational relationships range from least- to most-constraining.

Figure 1 depicts a continuum of hospital interorganizational relationships showing independent organizations retaining the highest levels of autonomy. At the other end of the continuum, organizations that have been acquired have low to no autonomy. The continuum further illustrates how organizations that are managed under a contract have less autonomy than independent organizations but more than those that have been acquired.

Figure 1. A Continuum of Hospital Interorganizational Relationships



### **Remaining Independent**

One strategic response to the environment is to remain an independent, self-governed organization, which allows for full autonomy. Although the vast majority of healthcare providers remain independent or consolidated on a local basis, growing pressure on financial performance, coupled with a growing mandate to meet national quality and cost benchmarks, could drive increased consolidation among CAHs over the long term (Myers & Lineen, 2009). According to Levitz and Brooke (1985), system hospitals have a distinct advantage over free standing hospitals to access debt capital and typically have higher levels of profitability.

For an industry representing 5% of U.S. gross domestic product, the number of independent hospitals represents a staggering amount of fragmentation. Among the top 10 companies in the hospital industry, each one accounts for only about 1% of the total

market, and the largest accounts for only 4% of the market (Brown, Werling, Walker, Burgdorfer, & Shields, 2012).

McCue and Diana (2007) utilized resource dependence and free cash flow theories to study free standing hospitals with more than 50 beds. While this study did not examine CAHs, the researchers determined that hospitals with positive cash flow had a greater market share than hospitals with negative cash flow and were located in markets with higher numbers of physicians and fewer acute care beds. The researchers also noted that hospitals with positive cash flow had fewer unoccupied beds, higher net revenues, greater liquidity, less debt, and fewer Medicare patients than their negative cash flow counterparts. McCue and Diana (2007) suggested that hospitals having positive cash flow are typically located in highly munificent environments and have strong management teams. In contrast to hospitals with high cash flow, CAHs are typically located in resource-depleted environments and consequently suffer from low or negative cash flow (CAH Financial Indicators Report Team, 2010), ultimately leaving them vulnerable to environmental changes.

### **Contract Management Agreements**

Contract management agreements (CMA) are formal arrangements created between a hospital and an outside organization, whereby the outside organization provides comprehensive management of the hospital's operations and serves to combine the two into an interdependent whole (Luke, Begun, & Pointer, 1989). This form of IOR allows policy control and asset ownership (autonomy) to be retained by the managed hospital while outsourcing management control to the outside organization (Alexander & Lewis, 1984; Alexander & Morrissey, 1989).



Previous researchers have examined the characteristics of hospitals managed under contractual arrangements. For example, Carey and Dor (2004) documented that hospitals managed under contract were small facilities serving lower case complexity; the number of beds were nearly half that of other hospitals, and the number of admissions was approximately 40% that of traditionally managed hospitals. Hospitals with 50 beds or less which were contract managed grew from 36% in 1991 to 42% in 2000. The occupancy rate was found to be lower in contract managed hospitals and the average length of stay was higher. The contract managed hospitals were located in rural settings and nearly half were government owned.

Alexander and Morrissey (1989) examined the determinants of hospital entry into contract management agreements with multi-hospital systems and found that management effectiveness, regulatory climate, and hospital ownership were predisposing conditions of contract management. In addition, Alexander and Lewis (1984) provided a descriptive analysis of hospitals under CM agreements and showed that CM institutions tended to have fewer than 100 beds, were located in rural areas defined as hospitals situated outside a designated Standard Metropolitan Statistical Area (SMSA), and were disproportionately situated in the West North Central, Mountain, and South Atlantic census regions. While these studies described correlates of hospital entry into CM agreements, CAHs were not the focus of this research.

Kralewski et al. (1984) studied the effect of contract management on hospital financial performance and discovered that CM hospitals showed no improvement in productive efficiency. CM hospitals did, however, increase their prices to consumers. The

ratio of gross patient revenue to total expenses increased significantly in the CM hospitals relative to those that were managed internally.

### **Acquisitions**

While mergers and acquisitions are often referred to synonymously in the research literature, the terms represent two different strategies that organizations may consider in response to their environment. According to Hitt et al. (2011), “A merger is a strategy through which two firms agree to integrate their operations on a relatively coequal basis” (p. 189). This strategy does not typically require capital outlays from either organization (Copeland & Weston, 1988). A hospital acquisition, on the other hand, is defined as “whenever one firm is purchased by another” (Shapiro & Balbirer, 2000, p. 378). For the purposes of examining the three points of the autonomy continuum (i.e., low, intermediate, and high), this study focused on acquisitions rather than mergers.

As noted in the research literature, organizations attempt to manage their dependence on the environment to reduce uncertainty; acquisitions are one organizational response to environmental interdependence. Additionally, the acquisition of a firm implies increased size, market power, and some elements of monopoly control (Copeland & Weston, 1988). Hospitals strive to boost profits through greater efficiencies and increased market share. These enhancements are accomplished by spreading fixed costs over multiple entities, entering new markets, and shifting production to a single location (Dranove, 1998; Grossman, 2000). According to Kirchheimer (2001), for-profit systems acquire hospitals in areas of population growth in order for the parent organization to increase market share.

Significant research has been conducted to determine organizational characteristics of hospitals that have been acquired (Bazzoli & Andes, 1995; Harrison et al., 2003; McCue & Furst, 1986). McCue and Furst (1986) identified financial characteristics shared by not-for-profit hospitals that were acquired by investor-owned hospital systems and found that investor-owned hospital systems purchased not-for-profit hospitals that were financially distressed. Bazzoli and Andes (1995) further documented that financially distressed hospitals had significantly higher rates of system acquisition due to growing competition in the market. Harrison et al. (2003) demonstrated that hospitals targeted for acquisition, on average, operated at a loss, incurred higher debt levels, and were more likely to be located in markets with a large number of health maintenance organizations. Older, for-profit hospitals with fewer occupied beds were also likely targets for hospital acquisitions.

According to Pfeffer (1972), there are three reasons an organization may seek to acquire another organization: first to reduce competition; second, to manage interdependence with either sources of input or purchasers of output; and third, to diversify operations and thereby lessen dependence on the present organizations with which it exchanges. Alexander et al. (1985) described how environmental and organizational factors influenced hospital acquisition strategies used by multi-hospital systems. Of the environmental factors considered, market demographics and utilization trends were most significant in the decision-making process. Investor-owned system executives identified the following four types of hospital-community settings that were attractive for acquisition: (a) declining urban hospitals, (b) primary care community hospitals, (c) major teaching hospitals, and (d) locally competing hospitals.

Organizational characteristics, specifically financial indicators, were also considered when deciding if an acquisition was desirable. Investor-owned system executives considered the age and condition of the physical plant to determine the extent of rebuilding, renovation, or modernization of technology that would be required. The factors identified by potential acquiring hospitals are important to this current study because they are most likely applicable to CAHs that may be considered for acquisition.

According to Alexander and Morrissey (1988), multi-hospital systems acquire hospitals in order to add specialty physicians, expand patient networks, increase service areas, and strengthen market share. The authors showed that systems were more likely to acquire hospitals in strong markets with a growing population, high per capita income, and low Medicare populations. In less prominent hospitals that are acquired, acute care services are redirected to the new parent organization and sub-acute functions become the dominant service offerings at the acquired location. This shift allows the parent organization to realize horizontal growth and span larger geographic areas (Bogue et al., 1995).

Researchers have demonstrated that there are significant consequences for consumers in markets where hospital acquisitions have occurred (Ho & Hamilton, 2000; Krishnan, R. & Krishnan, H., 2003). For example, Ho and Hamilton (2000) detected a significant increase in hospital readmission rates for heart attack patients and early discharges of normal newborns following a merger or acquisition. R. Krishnan and H. Krishnan (2003) further noted that hospital acquisitions resulted in increased revenue per patient and increased operating margins, which suggests that acquired hospitals increased prices and improved operating performance.

As related to operational efficiencies, Groff et al. (2007) determined that hospital mergers did not demonstrate improved efficiency after the first transitional year but did demonstrate significant efficiencies in the second year after the merger. Increased market share due to acquisition has been shown to reduce operating costs and improve brand awareness among consumers (Ermann & Gabel, 1984; Starkweather, 1981).

Goldberg (1999) also noted that hospital acquisitions increased based on greater competition in the marketplace. As managed care increasingly dominated the market and insurance companies continued to negotiate contracts that drove reimbursement down, hospitals chose to be acquired as a strategy to improve efficiency.

Finally, Copeland and Weston (1988) documented that a hospital is more likely to be acquired if it lacks economies of scale in such areas as marketing, finance, or strategic planning. Acquisition allows for more efficient flow of information and improved methods of conducting transactions. Therefore, it could be surmised that smaller hospitals with limited resources and smaller economies of scales, such as CAHs, may have a greater likelihood of being acquired relative to remaining independent.

### **Environmental Characteristics**

The research literature is replete with studies highlighting the importance of the external environment and the ways in which it influences the behavior of organizations (Aldrich, 1976; Aldrich & Pfeffer, 1976; Jacobs, 1974; Pfeffer, 1972, 1976; Pfeffer & Salancik, 2003). Environmental factors are elements external to the hospital that reflect demand for the hospital's services and resources. These factors are typically elements for which the hospital has little direct control (Alexander & Morrissey, 1989).

The range of dimensions describing organizational environments is extensive (Aldrich, 2008; Dess & Beard, 1984; Pfeffer & Salancik, 1978); however, three dominant dimensions have emerged over the years, including: (1) munificence, a measure of resource availability in the environment; (2) dynamism, a measure of the rate of change and, therefore, uncertainty in the environment; and (3) complexity, a measure of heterogeneity and range of an organization's activities (Dess & Beard, 1984; Zinn, Proenca, & Rosko, 1997). Low levels of munificence and high levels of dynamism and complexity act to create high levels of environmental uncertainty. While these dimensions are associated with organizations' strategic decisions, they have not been previously studied specific to CAHs.

