An Empirical Study Of The Determinants Of Location Of Hospital Mergers And Acquisitions: 1997-2016

By: **David R. Williams** and Trent J. Spaulding

Abstract

The present paper examines characteristics related to the two parties involved with hospital mergers and acquisitions and how these affect the location of the merger or acquisition. Using a dataset provided by Levin Associates, we study announcements of this phenomenon between 1997 and 2016. We find that private and publicly traded hospitals have been more engaged in interstate hospital M&As, as compared to nonprofit hospitals. We also find that nonprofit and publicly traded firms are increasing their rates of rural M&A activity over time. We offer areas for further research based on our literature review, the findings, and the changing dynamics of the hospital market. Our findings should be of interest to researchers, policy makers, and the public.

Williams, D.R. and Spaulding, T.J. (2018). "An Empirical Study of the Determinants of Location of Hospital Mergers and Acquisitions: 1997-2016," *Journal of Health Care Finance*. 45(1): 1-20. Publisher version of record available at: https://www.healthfinancejournal.com/index.php/johcf/article/view/156

JOURNAL OF HEALTH CARE FINANCE

Summer 2018

An Empirical Study of the Determinants of Location of Hospital Mergers and Acquisitions: 1997-2016

David R. Williams, Ph.D., FACHE
Professor and Undergraduate Program Director
Health Care Management Program
Department of Nutrition and Health Care Management
College of Health Sciences
Appalachian State University

Trent J. Spaulding, Ph.D.
Associate Professor
Department of Nutrition and Health Care Management
College of Health Sciences
Appalachian State University

ABSTRACT

The present paper examines characteristics related to the two parties involved with hospital mergers and acquisitions and how these affect the location of the merger or acquisition. Using a dataset provided by Levin Associates, we study announcements of this phenomenon between 1997 and 2016. We find that private and publicly traded hospitals have been more engaged in interstate hospital M&As, as compared to nonprofit hospitals. We also find that nonprofit and publicly traded firms are increasing their rates of rural M&A activity over time. We offer areas for further research based on our literature review, the findings, and the changing dynamics of the hospital market. Our findings should be of interest to researchers, policy makers, and the public.

Keywords:

Health system change; hospitals; strategic management

An Empirical Study of the Determinants of Location of Hospital Mergers and Acquisitions: 1997-2016

Introduction

For the past several decades hospital and health system mergers and acquisitions (hereinafter hospital M&A or hospital M&As) have been ongoing and of interest to scholars (e.g. Wilke and Choi, 1988; Brooks and Jones, 1997; Schmitt, 2017). The financial economics and management literatures note that firms undertake M&As for a number of reasons including: increasing market share to raise prices or lower costs (Henderson, 1979), to integrate markets (Sawler, 2005), to acquire the reputation of a firm (Dranove and Shanley, 1995; Klein, Crawford, and Alchian, 1978), as a defensive measure (Haleblian, Devers, et al., 2009), or to acquire competencies or other resources that the acquiring firm lacks (Demirbag, Ng, and Tatoglu, 2007). In the healthcare literature, more specific additional reasons prompting hospital M&As include: to improve quality of services, broaden geographic footprint, as a response to regulatory pressures and the economic downturn, reduced demand for inpatient beds, and to maintain identity or mission (Alexander and Morrisey, 1988; Dranove and Shanley, 1995; Vogt and Town, 2006; Hayford, 2012; McCue, Thompson, and Kim, 2015; Schmitt, 2017). We know much of the supposed reasons (and their performance outcomes) for hospital M&As, but other than trade press announcements little about the characteristics (McCue, et al., 2015) and location of M&As, as most research has focused on performance aspects of the consolidated hospital. The present paper is concerned with characteristics related to the two parties involved in hospital M&As and how these affect the location of the merger or acquisition.

A merger occurs when two firms of relatively the same size agree to go forward as a single new firm rather than remain separately owned and operated. The combination of Barnes Hospital with Jewish Hospital in St. Louis in 1996 is an example of a merger. An acquisition occurs when one firm takes over another firm and clearly establishes itself as the new owner. LifePoint Hospital Inc.'s purchase of Woods Memorial Hospital in Tennessee in 2012 is an example of an acquisition. For our study's purposes, we do not distinguish between the two types of transactions, but study both types combined.