Environmental factors that have been included in previous organizational studies include the following: (a) the proportion of Medicare and Medicaid patients to other payer types, (b) changes in the ratio of Medicare/Medicaid patients to other payer types, (c) market competition, (d) geographical location by region, (e) market concentration, (f) per capita income, and (g) the number of physician specialists per capita. Zinn et al. (1997) examined the association between organizational and environmental characteristics and the likelihood that not-for-profit hospitals would enter into one of two forms of IOR, hospital alliance membership or contract management. The selected variables reflected the level of munificence, dynamism, and complexity in the environment. The authors discovered that, in general, the less munificent the environment, the more likely a not-for-profit hospital would trade autonomy for control over resources in an IOR. Additionally, Zinn et al. (1997) noted that facilities located in

rural environments with scarce resources often sacrificed more autonomy by entering into a CMA in order to gain control over resources.

In sum, environments have been characterized as consisting of three dimensions and studied extensively in the healthcare industry yet few research studies have focused attention on CAHs. Additionally, strategic responses to the environment have been studied at multiple levels, including: governance structure, organic structure of organizations, input–output models. However, CAHs have not been evaluated to determine if environmental and organizational characteristics are associated with decisions to enter into CMA or be acquired. Finally, IORs have been studied extensively, including strategic alliances, affiliations, joint-ventures, etc., yet hospitals with 25 beds or less have not been disaggregated from other hospitals in these studies to determine if strategic responses are related to specific environmental and organizational characteristics.

### **Theoretical Framework**

The Resource-Dependence Theory (RDT) may be an appropriate lens to use when examining CAHs and the changing landscape of the healthcare industry. Pfeffer and Salancik (1978) asserted that environments affect and constrain organizations, and these constraints influence how organizations respond. Based on RDT, an organization's environment is the source of scarce and valued resources necessary for survival (Alexander & Morrissey, 1989). Organizations must interact with the environment to obtain resources that are either scarce in the industry or cannot be generated by the organizations themselves.

Pfeffer and Salancik (1978) identified three factors that influenced the level of dependence organizations had on particular resources. First, the overall importance of the resource to the firm was critical in determining the resource dependence of the firm. Second, the scarcity of the resource was a factor. The scarcer a resource, the more dependent the firm became. Finally, competition between organizations for control of a resource was a factor influencing resource dependence. Environmental resources for CAHs include physicians and patients.

RDT states that organizations lacking in essential resources will seek to establish relationships with other organizations in order to obtain scarce resources. Further, organizations will attempt to position their dependence relationships in order to either minimize their own dependence or increase the dependence of other organizations on them. To that end, the level of resource scarcity will influence an organizational leader's decision to relinquish autonomy and enter into interorganizational relationships.

### **Hypotheses**

In this study, the following hypotheses were tested to analyze the association between environmental and organizational factors and a CAH's decision to remain independent, be managed under a contract agreement, or be acquired.

1. Relative to remaining independent, the probability of a CAH being contract managed or acquired, increases as munificence decreases.
2. Relative to remaining independent, the probability of a CAH being contract managed or acquired increases as the level of dynamism increases.
3. Relative to remaining independent, the probability of a CAH being contract managed or acquired increases as the level of complexity in the market increases.



4. Relative to remaining independent, the probability of a CAH being contract managed or acquired increases with organizational characteristics such as ownership, net income, net assets and the age of the plant.

In summary, previous literature has illuminated many environmental and organizational characteristics associated with a hospital's strategic choice to either be contract managed or acquired. However, seemingly absent in the literature are studies that have examined the association between a CAH's decision to be contract managed or acquired with environmental and organizational characteristics.

## **Chapter 3**

### **Methodology**

The purpose of this chapter is to describe the research design, data sources, and the variables used in the study. Additionally, statistical procedures for model estimation and methods used to test the research hypotheses are explained.

### **Research Design**

The goal of this study was to examine whether the likelihood of a critical access hospital being contract managed or becoming acquired varied as a function of environmental and organizational characteristics. The study used a pooled, cross-sectional binary logistic regression model to examine these relationships.

### **Study Population**

The unit of analysis in the study was the CAH-year and the sample consisted of CAHs in the United States between the years 2003 and 2009. This sample reflects the most current available data. Additionally, this time period was selected due to a change in federal legislation in 2003 that increased the number of allowed acute care beds from 15 to 25 or critical access hospitals. During the subsequent two years (2004, 2005), states revised their inclusion criteria to match the revised federal legislation; thus allowing more rural hospitals the opportunity to convert to CAH status. This change is substantiated by the number of hospital conversions to CAH status in the nation that were completed between 2000 and 2005 (Oberlin, Thygesen, & Walters, 2010). Only hospitals that could be confirmed with the Flex Monitoring Team's list of CAHs were included in the study.

## **Data Sources**

Data for this study were drawn from the following five sources: (1) the Flex Monitoring Team's list of Critical Access Hospitals; (2) the American Hospital Association Annual Survey of Hospitals (AHA); (3) the Area Resource File (ARF); (4) the Medicare Hospital Cost Report Minimum Data Set; and (5) the Levin Associates Merger & Acquisition report.

The Rural Health Research Centers at the Universities of Minnesota, North Carolina-Chapel Hill, and Southern Maine (the Flex Monitoring Team) were the recipients of a five-year cooperative agreement award from the Federal Office of Rural Health Policy to continue to monitor and evaluate the Medicare Rural Hospital Flexibility Grant Program (Flex Program). In addition to developing and reporting quality, financial, and community impact performance measures to state and federal policy makers, the Flex Monitoring Team also publically publishes an annual listing of all CAHs in the United States. This list was used to verify and validate the CAHs in the AHA database.

The American Hospital Association Annual Survey of Hospitals provides extensive data regarding hospital organizational characteristics, including those hospitals that entered into a CMA in a given year. AHA datasets are collected via an annual national survey of all U.S. hospitals with an average response rate of 90%. Independent variables that were extracted from these data included a Herfindahl-Hirschman Index, contract management status, and ownership. The AHA data also provides Medicare identification numbers, which were used to merge additional data sets.

The Area Resource File (ARF) provides extensive county level information on market characteristics, demographics, economic activity, resource scarcity, and other measures of the CAH environment. The ARF is compiled by the Bureau of Health Professions from the U.S. Department of Health and Human Services. Data from these files have been extensively used in numerous other studies that examined market characteristics. Key independent variables were extracted from this dataset, including: (a) the number of non-federal active physicians working in a particular county, (b) per capita income levels for the population residing in a CAH county, and (c) the unemployment rate for the CAH county.

The Medicare Hospital Cost Report Minimum Data Set provides information on hospital finances. CAHs that receive Medicare reimbursements are required to submit financial information annually to CMS. These minimum cost datasets are the most comprehensive datasets available for U.S. hospitals that serve Medicare patients. This study used annual datasets for the years 2003-2009 for all CAHs. Since these data files provide comprehensive information on hospital financial performance and are comparable across all hospitals in the industry, they have been repeatedly used in hospital studies. For this study, the independent variables provided by the CMS minimum cost datasets included: (a) hospital net income, (b) hospital net fixed assets, and (c) hospital age of physical plant.

Data on CAH acquisitions were obtained from the Irving Levin Associates 17th edition of the Health Care Services Acquisition Report, formally known as The Hospital Acquisition Report, which covers eight sectors of the healthcare services merger and acquisition market from 2005 through 2009. Acquisition transactions are tracked based

on the date of their announcement rather than the date of their closing. These data were obtained from media reports, Securities and Exchange Commission documents, and interviews with management. The report lists hospital transactions by hospital name and location.

Hospitals that were designated as CAHs by the Flex Monitoring Team were compared against the AHA datasets. Once the AHA hospital designation was confirmed against the Flex Monitoring Team's list of CAHs, the dataset was merged with the ARF using the federal information processing standards (FIPS) variable. The CMS minimum dataset was then merged with the AHA and ARF datasets using the Medicare ID variables that are included in each dataset. CAHs identified in the Levin report as being acquired were merged with the dataset by Medicare ID number. This process was first done separately for each year of the study to create annual data sets (e.g., merge AHA, ARF, Medicare, and Levin data for 2003), followed by an aggregation of the annual data sets to create a long-form, pooled cross-sectional data set.

## **Measures**

### **Dependent Variables**

For this study, the dependent variables (DVs) were the CAH's decision to remain independent, be managed under a contract, or become acquired. Because these outcomes are not mutually exclusive and a CAH may have chosen a combination of these strategies over the timeframe studied, an ordinal or multinomial logistic analysis was deemed inappropriate. Instead, a two-model, binomial approach was chosen, using two dummy dependent variables in separate analyses: (1) contract managed (coded as 1) for each year a CAH indicated it was managed under a contract versus independent (coded as

0) and (2) CAHs that were acquired in the year that the transaction was reported between the years 2005 and 2009 (coded as 1) versus independent (coded as 0). These variables were based on data obtained from the AHA database and Levin & Associates Merger and Acquisition report. The following section presents the underlying reasoning behind variable selection in this study. This study did not identify or study any CAHs that may have closed between 2003 and 2009.

### **Independent Variables**

The study included three types of independent variables: environmental factors, organizational factors, and controls. The environmental factors were further identified based on the RDT framework: (1) Munificence, (2) Dynamism, and (3) Complexity. These factors were selected based on previous studies and the theoretical premise discussed in Chapter 2.

### **Environmental Variables**

The environmental factors were measured at the county level.

*Munificence.* Munificence is a measurement of resource availability in the environment; it was measured as the number of active non-federal physicians per 1,000 county residents, the per capita income, and the unemployment rate. The number of active non-federal physicians is directly related to a hospital's performance because physicians order all tests and admit patients to the hospital; thus, the CAH's volume of services is directly related to the number of active physicians working in the community.

High per capita income reflects a sound economic community where individuals hold well-paying jobs. This is expected to increase demand for hospital services and have a positive effect on hospital profitability. Improved profitability is caused by greater

health insurance coverage, an increased ability to pay for care, and reduced indigent care. Thus, higher income per capita should increase the disposable income of the population and reduce the number of CAHs that are managed under a contract agreement or decide to be acquired (Alexander & Morrissey, 1989; Friedman & Shortell, 1988; McCue, M., McCue, T., & Wheeler, 1988).

The unemployment rate serves as a proxy measure of a community's financial ability to purchase health insurance and pay for health care services (McCue, Thompson, & Dodd-McCue, 2000). Reductions in a community's unemployment rate should generate additional demand for hospital services and decrease the probability of a CAH being contract managed or being acquired.

1. Relative to remaining independent, the probability of a CAH being contract managed or acquired, increases as munificence decreases.
  - a. Relative to remaining independent, the probability of a CAH being contract managed increases as the number of active non-federal physicians per 1,000 lives decreases;
  - b. Relative to remaining independent, the probability of a CAH being acquired increases as the number of active non-federal physicians per 1,000 lives decreases;
  - c. Relative to remaining independent, the probability of a CAH being contract managed increases as the annual per capita income of the population in a CAH's geographical location decreases;

- d. Relative to remaining independent, the probability of a CAH being acquired increases as the annual per capita income of the population in a CAH's geographical location decreases;
- e. Relative to remaining independent, the probability of a CAH being contract managed increases as the unemployment rate of the population in a CAH's geographical location increases;
- f. Relative to remaining independent, the probability of a CAH being acquired increases as the unemployment rate of the population in a CAH's geographical location increases.

*Dynamism.* Dynamism, which is a measure of the rate of change and thus, uncertainty in the environment, was measured by creating the following three variables: (1) the median annual percent change in the number of active non-federal physicians per 1,000 county residents between 2003 and 2009; (2) the median annual percent change in median per capita income between 2003 and 2009; and (3) the median annual percent change in county unemployment rate between the years 2003 through 2009. The median percent change for each hospital was used because many hospitals did not have complete data for each year; thus, the average percent change would not have been an accurate depiction of change. Once the annual percent change for each variable was calculated, the aggregate function in SPSS was used to calculate the median value for each hospital's percent change.

- 2. Relative to remaining independent, the probability of a CAH being contract managed or acquired increases as the level of dynamism increases.



- a. Relative to remaining independent, the probability of a CAH being contract managed increases as the median percent change in the number of active non-federal physicians per 1,000 CAH residents decreases between the years 2003-2009;
- b. Relative to remaining independent, the probability of a CAH being acquired increases as the median percent change in the number of active non-federal physicians per 1,000 CAH residents decreases between the years 2003-2009;
- c. Relative to remaining independent, the probability of a CAH being contract managed increases as the median percent change in the per capita median income decreases between the years 2003-2009;
- d. Relative to remaining independent, the probability of a CAH being acquired increases as the median percent change in the per capita income decreases between the years 2003-2009;
- e. Relative to remaining independent, the probability of a CAH being contract managed increases as the median percent change in the unemployment rate decreases between the years 2003-2009;
- f. Relative to remaining independent, the probability of a CAH being acquired increases as the median percent change in the unemployment rate decreases between the years 2003-2009.

*Complexity.* Complexity, which is a measure of environmental heterogeneity and the range of an organization's activities, was measured by the Herfindahl-Hirschman Index (HHI). The HHI is defined as the sum of squares of the market measured as a

percentage of the organizations operating in the market. This index allows measurement of the extent of concentration in the local hospital market. Thus, a Herfindahl-Hirschman Index was created for CAHs by summing the square of hospital market shares in a county using the number of discharges (i.e.,  $HHI = \sum s_i^2$ , where  $s_i$  is the market share of hospital  $i$  in the county). If the HHI for a hospital was 1 (i.e., very concentrated), the level of complexity was considered to be very low. The HHI has been used extensively in hospital research (Alexander & Morrissey, 1988; Harrison, McCue, & Wang, 2003).

3. Relative to remaining independent, the probability of a CAH being contract managed or acquired increases as the level of complexity in the market increases.
  - a. Relative to remaining independent, the probability of a CAH being contract managed increases as the Herfindahl-Hirschman Index decreases;
  - b. Relative to remaining independent, the probability of a CAH being acquired increases as the Herfindahl-Hirschman Index decreases.

### **Organizational Variables**

The organizational factors in this study were measured at the hospital level. The CAHs' net income, net fixed assets, and age of facility (number of years), were included in this study. A CAHs net income was taken from the CMS cost report data and is typically calculated by subtracting expenses from income (Copeland, Weston, & Shastri, 2004). The term net fixed asset refers to the value of an organizations fixed assets for a point in time on a balance sheet. It is calculated by adding the purchase price of all fixed assets and leasehold improvements and subtracting the accumulated depreciation and total liabilities (Shapiro & Balbirer, 2000). According to International Accounting Standard (IAS) 16, fixed assets are assets whose future economic benefit is probable to

flow into the entity, whose cost can be measured reliably. All CAHs are required to calculate and report their net fixed assets annually to CMS.

4. Relative to remaining independent, the probability of a CAH being contract managed or acquired increases as the net income decreases.
  - a. Relative to remaining independent, the probability of a CAH being contract managed increases as net income decreases;
  - b. Relative to remaining independent, the probability of a CAH being acquired increases as net income decreases.

Access to capital is critical to a hospital's survival including the replacement of existing plants and equipment. Hospitals with aging facilities will have to fund these capital improvements through operating resources or capital reserves. As further noted in the research literature, older facilities are more likely to be acquired (Harrison et al., 2003; Kirchheimer, 2001). The variable, age of facility, was calculated by dividing a CAH's accumulated depreciation (reported on a CAH's balance sheet), by its depreciation expense (reported on its income statement). The calculation method used is an industry standard used by the Office of Statewide Health Planning and Development (OSHDP).

5. Relative to remaining independent, the probability of a CAH being contract managed or acquired increases as the age of the facility increases.
  - a. Relative to remaining independent, the probability of a CAH being contract managed increases as facility age increases;
  - b. Relative to remaining independent, the probability of a CAH being acquired increases as facility age increases.

6. Relative to remaining independent, the probability of a CAH being contract managed or acquired increases as its net assets decrease.
  - a. Relative to remaining independent, the probability of a CAH being contract managed increases as its net assets decrease;
  - b. Relative to remaining independent, the probability of a CAH being acquired increases as its net assets decrease.

Claxton et al. (1997), observed that because the not-for-profit organizational form is designed to facilitate community benefits, public participation in any conversion process must be significant. Consumer groups, community organizations, and the state attorney general are all likely to participate. The literature regarding not-for-profit acquisitions shows that to protect the public benefits found in not-for-profit organizations, state regulations make it difficult for not-for-profit hospitals to transfer their ownership to a for-profit organization. Thus, the following hypotheses apply:

7. Relative to remaining independent, the probability of a CAH being contract managed or acquired decreases with not-for-profit ownership.
  - a. Relative to remaining independent, the probability of a CAH being contract managed decreases with not-for-profit ownership;
  - b. Relative to remaining independent, the probability of a CAH being acquired decreases with not-for-profit ownership.

Multiple states have adopted legislation that makes it difficult for a public, government entity, such as a District hospital to transfer its assets. For example, in California, SB 804 requires that the Board of Directors, by resolution, submit a measure to the voters of the district for approval, prior to the transfer of 50% or more of district

assets. In 1983, local government owned 29% of all hospitals; however, they represented only 9% of hospital acquisitions. These facilities were frequently managed by contract but were not targets for acquisition. Low capitalization, high levels of charity care, and control by government authorities made them unattractive for acquisition (Bogue et al., 1995). Thus, the following hypotheses apply:

8. Relative to remaining independent, the probability of a CAH being contract managed or acquired decreases with being a government entity.
  - a. Relative to remaining independent, the probability of a CAH being contract managed decreases with being a government entity;
  - b. Relative to remaining independent, the probability of a CAH being acquired decreases with being a government entity.

### **Control Variables**

Control variables included market and organizational characteristics that previous researchers have identified or argued as associated with being contract managed or acquired. Time was also included as a control variable. A brief description of the variables, measures, and data sources are presented in Table 1.

Table 1

*Constructs, Variables, Measures, and Source*

Category	Variable	Measure	Source
Dependent Variables			
CAH strategy	CAHs that were Contract Management Agreement (CMA); CAHs that remained independent (IND)	1 if CAH contract managed; 0 if CAH independent	AHA
CAH strategy	CAHS that were acquired (ACQ); CAHs that remained independent (IND)	1 if CAH acquired, 0 if CAH independent	Levin & Associates
Independent Variables			
ENV - Munificence	Number of active non-federal physicians per 1,000 residents	Sum of active non-federal physicians per 1,000 residents in the county between 2003-2009	ARF
ENV - Munificence	Per Capita Income	Annual Per Capita Income between 2003-2009	ARF
ENV - Munificence	Unemployment Rate	Percent of population unemployed at the county level	ARF
ENV - Dynamism	Median Annual Percent Change in Number of Active Non-Federal Physicians per 1,000 residents	Calculate the Median Annual Percent Change After Calculating the Annual Percent Change of Active Non-Federal Physicians per 1,000 residents	ARF
ENV - Dynamism	Median Annual Percent Change in per-capita income	Calculate the Median Annual Percent Change After Calculating the Annual Percent Change of Per Capita Income	ARF
ENV - Dynamism	Median Annual	Calculate the	ARF

	Percent Change in Unemployment Rate	Median Annual Percent Change After Calculating the Annual Percent Change of Unemployment. $HHI = \sum s_i^2$ , where $s_i$ is the market share of hospital $i$ in the county	
ENV - Complexity	Herfindahl- Hirschman Index by Discharges	Calculated by subtracting total expenses from gross revenue reported to CMS.	AHA
ORG	Net income	Calculated by adding the purchase price of all fixed assets and leasehold improvements and subtracting the accumulated depreciation and total liabilities.	CMS
ORG	Net Fixed Assets	Accumulated depreciation divided by depreciation expense	CMS
ORG	Age of the facility	1 if CAHs were not- for-profit; 0 if CAHs were for-profit	AHA
ORG	Ownership	1 if CAHs were government; 0 if CAHs were not government	AHA
CONT	Time	Continuous 2003- 2009 if CMA; Continuous 2005- 2009 if ACQ	AHA; Levin & Associates

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### Descriptive Analysis

Once the aforementioned datasets were merged, a descriptive analysis was conducted for all observations comparing variables between the years 2003 and 2009.

Frequencies were derived using the crosstab function for all dichotomous IVs by strategic response (IND, CMA, and ACQ). The dichotomous variables of interest included: if the CAH was a not-for-profit and if the CAH was a government facility; region; and the total number of CAHs by year observations. Descriptive statistics for continuous IVs were examined by strategic response and included the mean, and standard deviation.