Early studies based on hospital consolidation in the 1970s found hospital M&As to lead to higher prices and costs, with researchers attributing this to the "medical arms race" phenomenon where physicians "play" competing hospitals against one another to obtain medical technologies and other resources for their use (Cuellare and Gertler, 2003). Since the advent of Medicare's Prospective Payment System in the 1980s, hospital consolidations have increased (Alexander, Halpern, and Lee, 1996) and have, perhaps, occurred in waves (Vogt, 2009; Advisory Board, 2013). The 1990s saw hospitals faced with the changing reimbursement landscape as managed care swept across the country (Park and Town, 2014). In 2010, the Patient Protection and Affordable Care Act (ACA) was signed bringing with it additional requirements and potential cuts in payment. For example, under value based reimbursement schemes, hospitals may face Medicare cuts if they do not meet the prescribed technology and quality measures (Noles et al. 2015). The above factors affected all hospitals, further leading to both nonprofit and for-profit hospitals forming locally

concentrated health systems (Cuellar and Gertler, 2003) with approximately 60 percent of hospitals residing in health systems in the early 21st century (Cutler and Morton, 2013).

Much of the hospital M&A literature focuses on local consolidation (Schmitt, 2017). Yet many of the hospital M&As taking place recently involve hospitals that cover separate geographic service areas (Dafny, 2014) of which we know little (e.g. Harrison, McCue, and Wang, 2003). Additionally, most studies cover a short time frame such as one to four years. The present study examines all announced hospital M&As over the 20-year period occurring between 1997 and 2016. We are interested in knowing whether ownership characteristics affect the location of hospital M&As. In particular, we seek to explore the choice of location and the variation among for-profit, nonprofit, and private hospitals. We suggest that if variation exists between ownership types, then this may reflect different purposes for M&As by ownership structure. We conclude by offering areas for future research based on our literature review and findings.

Literature review

Economic theory suggests that mergers and acquisitions have the potential to increase leverage over suppliers for the procurement of less expensive inputs and to increase efficiencies through economies of scale and scope (Krishnan and Krishnan, 2003). For this reason, two streams that dominate much of the literature on hospital M&As have focused on increasing local market share to (1) raise prices or (2) lower costs (Ho and Hamilton, 2000; Noles et al., 2015). For example, Krishnan (2001) studying health system acquisitions in California and Ohio found that this had the tendency to raise prices. Cuellar and Gertler (2005) studying hospitals in systems compared with those not in systems found managed care and indemnity prices were higher for system hospitals compared with hospitals that were not in systems. Dafny, Ho, and Lee (2016) show that even cross-market mergers (i.e., hospital mergers across distinct geographic boundaries) can reduce competition and lead to higher prices. Lewis and Pflum (2017: 579) summarize much of this M&A-price literature when they state "[r]ecent empirical studies have consistently found that mergers between local rival hospitals result in significantly higher reimbursement rates."

Relative to hospital expenses or costs, in an early study of mergers between 1956 and 1970, Treat (1976) finds that costs increase significantly after mergers compared with non-merged facilities for urban hospitals, but not for rural hospitals. Dranove and Shanley (1995) studying California hospitals in 1988 find that health systems are no better at exploiting economies of scale related to production, administration, and marketing than independent hospitals. Connor, Feldman, and Dowd (1998) find modest cost savings tend to quickly vanish in concentrated markets. In a review paper, Vogt and Town (2006) find mixed results but a slight indication that hospitals that consolidate facilities also lower costs (with it being noted that this cost savings may not be passed on to the payer). Harrison (2011) finds economies of scale for merged hospitals in the short term, but over time these efficiencies decrease. Schmitt (2017: 80) summarizes this M&A-cost literature when he notes, "[o]n balance, the evidence thus far fails to support strong claims of systematic cost savings from mergers."

Because the hospital M&A literature has shown a lack of support for cost reduction, yet substantial support for price increases post merger there continues to be debate among

scholars about the appropriate level of antitrust enforcement. This is to say that some researchers are concerned as to whether or not antitrust laws are being enforced at an appropriate level in all markets. In a much-cited work by Lynk (1995), he shows that nonprofit hospital prices in California are less than for-profit hospital prices. The suggestion here is that nonprofit mergers would not result in increased prices. Numerous researchers have challenged this position and questioned the appropriateness of mergers in certain markets (e.g. Vita and Sacher, 2001; Conners, 2003; Tenn, 2011). This debate continues a literature stream with suggestions for revisions to guidelines and a strengthening of enforcement.