Distributions for continuous variables were examined to detect potential outliers. For cases in which outliers were detected, they were examined to determine if they should be excluded from the study. Finally, a bivariate correlation analysis was conducted to identify potential issues of multicollinearity.

### **Multivariate Analysis**

A pooled, cross-sectional binomial logistic regression analysis was used to examine whether a CAH's decision to either remain independent or enter into an IOR was a function of environmental and organizational characteristics. The models included year fixed effects to account for temporal trends, while hospital random effects were used to account for repeated observations over the study period. Analysis consisted of two models: (1) analysis of CAHs that were contract managed (vs. independent) between the years 2003-2009 and (2) analysis of CAHs that were acquired (vs. independent) between the years 2005-2009.

Binary logistic regression was preferred over linear regression for this study because the dependent variables were qualitative. Additionally, because each of the dependent variables was not mutually exclusive, a binomial regression model was used.



The first logistic regression model was used to examine whether the environmental and hospital characteristics were related to a CAH being contract managed. The following expression summarizes how this model was specified:

$$\text{CMA CAH}_{2003-2009} = f(\text{Munificence}_{2003-2009}, \text{Dynamism}_{2003-2009}, \text{Complexity}_{2003-2009}, \text{ORG}_{2003-2009}, \text{CONT}_{2003-2009})$$

In this part of the analysis, the following definitions applied: Contract managed CAHs (CMA CAH<sub>2003-2009</sub>) represented a critical access hospital that was managed under a contract management agreement between the years 2003 and 2009. The munificence variables were the number of active non-federal physicians per 1,000 residents in the CAH's county between the years 2003 and 2009, per capita income in the CAH's county between the years 2003 and 2009, and the unemployment rate in the CAH's county between the years 2003-2009. Dynamism variables included: the median annual percent change of active non-federal physicians per 1,000 residents in a CAHs county between the years 2003 and 2009, the median annual percent change of per capita income in the CAH county between the years 2003 and 2009, and the median annual percent change of unemployment rate in the CAHs county between the years 2003 and 2009. Complexity was represented by the Herfindahl-Hirschman Index between the years 2003 and 2009. Organizational variables included: the CAHs net income between the years 2003 and 2009; net fixed assets between the years 2003 and 2009; and the age of the CAH facility between the years 2003 and 2009. The model controlled (CONT) for time between 2003 and 2009.

The second logistic regression model was used to determine the environmental and hospital characteristics related to a hospital's decision to be acquired. The following expression summarizes how this model was specified:

$$\text{ACQ CAH}_{2005-2009} = f(\text{Munificence}_{2003-2009}, \text{Dynamism}_{2003-2009}, \text{Complexity}_{2003-2009}, \text{ORG}_{2003-2009}, \text{CONT}_{2003-2009})$$

In this part of the analysis, the following definitions applied: Acquired CAHs ( $\text{ACQ CAH}_{2005-2009}$ ) represented a critical access hospital that was acquired by another hospital between the years 2005 and 2009. The munificence variables were the number of active non-federal physicians per 1,000 residents in the CAH's county between the years 2003 and 2009; per capita income in the CAH's county between the years 2003 and 2009; and the unemployment rate in the CAH's county between the years 2003-2009. Dynamism variables included: the median annual percent change of active non-federal physicians per 1,000 residents in a CAH's county between the years 2003 and 2009; the median annual percent change of per capita income in the CAH's county between the years 2003 and 2009; and the median annual percent change of unemployment rate in the CAH's county between the years 2003 and 2009. Complexity was represented by the Herfindahl-Hirschman Index between the years 2003 and 2009. Organizational variables included: the CAH's net income between the years 2003 and 2009; net fixed assets between the years 2003 and 2009; and the age of the CAH facility between the years 2003 and 2009. This model also controlled for time (CONT).

For this study, the maximum likelihood estimation method was used to estimate the relationships and test the study hypotheses. A Chi-square test was performed to test the overall statistical significance of the model covariates, while p-values less than or

equal to 0.05 indicated whether individual model covariates were statistically significant. Each model was evaluated to determine its predictive power. The Nagelkerke R-Square value was evaluated in each model to determine the strength of the relationship between the predictors and the prediction. Finally, each model was evaluated to determine the goodness-of-fitness using the Hosmer and Lameshow goodness-of-fit Chi-square value.

## **Chapter 4**

### **Results**

The results of the empirical analysis used to evaluate the hypotheses and research questions are presented in this chapter. The first section of the chapter presents descriptive analyses and statistics for the three groups of CAHs: Independent, Contract Managed, and Acquired. The mean and standard deviations for continuous independent variables (IVs) are presented. Frequencies and percentages are presented for categorical independent variables. Significance levels for these variables are also presented.

Towards the end of this chapter the results of the pooled, cross-sectional, random effects binomial regression analysis are presented, and significance levels for the IVs in the model are reported. Results with p-values of 0.05 or lower are considered to be statistically significant.

### **Outlier Analysis**

Prior to performing an outlier analysis, the dataset was reviewed for face validity. Specifically, two variables, net assets and age of the facility was examined and it was determined that five CAHs-year observations included negative figures for their net assets and twenty CAH-year observations included negative figures for the average of the plant. Further review of the negative values for these observations appeared to demonstrate that the negative figures were probably due to a reporting error. Due to this conclusion, these observations were removed from the dataset.

According to Tabachnick & Fidell (2007) analyzing and accounting for cases that present outlier values is an essential step in any analysis since including outliers, without

analyzing them, could generate unreliable results. In this study, univariate outliers were identified and analyzed by calculating z-scores for each continuous variable. Variables with z-scores above or below 4 were removed from the sample.

After removing the univariate outliers, a multivariate outlier analysis was also performed by calculating the Mahalanobis distance (Tabachnick & Fidell, 2007).

Multivariate outliers are cases that have an unusual combination of values for a number of variables. This outlier technique identifies outliers by measuring the distance of a case from a centroid (multidimensional mean) of a distribution given the covariance of the distribution. Cases were removed as outliers if the case had a critical value of Mahalanobis distance with 10 df at  $\alpha = .001$  greater than 29.588.

The total number of observations in the dataset between 2003 and 2009 was 7,166; 773 observations were removed due to missing data. Of the remaining 6,393 observations, 628 outliers were observed and removed; 423 were univariate outliers and 205 were multivariate outliers, leaving 5,765 total observations in the dataset. Since this study used an analytical model that assumed a normal distribution for continuous variables, these outliers were further examined.

Of the univariate outliers removed, as described above, the variables in the dataset that had univariate outlier z-score values greater or less than 4 included: the number of active non-federal physicians per 1,000; per-capita income; unemployment rate; net income; fixed net assets; age of physical plant; median annual percent change of active non-federal physicians per 1,000 residents; median annual percent change of per-capita income; and the median annual percent change of unemployment. Of the univariate

outliers, one acquired CAH has a z-score greater than 4 for net income and was removed from the dataset. All other outliers were removed from the sample as well.

Of the multivariate outlier cases removed, as described above, there were 205 observations that had a Mahalanobis Distance greater than 29.588, including two CAH observations that had been acquired in 2008 and 2009. These outliers were also removed from the sample. After removing all outliers, the total number of CAHs included in this study in 2003 was 615 and in 2009 there were 1044.

### **Multicollinearity Analysis**

Multicollinearity among IVs in regression analysis weakens the predictive value of the analysis and can result in parameters that are unreliable. To test for multicollinearity, Pearson's Correlation coefficients ( $r$ ) were examined for combinations of independent continuous variables. Correlation is measured by the linear association between two random variables.

Pearson's correlation coefficients range from -1 to 1. The greater the absolute value of the coefficient, the stronger the linear association. A positive coefficient implies that the association is positive; a negative value implies that the association is negative. Typically, a value of 0.8 or higher is considered very high and a value of 0.6 to 0.8 is considered high (Field, 2009). Among the variables included in the empirical analysis for this study, there were no correlation coefficients whose absolute values were above 0.487, suggesting no significant issues with collinearity.

## Descriptive Analysis

After evaluating and removing outliers and observations with missing data, descriptive tests were performed to provide a better understanding of the variables individually. All tests were performed using SPSS statistics version 18.

Descriptive statistics of categorical variables are shown in Table 2. Of the 23 CAHs acquired in this study, there was no acquisition activity in the Northeast or West. Additionally, of the observations in this study, the Northeast and West regions had the fewest number of CAHs.

Although the sample size of CAH acquisitions is small, the sample represents all CAH acquisitions between 2005 and 2009. Furthermore, the fact that only 25 acquisition transactions took place during this time frame, suggests that this strategic response could be considered rare events.

Table 2

*Descriptive Statistics of Categorical Variables for CAH-Year Observations for the 2003-2009 Study Period (N = 5,765)*

Variable	IND <i>n</i> = 4079		CMA <i>n</i> = 1664		ACQ <i>n</i> = 22	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Region						
Northeast	183	5	26	2	0	0
Midwest	2079	51	960	58	9	43
South	1083	27	394	24	13	57
West	734	18	284	17	0	0
Ownership						
Not-For-Profit	2069	48	877	53	7	32
Government	1866	46	724	44	7	32

Preliminary descriptive analysis produced means and standard deviations for all continuous variables of interest. Table 3 presents descriptive statistics for all CAHs,

comparing them from 2003 to 2009. Table 4 presents the descriptive statistics of the continuous variables comparing CAHs that were contract managed to those that remained independent. Table 5 presents the descriptive statistics of continuous variables comparing CAHs that were acquired to those that remained independent.

For continuous variables, an independent sample t-test was performed to test the difference in means of the variables of interest between the years 2003 and 2009 for all CAHs. Additionally, t-tests were used to compare the contract managed and acquired CAHs to the referent group – independent CAHs (i.e., independent CAHs vs. contract managed and independent CAHs vs. those that were acquired). In order to determine the significance for the difference in means between the groups for multiple variables, the results of Levene's test for equality of variances was conducted. Equal variance was not assumed if the significance for Levene's test was 0.05 or below. Equal variance was assumed if the significance for Levene's test was above 0.05.

Since the categorical descriptive statistics indicated that all acquired CAHs included in the study were located in the Midwest and South, the continuous descriptive statistics of interest for acquired CAHs were wholly restricted to those regions.



Table 3

*Descriptive Statistics of Continuous Variables for All CAHs Comparing 2003 to 2009*

	2003 <i>n</i> = 615	2009 <i>n</i> = 1044	t-statistic
Variables	Mean (Std. Dev.)	Mean (Std. Dev.)	
<b>Munificence</b>			
NonFedMD	24.12 (46.745)	26.14 (46.893)	-0.845
Per Capita Inc in Thousands	24.2554 (3.59945)	29.2175 (4.96278)	-23.481***
Unemployment rate	5.6754 (2.38219)	5.4375 (2.02536)	2.074***
<b>Dynamism</b>			
Median % Chg NonFedMD	-0.1856 (2.55151)	-0.1886 (2.73708)	.022
Median % Chg Per Cap Inc	2.3962 (1.80666)	1.9520 (1.82959)	4.799
Median % Chg Unemployrate	-0.8566 (3.95816)	-0.2054 (4.25222)	-3.090
<b>Complexity</b>			
HHI	0.8403 (.21967)	0.8319 (.22652)	0.736
<b>Organizational</b>			
Net Income Hundred Thousands	2.3364 (8.99923)	4.7468 (12.71816)	-4.502***
Age of Facility	12.6813 (8.93709)	10.9943 (8.27236)	3.893*
Net Assets Millions	.4112 (0.40534)	0.7610 (.71014)	-12.770***

\*\*\* significant at  $p \leq 0.01$

\*\* significant at  $p \leq 0.05$

\*significant at  $p \leq 0.1$

Based on the descriptive statistics comparing all CAHs from 2003 to 2009, the following variables were found to be statistically significant: (a) the per capita income was lower in 2003 than in 2009, (b) the unemployment rate was higher in 2003 than in 2009, (c) a CAH's net income and net assets were significantly less in 2003 than in 2009, and (d) the age of a CAHs facility was older in 2003 compared to the age of a facility in 2009, although only marginally significant.

Table 4

*Descriptive Statistics of Continuous Variables for Contract Managed CAH-Year and Independent CAH-Year Observations between 2003-2009*

	CMA <i>n</i> = 1664	IND <i>n</i> = 4078	t-statistic
Variables	Mean (Std. Dev.)	Mean (Std. Dev.)	
<b>Munificence</b>			
NonFedMD	19.46 (34.821)	27.19 (49.116)	-6.730 ***
PerCapInc in Thousands	27.8165 (4.75917)	27.4955 (4.76785)	2.316
Unemployrate	5.0030 (1.79170)	5.2851 (2.01171)	-5.219 ***
<b>Dynamism</b>			
Median % Chg NonFedMD	-0.0870 (2.99056)	-0.2085 (2.60365)	1.534
Median % Chg Per Cap Inc	2.1759 (1.78006)	2.0642 (1.84781)	2.101
Median % Chg Unemployrate	-0.4296 (4.03352)	-0.4799 (4.16039)	0.425**
<b>Complexity</b>			
HHI	0.8501 (.21826)	0.8296 (.22816)	3.178 ***
<b>Organizational</b>			
Net Income in Hundred Thousands	4.5920 (11.25584) 12.0502	5.0092 (12.03416)	-1.249 **
Age of Facility	(9.12877)	11.4442 (8.10222)	2.355 ***
Net Assets in Millions	0.5860 (0.60663)	.6373 (.61228)	-2.890

\*\*\* significant at  $p \leq 0.01$

\*\* significant at  $p \leq 0.05$

\*significant at  $p \leq 0.1$

From an environmental perspective, CAHs that were contract managed had fewer active non-federal physicians per 1,000 residents in their surrounding environment, a lower unemployment rate, a lower median percent change in unemployment between 2003 and 2009, and were in a slightly less competitive environment. CAHs that were contract managed had lower net income and older facilities.

Table 5

*Descriptive Statistics of Continuous Variables for Acquired CAHs and Independent CAH-Year Observations between 2003-2009 in the South and Midwest*

	ACQ <i>n</i> = 22	IND <i>n</i> = 3038	t-statistic
Variables	Mean (Std. Dev.)	Mean (Std. Dev.)	
<b>Munificence</b>			
NonFedMD	26.64 (45.254)	27.25 (48.686)	-0.059
PerCapInc Thousands	29.4710 (5.61480)	28.3225 (4.74257)	1.130
Unemployrate	5.6545 (1.86566)	5.1958 (1.89977)	1.129
<b>Dynamism</b>			
Median % Chg NonFedMD	0.5842 (2.80216)	-0.2057 (2.66717)	1.384
Median % Chg Per Cap Inc	2.0671 (1.77941)	1.9719 (1.83827)	0.242
Median % Chg Unemployrate	0.2260 (2.74529)	-0.3089 (4.20521)	0.596*
<b>Complexity</b>			
HHI	0.8831 (.19833)	0.8286 (.22931)	1.282**
<b>Organizational</b>			
Net Income Hundred Thousands	-4.2771 (11.06320)	5.7283 (12.61255)	-3.710
Age of Facility	9.1943 (7.30722)	11.1173 (7.85841)	-1.144
Net Assets Millions	0.4509 (0.70597)	0.6973 (0.64499)	-1.784

\*\*\* significant at  $p \leq 0.01$

\*\* significant at  $p \leq 0.05$

\*significant at  $p \leq 0.1$

Upon examination of the descriptive statistics of acquired CAHs and Independent CAHs in the South and Midwest, there was one statistically significant difference and one moderately significant difference. The acquired CAHs in the South and Midwest were in

less concentrated markets and they had a higher median percent change in unemployment than CAHs that remained independent in the South and Midwest.

### **Multivariate Findings**

According to (Field, 2009), the appropriate analytic technique when the dependent variable (DV) is dichotomous and the model involves a number of independent variables (IV) is multivariate logistic regression. Logistic regression was used to model the data and identify significant relationships between the IVs and the DV – the likelihood of a CAH being contract managed or acquired. A detailed listing of the variables, beta coefficients, p-values, odds ratios, and 95% confidence intervals for the odds ratios of the logistic regression model for CAHs that entered into a contract management agreement are presented in Table 6.

Table 6

*Logistic Regression Results of Contract Managed Critical Access Hospitals between 2003 and 2009 (N = 5,742)*

	B	Sig.	OR	95% C.I. for OR	
				Lower	Upper
Non Fed MD	-0.005	.000	0.995	0.994	0.997
Per Capita Income in Thousands	0.012	0.106	1.012	0.997	1.027
Unemployment Rate	-0.049	.005	0.952	0.920	0.985
Median Pct Change Non-Fed MD	0.019	0.075	1.020	0.998	1.023
Median Pct Change Per Cap Income	0.037	0.023	1.038	1.005	1.071
Median Pct Change Unemployment Rate	0.008	0.275	1.008	0.994	1.023
HHI	0.125	.387	1.133	0.854	1.504
Net Income in Hundred Thousands	-0.001	0.686	.999	0.994	1.004
Age of Plant	0.008	0.024	1.008	1.001	1.015
Net Assets in Millions	-0.078	.161	0.925	0.829	1.032
Not-for-profit	0.034	0.835	1.034	0.753	1.420
Government	0.216	0.184	1.242	0.902	1.709
year	0.003	0.857	1.003	0.971	1.037
Constant	-7.286	0.828	0.001		

As noted in Table 6, two of the 13 variables - the number of active non-federal physicians ( $b = -0.005$ ,  $p < 0.001$ ), and the unemployment rate ( $b = -0.049$ ,  $p < 0.05$ ) - were negatively and significantly associated with a CAH being contract managed. Two of the 13 variables – the median percent change in per capita income ( $b = 0.037$ ,  $p < 0.05$ ), and the age of a CAHs plant ( $b = 0.008$ ,  $p < 0.05$ ) - were positively and significantly associated with a CAH being contract managed. One variable, the median percent change in non-federal physicians between 2003 and 2009 ( $b = 0.019$ ,  $p < 0.1$ ), was found to be positively

associated with a CAH being contract managed; however, the results were only marginally significant. The negative coefficients for the number of active non-federal physicians per 1,000 residents, and unemployment rate indicate that CAHs operating in markets with fewer active non-federal physicians, lower unemployment rates were more likely be managed under a contract management agreement. The odds ratio for the number of active non-federal physicians indicated that the relative odds of a CAH being contract managed decrease 0.5% with every additional active non-federal physician per 1,000 residents. The odds ratio for the unemployment rate indicated that the relative odds of a CAH being contract managed decreases 4.8% with every 1% increase in unemployment rate. The positive coefficients for the median percent change in per capita income, age of the plant, and median percent change in non-federal physicians indicate that CAHS operating in markets with higher median percent change in per capita income, higher median percent change in non-federal physicians, and CAHs with older facilities were more likely to be managed under a contract management agreement. The odds ratio for the median percent change in per capita income indicated that the relative odds of a CAH being contract managed increases 3.8% with every 1 unit increase in the median percent change in per capita income. The odds ratio for the median percent change of non-federal physicians per 1,000 resident indicated that the relative odds of a CAH being contract managed increases 0.2% with every 1% unit increase in the median percent change of non-federal physicians. The odds ratio for the age of the facility indicated that the relative odds of a CAH being contract managed increases 0.1% with every additional year of the facility age.

The percentage correct prediction of 71.0 indicated a reasonably high predictive power for this logistic regression model; however, analysis revealed that after adding the variables into the model, the predictive power did not increase and the model was not able to better predict if a CAH was contract managed. A Nagelkerke R-square value of .021 indicated a weak relationship of 2.1% between predictors and the prediction. In logistic regression, Hosmer and Lemeshow (1989) goodness-of-fit is a post-hoc test performed to evaluate the fit of a specific model. The null hypothesis in this model is that the weighted combination of predictors is related to outcome log-odds in linear fashion. A non-significant Chi-square indicates a good fit of data with the linear model. Since Hosmer and Lemeshow goodness-of-fit test is designed specifically for binary response variables, it is considered more reliable than R-square value when interpreting model strength in logistic regression (Field, 2009). The test result of the Hosmer and Lemeshow goodness-of-fit test with Chi-square value 8.241 and significance value .347 indicated that the model was a good fit.

A second logistic model was tested to examine the relationships between the IVs and the acquisition DV (Table 7).

Table 7

*Logistic Regression Results of Acquired Critical Access Hospitals in the South and Midwest between 2005 and 2009 (N = 2,417)*

	B	Sig.	OR	95% C.I. for OR	
				Lower	Upper
Non Fed MD	0.004	0.390	1.004	0.995	1.014
Unemployment Rate	0.164	0.224	1.178	0.905	1.534
Per Capita Income Thousands	0.106	.046	1.112	1.002	1.234
Median Pct Change MD	0.104	0.231	1.109	0.936	1.314
Median Pct Change Unemployment Rate	0.061	0.332	1.063	0.940	1.201
Median Pct Change Per Cap Inc	-0.041	0.743	0.960	0.750	1.227
HHI	0.984	0.423	2.674	0.241	29.668
Net Income Hundred Thousands	-0.055	.004	0.946	0.912	0.983
Age of Plant	-0.008	0.778	0.992	0.936	1.051
Net Assets Millions	-0.525	0.297	0.592	0.220	1.588
Not-for-profit	2.132	.000	8.431	2.577	27.586
Government	1.978	.001	7.231	2.248	23.254
year	0.015	0.931	1.015	0.728	1.415
Constant	-40.875	0.904	0		

As noted in Table 7, three of the 13 variables – being not-for-profit ( $b=2.133$ ,  $p<0.001$ ), being a government CAH ( $b=1.978$ ,  $p<0.05$ ), and per capita income ( $b=.106$ ,  $p<0.05$ ) – were positively and significantly associated with a CAH's decision to be acquired. One of the 13 variables - net income ( $b=-.055$ ,  $p<0.05$ ) – was negatively associated with a CAHs decision to be acquired. The positive coefficients for the not-for-profit, and government variables indicate that not-for profit and government CAH entities were more likely to be acquired than those that are for-profit or non-government entities. The positive coefficient for per capita income indicates that CAHs operating in markets with more per capita income are more likely to be acquired, relative to remaining independent. The negative coefficient for net income indicates that CAHs with higher net



income are less likely to be acquired, relative to remaining independent. The odds ratio for being a not-for-profit indicated that the relative odds of a CAH being acquired increase by 743% if the CAH is a not-for-profit entity. The odds ratio for being a government entity indicated that the relative odds of a CAH being acquired increases 623%, relative to remaining independent. The odds ratio for net income indicated that the relative odds of a CAH being acquired decreases 5.4% with every \$100,000 increase in a CAH's net income. The odds ratio for per capita income indicated that the relative odds of a CAH being acquired increases 11% with every \$1,000 increase in per capita income.

The percentage correct prediction of 99.1 indicated a reasonably high predictive power for this logistic regression model; however, analysis revealed that after adding the variables into the model, the predictive power did not increase and the model was not able to better predict if a CAH would be acquired. A Nagelkerke R-square value of .164 indicated a relatively weak relationship of 16.4% between predictors and the prediction. In this logistic regression model, the Hosmer and Lemeshow goodness-of-fit post-hoc test revealed a Chi-square value of 6.552 and significance value .586 which indicated that the model was a good fit.

### **Summary of Findings for Logistic Models**

Table 8, Hypothesized Directions and Observed Directions of Relationships of Independent Variables with Dependent Variables in the Models, summarizes the hypothesized relationships as compared to the observed relationships between the IVs and the DVs. The direction of the relationship between the IVs and the DVs is presented using (+) and (-) signs. The (+) sign indicates that higher levels of the independent variable are associated with greater likelihood of a hospital being contract managed

acquired. Similarly, the (-) sign indicates that lower levels of the independent variable are associated with a lower likelihood of a hospital being contract managed or acquired.

Asterisks indicate statistically significant relationships. These results are discussed in detail in Chapter 5.

Table 8

*Hypothesized Directions and Observed Directions of Relationships of Independent Variables with Dependent Variables in the Models*

	Dependent Variable	Expected Relationship	Observed Relationship
<b>Variables</b>			
<b>Munificence</b>			
Non Fed MD	CMA	(-)	(-) <sup>***</sup>
	ACQ	(-)	(+)
Per Capita Income	CMA	(-)	(+)
	ACQ	(-)	(+) <sup>**</sup>
Unemployment rate	CMA	(+)	(-) <sup>**</sup>
	ACQ	(+)	(+)
<b>Dynamism</b>			
Median % Chg Non Fed MD	CMA	(-)	(+) *
	ACQ	(-)	(+)
Median % Chg Per Capita Income	CMA	(-)	(+) **
	ACQ	(-)	(-)
Median % Chg Unemployment rate	CMA	(+)	(-)
	ACQ	(+)	(+)
<b>Complexity</b>			
HHI	CMA	(-)	(+)
	ACQ	(-)	(+)
<b>Organizational</b>			
Net Income	CMA	(-)	(-)
	ACQ	(-)	(-) <sup>**</sup>
Age of Facility	CMA	(+)	(+) <sup>**</sup>
	ACQ	(+)	(-)
Net Assets	CMA	(-)	(-)
	ACQ	(-)	(-)
Not-for-profit	CMA	(-)	(+)
	ACQ	(-)	(+) <sup>***</sup>
Government	CMA	(-)	(+)
	ACQ	(-)	(+) <sup>**</sup>

\*\*\* significant at  $p \leq 0.01$

\*\* significant at  $p \leq 0.05$

\*significant at  $p \leq 0.1$

In summary, CAHs operating in markets with fewer active non-federal physicians and lower unemployment rates were more likely to be contract managed relative to remaining independent. CAHs with a higher median percent change in per capita income, newer facilities, and a higher median percent change in non-federal physicians were more likely to be managed under a contract management agreement.

CAHs operating in markets with higher per capita incomes and CAHs with less net income were more likely to be acquired relative to remaining independent. Finally, CAHs that are not-for-profit or a government entity were more likely to be acquired relative to remaining independent.

## **Chapter 5**

### **Discussion and Conclusions**

This chapter presents a summary and explanation of significant findings related to a CAH's decision to either be contract managed or become acquired. Additionally, responses to the research questions and limitations of this study are presented in this chapter. Implications for researchers, hospital leadership, the public, and policymakers are outlined. Finally, the chapter concludes with suggestions for areas of future research.

The purpose of this study was to explore the relationships of various environmental and organizational characteristics as related to a CAH's decision to either be contract managed or become acquired. The proposed relationships were based on the framework of resource dependence theory and previous research related to hospital characteristics associated with contract management agreements and acquisitions. Based on the research literature, strategic management focuses on aligning the organization with its external environment (Ginn, 1990; Zajac & Shortell, 1989). Further, industry leaders have suggested that the ambiguity of recent legislation to reform healthcare will likely prompt hospital leaders to consider strategic alliances such as contract management agreements or being acquired (Burik & Callahan, 2010).

#### **Discussion of Hypotheses and Research Questions**

The following section addresses the research questions and hypotheses based on the hypothesized models.

### **Research Question 1: Munificence**

*Relative to remaining independent, will the probability of a CAH being contract managed or becoming acquired increase as munificence decreases?*

The first research question was examined using six hypothesis statements. Of these, three hypotheses were found to be statistically significant. First, as predicted, the number of active, non-federal physicians was negatively associated with a CAH's decision to be contract managed, indicating that as the number of physicians in the CAH community decreased, the likeliness of the CAH to relinquish some of its autonomy and be managed under a contract increased. Physicians are a primary resource for CAHs, yet, according to the literature, many CAHs operate in environments that are considered health professional shortage areas (HPSAs) (Harrison, Ogniewski, & Hoelscher, 2009). In principle, significant contractual relationships may offer certain advantages to CAHs concerned with resource scarcity, including potentially increasing access to necessary health professionals, while at the same time, allowing a CAH's board of trustees to retain autonomy for policy development and oversight. Being managed under a contract agreement may increase a CAH's access to physicians and other healthcare providers by way of technology integration, such as telemedicine and access to an electronic medical record system, which are typically expensive investments. Telemedicine is making its entrance into the rural healthcare arena with the expectation of reducing costs and improving access to necessary healthcare providers. Further, telemedicine gives providers the ability to assess and treat patients without having to travel long distances. Telemedicine may help physicians oversee mid-level practitioners and other allied health

professionals which, in turn, could improve the use of physician extenders in a CAH community.

Contract management agreements may also benefit the organization providing the management services to the CAH. By supplying physicians to the CAHs they manage, either in person or by way of telemedicine, the managing organization can potentially expand its market share and increase the referral rate to its own organization.

The second hypothesis related to research question one indicated that the annual per capita income of the population in a CAH's geographical location was positive and significantly associated with a CAH's decision to be acquired. Importantly, this result was not consistent with previous findings in the research literature whereby the annual per capita income was predicted to have a negative association with a hospital's decision to be acquired. Although this finding was statistically significant, due to the small sample size, all results in this study associated with a CAH being acquired must be considered exploratory and predictive modeling using a logistic regression model is not recommended. These results may potentially be due to the desirability of the market to an organization that is considering an acquisition. CAHs in markets where the per capita income is higher may be more desirable for acquiring organizations because higher per capita income often suggests more discretionary income for healthcare services, making an acquisition attractive to an acquiring parent organization. Alternatively, for markets in which the per capita income is higher, the members of the community presumably have the means to travel to urban healthcare markets; thus, they may not frequent their community hospital, thereby affecting the CAH's ability to retain autonomy and continue operating without considering other strategic options.

Finally, in this investigation the unemployment rate in a CAH's geographical location was negatively associated with a CAH's decision to be contract managed. Again, this finding was contrary to the predicted outcome. One explanation for this finding may be that markets with lower unemployment rates, where an individual's ability to pay for healthcare services was higher, may be more attractive to an organization that is interested in offering contract management services. Additionally, organizations that offer contract management services may be attempting to expand their current services into markets with a higher percentage of commercially insured consumers. Providing services in a market where consumers have the ability to pay for services may ultimately lead to an increase in referrals to the parent organization's own facilities and; therefore, improve their own bottom line.

The remaining munificence hypotheses were not found to be statistically significant as postulated by the resource dependence theory. The lack of significance could indicate that some environmental characteristics are more central than others when considering strategies to improve access to scarce resources. In this investigation, the number of active non-federal physicians was related to a CAH being managed under contract; however, perhaps the use of allied health professionals as physician extenders plays a more important role in a CAH's decision to be contract managed. This shift in personnel could potentially offset fewer active non-federal physicians in the market. There may also be environmental factors that are more influential than per capita income or unemployment as related to a CAH's decision to be managed under a contract or acquired.



## **Research Question 2: Dynamism**

*Relative to remaining independent, will the probability of a CAH being contract managed or becoming acquired increase as the level of dynamism increases?*

This research question was constructed by analyzing the median annual percent change of the following: number of active non-federal physicians, per capita income, and unemployment rate. The median percent change in the number of non-federal physicians per 1,000 residents was found to be positively and significantly related to a CAH being contract managed. The median percent change in per capita income was also found to be positive, but only marginally significantly related to a CAH being contract managed. Although these hypotheses support the theoretical frame work suggesting that a dynamic environment would be associated with a CAHs decision to be managed under a contract, it was predicted that the hypotheses would be negatively related, not positively related.

Dynamism is often constructed in research models by measuring the amount of change in a given market over a period of time. The change in the number of non-federal physicians in the market may actually be the result of a CAH being contract managed. The median percent increase in per capita income may reflect CAH environments that are attractive to those providing contract management services. The hypotheses related to dynamism and acquisitions were not supported in this study. This null finding may suggest that the variables selected to represent dynamism are not as important as others that were not tested in this study.

### **Research Question 3: Complexity**

*Relative to remaining independent, will the probability of a CAH being contract managed or becoming acquired increase as the level of complexity in the market increases?*

In this study, there was no evidence to support the hypothesis that the probability of a CAH being managed under contract or acquired, relative to remaining independent, would increase with less market competition. These results are inconsistent with the findings of Alexander and Morrissey (1988) who demonstrated that systems target hospitals in less-concentrated markets. These results may indicate that a CAH's primary service area is not necessarily defined by the county in which it resides, in which case the HHI indicator may not have accurately reflected the CAHs actual market.

### **Research Question 4: Organizational Characteristics**

*Relative to remaining independent, will the probability of a CAH being managed under a contract or becoming acquired increase as a CAH's net income decreases?*

As hypothesized, the results of this study demonstrated that as a CAH's net income decreases, the likelihood of it being acquired increased. This is consistent with previous research by McCue (1986) and Harmatta & Bogue (1997), which determined that hospitals with low profit margins and in financial distress are more likely to be acquired. The finding indicates that poorly performing CAHs may seek potential buyers to survive. However, there was no statistically significant evidence to support the hypothesis that the probability of a CAH being managed under a contract agreement would increase as its net income decreased. This may reflect the financial constraints of a CAH's board of trustees gaining access to capital funds, a rarity in contract management

agreements. Thus, only one of the two hypotheses postulated by the resource dependence theory was supported.

#### **Research Question 5: Age of Facility**

*Relative to remaining independent, will the probability of a CAH being managed under a contract agreement or becoming acquired increase as the age of the facility increases?*

As predicted, the age of the facility was found to be positively and statistically related to an increased probability of a CAH being contract managed but not acquired. These results may be a reflection on a CAH's resource dependence on outside entities. Perhaps these hospitals entered into contract management agreements to improve efficiency, reduce costs and intentionally build cash reserves such that capital would be available in the future to replace existing facilities.

#### **Research Question 6: Fixed Net Assets**

*Relative to remaining independent, will the probability of a CAH being managed under a contract agreement or becoming acquired increase as its fixed net assets decrease?*

In this study, there was no evidence to support the hypothesis that the probability of a CAH being managed under contract or acquired, relative to remaining independent, would increase as its net assets decreased. Perhaps these hypotheses were not supported due to the complex financial valuation models that include other important financial indicators, such as cash flow and the present worth of future economic benefits, or value estimates based on an analysis of recent sales or offerings of comparable properties.

## **Research Question 7: Ownership**

*Relative to remaining independent, the probability of a CAH being contract managed or becoming acquired is lower for a not-for-profit organization or government entity.*

This study found that not-for-profit and government CAHs were positively associated with a CAH's decision to become acquired but not being contract managed. Traditionally, not-for-profit hospitals have raised capital from grants and tax-subsidized operating surpluses (Robinson, 2000). They also borrow heavily from the tax-exempt bond market, which creates hurdles concerning their solvency and credit ratings (Calem & Rizzo, 1995). Thus, not-for-profit hospitals' inability to access alternative sources of capital, such as stock, may encourage their decision to be acquired by for-profit hospitals.

### **Strengths and Limitations of the Study**

One of the primary strengths of this study includes the use of multiple data sources. As noted by (Avolio, Yammarino, & Bass, 1991), data drawn from a single source may be subject to common method bias. Thus, the use of multiple sources has the potential to generate findings that are strong in internal validity. An additional strength of this study is that it addressed an issue of contemporary importance. Unprecedented federal financial and political support for healthcare reform will likely increase consolidation, which makes understanding the environmental and organizational characteristics associated with CAHs of paramount importance. Based on an extensive review of the literature, this study is the first to examine the environmental and organizational characteristics as related to CAHs' strategic choice to be contract managed

or become acquired. In addition to these stated strengths, there were a number of limitations in this study.

The first limitation of this study was the number of CAH acquisitions that occurred between 2005 and 2009. The small number of acquisitions indicates that these transactions are rare events, which may have decreased the possibility of detecting significant relationships; thus, reducing the power of the findings. Therefore, all results associated with a CAH being acquired should be considered exploratory in nature.

The second limitation to this study is related to the type of model used to study the strategic responses of CAHs. Since strategic decisions made by CAH leaders are not mutually exclusive of one another, a multinomial logistic regression approach would have allowed the decisions to be compared to each other, rather than two models comparing the decisions against remaining independent.

A third limitation to this study is related to secondary data sources. This study relied on secondary data sources, which have inherent limitations with regard to accuracy and completeness. For example, although bed size was not used in this study to represent the size of a CAH, data from the American Hospital Association on bed size data did not match other secondary data sources. Therefore, net income was used as a proxy for CAH size in this study. Other studies may want to consider other variables that may provide better proxies for size, such as net patient revenue. Similarly, the financial independent variables were derived from Medicare and Medicaid cost reports. Although vetted by the Center for Medicare and Medicaid Services, these data elements may not be audited by an external organization (Harrison, 2002). Likewise, the data related to contract managed hospitals was abstracted from the AHA dataset; however, there is no way to assess the

different types of contract management agreements that exist.

Another data source limitation worth noting is that the Levin & Associates dataset was the only source used to identify acquired CAHs, which may not capture the total number of CAH acquisitions. Nevertheless, given the scarcity of data on this event, the findings of the study are likely important for establishing baseline levels of CAH acquisitions. Furthermore, other secondary data sources are likely to suffer from the same accuracy limitations. Another common limitation of secondary data sources concerns the reporting periods of hospitals in different data sources. Data from the American Hospital Association was based on the calendar year while financial data from the Center for Medicare and Medicaid Services was based on the fiscal year. If the majority of days (more than 180 days) for a hospital fell within a particular year between 2003 and 2009, as reported in the CMS hospital cost reports, the hospital was included in that year. However, since data from the AHA and CMS reports were merged to analyze the association of IVs and DVs, the differing reporting periods could have resulted in under or over estimation of the financial variables in a given year.

The final limitation of this study concerns the generalizability of the findings in the CAH acquisition logistic regression model. All of the acquired CAHs in the study were located in the Midwest and South; therefore, it cannot be assumed that the statistically significant findings from this study can be applied to CAHs in areas other than the Midwest and South.

## **Implications of the Research Study**

This empirical study of CAHs' strategic decisions has important theoretical, managerial, public, and policy implications. The following section describes these implications in greater detail.

### **Research Implications**

From a theoretical perspective, the results of this study were equivocal. These results suggest that the RDT has limited explanatory power for the selected variables and that other theories may shed additional light on environmental characteristics associated with a CAH's decision to be contract managed or acquired. In addition, using secondary data can present challenges when selecting variables to serve as proxies for the theoretical constructs of munificence, dynamism, and complexity. Therefore, rather than conclude that the RDT has limited explanatory power, it may be beneficial to explore the use of primary data source variables that may better portray the three environmental categories.

### **Managerial Implications**

The results of this study also have important implications for CAH management, especially as the healthcare industry continues to experience turbulence and uncertainty. It may be helpful for CAH leadership to know that CAHs managed under a contract agreement display the following characteristics: fewer physicians in their market, lower unemployment rates, greater levels of dynamism and have older facilities. Since these market and organizational characteristics are associated with a higher probability of a CAH being managed under a contract agreement, CAH leaders who are evaluating

contract management as a potential future strategy could apply this information to their strategic planning processes.

Since the probability of a CAH being managed under a contract agreement increases in markets with fewer physicians, CAH leaders who are expecting to see a reduction in the physician workforce may consider entering into a contract management agreement. By being contract managed, CAHs may have increased access to physicians and/or physician oversight for physician extenders, such as nurse practitioners or physician assistants. Finally, a contract management agreement may provide a CAH with access to more physicians if the organization providing the contract services provides technology to support greater access to care and reduced costs. Ultimately, an increase in resources could have a favorable financial impact to a CAH's net income.

Using lower unemployment levels as a proxy for the community's ability to pay for services is an important consideration for CAH leaders. Organizations that provide management services may express interest in partnering with CAHs who have a favorable payer mix with the expectation of strengthening the referral patterns between facilities. CAH leaders who are considering the possibility of entering into a CMA may use this market characteristic as leverage for improved pricing for management resources.

The findings of this study may be particularly helpful to CAH leaders who are considering strategies of acquisition and to hospital leaders who are interested in acquiring a CAH. As demonstrated by this research, CAH acquisitions were more likely to occur in markets with higher per capita income and with CAHs that had less net income and were either a not-for-profit or government entity.



The results of this study may provide CAH leaders and other hospital managers with valuable insights and greater understanding of the many factors that are associated with a CAH's decision to either be contract managed or acquired. With continued environmental uncertainty due to changing market conditions and new legislation, the findings of this study are intended to help healthcare leaders make informed decisions throughout their strategic planning processes.

### **Public Implications**

Community members served by CAHs may also benefit from the results of this study. For example, if a CAH enters into a contract management agreement with another organization, the community may gain much needed resources that might otherwise be unavailable, such as physicians or physician extenders. CMAs may provide a CAH access to technology, such as telemedicine, which would increase patients' access to care without the need to travel to obtain it. Further, a community-based CAH could reduce costs by gaining economies of scale, resulting in lower healthcare costs to the consumer.

Acquisitions can be perceived by the public negatively, especially since the research literature and the press reports increased costs associated with market consolidations. However, in many rural communities being acquired may be a strategy that allows a CAH to preserve basic healthcare services for the community it serves. To better manage perceptions, a board of trustees should keep community members served by the CAH well informed of how the decision to be acquired is in the best interest of the community.

## Policy Implications

From a policy perspective, the results of this study may inform law makers of the environmental and organizational characteristics associated with CAH interorganizational relationships (IORs). CAHs frequently serve as *safety net* providers (Barles, 2010; RUPRI Health Panel, 2012) as they are the only means to healthcare services for thousands of individuals in rural geographic areas. Based on the findings of this study, CAHs that operate in markets with higher per capita income generate less net income, are not-for-profit or a government entity, and are more likely to be acquired.

The sale of a not-for-profit hospital to a for-profit hospital often raises community concerns regarding charitable services, reduced control, higher prices, and less access to clinical care (Needleman, Lamphere, & Chollet, 1999). Therefore, governmental decisions on whether or not to approve acquisitions must include an evaluation of the effects of the consolidation on the community's welfare.

The goals of the Patient Protection and Affordable Care Act include: to improve healthcare outcomes, improve patient's experience, and reduce costs. As demonstrated by pilot projects for Accountable Care Organizations, Medical Homes, and bundled payments, current legislation appears to favor further integration of healthcare services. However, the current legislation does not favor or address the unique challenges faced by rural hospitals. Recently, the National Advisory Committee on Rural Health and Human Service published a white paper with policy recommendations for the Secretary of the U.S. Department of Health and Human Services encouraging law makers to consider the unique environmental and organizational characteristics of CAHs for future demonstrations that are aimed at aligning value-based reimbursement with the realities of

resource constraints of CAHs and other small hospitals (National Advisory Committee On Rural Health and Human Services, 2011). Given the findings of this study and the status of CAHs as safety net providers for rural communities, law makers should consider the implications of PPACA on CAHs that do not have the financial wherewithal or the ability to partner with other organizations.

### **Future Research**

This study was a cross-sectional retrospective study; therefore, relationships should be interpreted as associational only. To detect the causality of relationship, it would be valuable for future studies to utilize longitudinal, panel designs that would allow analysts to control for confounding explanations. For example, a fixed effect (FE) panel analysis could be used to analyze subtle organizational differences that change over time. Factors that may impact or bias the predictor or outcome variables could be controlled for within the FE model. Since the FE model controls for all time-invariant differences between entities, the estimated coefficients of fixed effects models cannot be biased because of omitted time invariant characteristics. The purpose of this study was to examine CAHs' strategies over time; however, it was difficult to capture subtle changes of organizations over time. A fixed-effect model may have been the preferred model although data to examine change over time were limited.

From a theoretical perspective, with the selected independent variables, this study demonstrated that the RDT has limited explanatory power for the selected variables. The equivocal results of this study, however, supports the use of alternative theories to shed additional light on environmental characteristics associated with a CAH's decision to be contract managed or acquired. For example, corporate financial theory emphasizes the

importance of acquisitions for increasing size and market share and improving management efficiency (Copeland & Weston, 1988). This theory identifies several motivating factors that may cause one organization to acquire another (Lloyd, 1997). Due to recent healthcare legislation that favors managed care models and increased provider integration, corporate financial theory could provide information about CAHs and their attractiveness to those who provide contract management services or are interested in acquiring a CAH.

This study used the framework of RDT and used the continuum of hospital interorganizational relationship model from Zinn and colleagues (1997) as a reference to depict three strategic responses on the continuum. However, future researchers may choose to incorporate other responses, such as alliances, network affiliations, or even closures.

The three primary market characteristics in this study were munificence, dynamism, and complexity; however, because the variables selected had equivocal results and the covariates did not improve the predictive power of either model, future researchers may wish to consider other environmental characteristics that could impact a CAH's decision to be contract managed or acquired. For example, since CAH markets typically have a difficult time recruiting and retaining physicians (Harrison, 2009), many rural communities rely on allied health professionals to provide basic healthcare services. In place of physicians, future researchers may want to consider the number of physician extenders, such as nurse practitioners and physician assistants, working in the CAH community, to reflect munificence.

In addition to examining the number of allied health professionals in a CAH market, it may be worthwhile for future researchers to examine the number and types of specialists working in a CAH market as related to a CAH's decision to be contract managed or acquired. Recently, researchers noted that the number of rural hospitals not providing surgery increased between 2001 and 2008, and that most of these rural hospitals were CAHs (Holmes, Karim, & Pink, 2011). If specialty services, such as surgery, have a significant impact on a CAH's financial viability, the number and types of specialists that serve a CAH community may be important for future research.

Finally, this study used secondary data sources at the county level. However, many CAH's primary service area may extend far beyond the county in which it resides. Therefore, it may be valuable for future research to construct other variables to better represent the actual primary market areas for CAHs.

Additional organizational characteristics that might influence a CAH's strategic decision to be contract managed or become acquired include the types and number of services offered. For example, future researchers could examine the number of Federally Qualified Health Centers (FQHCs) and/or Rural Health Clinics (RHCs) operated by a CAH, whether or not the CAH operates a skilled nursing facility, and the types of technology it uses. Although CAH Board composition was beyond the scope of this study, it may have a significant impact on a CAH's strategic decision to be managed under contract or become acquired. Therefore, future researchers may wish to examine the size, age, experience, and tenure of Board members, to determine if there is a relationship between Board characteristics and the probability of a CAH being contract managed or becoming acquired.

While this study used financial metrics well established in previous literature, there may be other financial indicators that influence a CAH's decision to be contract managed or acquired. Future researchers may choose financial ratios that represent a CAHs profitability, liquidity, and debt.

Finally, this study chose to examine the environmental and organizational characteristics associated with a CAH's strategic decisions; however, it may be beneficial for future researchers to explore the characteristics of hospitals that provide contract management services or have acquired a CAH. These data could serve to further inform management, the public, and policymakers of the types of market and organizational characteristics that are associated with contract management providers and those who are interested in acquiring a CAH. This information may become especially important in light of new PPACA legislation which tends to favor higher levels of integrated care, as established by demonstration projects for accountable- care organizations, value-based purchasing, medical homes, and bundled payments. According to the experts, PPACA is likely to significantly increase the number of interorganizational relationships in the U.S. (Flanigan, Pfrang, Gisby, & Woitel, 2010).

### **Conclusions**

The purpose of this study was to examine the association of market and organizational characteristics as related to a CAH's strategic decision to either enter into a contract management agreement or be acquired. Findings from this study suggest that environmental munificence and complexity were related to a CAH's strategic decision to either be contract managed or acquired. Additionally, this research established that some organizational characteristics were associated with a CAH's strategic decisions. The

results demonstrated that CAHs located in markets with fewer active non-federal physicians per 1,000 residents, and had fewer net assets were more likely to be contract managed. CAHs located in markets with higher per capita income, less net income, not-for-profit and governmental were more likely to be acquired. While the hypotheses of this study established a sound theoretical foundation, several unanticipated results were also observed. The lack of significant empirical evidence for this complex topic, however, presupposes that all findings of this study provide valuable information for design and implementation of future studies.

The findings from this study moderately supported the resource dependence theory. Further, results documented the important contributions in four key areas: future research development and application, managerial applicability, public interest, and policy implications. As healthcare reform aims to improve healthcare outcomes, improve patients' experiences, and reduce costs, CAHs will need to continue to assess their strategic options to reduce uncertainty and remain financially viable and high quality providers within the communities they serve.

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APPENDIX A  
IRB DOCUMENTATION




*Institutional Review Board for Human Use*

DATE: January 19, 2012

MEMORANDUM

TO: Virginia Razo  
Principal Investigator

FROM: Cari Oliver   
Assistant Director, UAB OIRB

RE: Request for Determination—Human Subjects Research  
**IRB Protocol #N111116004 – Environmental and Organizational  
Characteristics Associated with Strategic Decisions of Critical Access  
Hospitals**

A member of the Office of the IRB has reviewed your exempt application with the above title. Upon review it was determined that the application **qualifies for the designation of Not Human Subjects Research.**

The reviewer has determined that this proposal is **not** subject to FDA regulations and is **not** Human Subjects Research. Note that any changes to the project should be resubmitted to the Office of the IRB for determination.

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APPENDIX B  
LETTER OF PERMISSION

**From:** JACQUELINE S. ZINN [mailto:zinn@temple.edu]  
**Sent:** Wednesday, September 05, 2012 9:47 AM  
**To:** Ginny Razo  
**Subject:** Re: Permission Request for Reprint

Sure--please reference the source. Best, dr. Zinn

On Wed, Sep 5, 2012 at 11:18 AM, Ginny Razo <[vrazo125@usamedia.tv](mailto:vrazo125@usamedia.tv)> wrote:

Dr. Ms. Zinn,

My name is Virginia Razo and I am a DSc candidate at University Of Alabama's Health Care Administration Executive Doctoral program. I am completing my research on environmental and organizational characteristics associated with a Critical Access Hospital's strategic decision to either enter into a contract management agreement or be acquired and would like to include the figure, A Continuum of Hospital Interorganizational Relationships, in my dissertation. This figure was published in the article Organizational and Environmental Factors in Hospital Alliance Membership and Contract Management: A Resource Dependence Perspective in the Spring edition of 1997 in Hospital & Health Services Administration.

Would you please grant me approval to include this figure in my dissertation?

Sincerely,

Virginia A. Razo