Another stream in the hospital M&A literature focuses on firm financial performance post acquisition. For example, a study in the 1980s for Modern Healthcare of 36 hospitals that merged into 18 hospitals found improved financial profitability 2 years after the merger (Harris, Ozgena and Ozcan, 2000). Whereas, Mullner and Andersen (1987) studying 32 hospital mergers during a similar time period (i.e., early 1980s) did not find any significant results attributable to the mergers. Clement et al. (1997) studying strategic hospital alliances (including but not limited to hospital M&As) found hospitals in alliances had higher operating cash flow per bed than the hospitals that were not in strategic alliances. While McCue et al. (2015) found the cash flow margin of acquired hospitals being lower than a comparison group of non-acquired hospitals. A study by Deloitte (2013) of hospital acquisitions in 2007 and 2008 found the financial performance of acquired firms improved after the acquisition, however, remained below their peers. Noles et al. (2015) studying rural hospitals found that mergers and acquisitions did not result in more capital, debt relief, or an improvement in profitability. In summary, results from studies on hospital M&As and financial performance, like the M&A market for all industries (Cartwright and Schoenberg, 2006), remains mixed at best.

A fifth stream focuses on the quality of care after the merger. For example, Hayford (2012) found hospital mergers to be associated with greater treatment intensity. Kessler and McClellan (2000) found that hospitals in more competitive environments have lower incidences of adverse health events. Studying one hospital merger in Chicago, Romano and Balan (2011) found little evidence that the merger improved quality. Though there is some literature exploring the consequences on patient outcomes, there is much research needed in this area before conclusions can be drawn (Ho and Hamilton, 2000; Hayford, 2012).

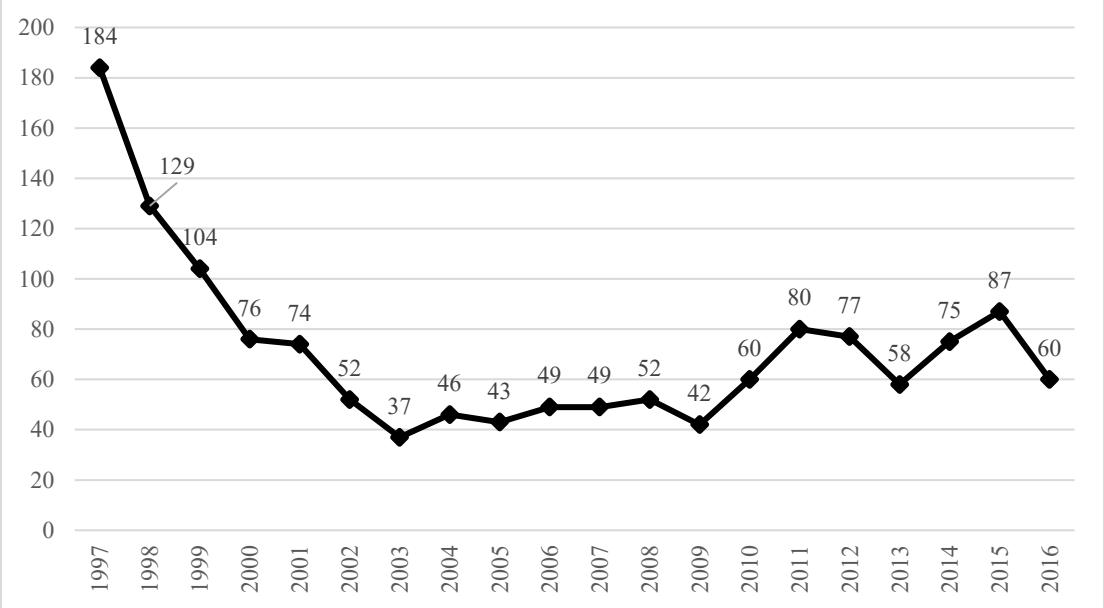
Another stream examines the price paid for the acquired hospital. Much of this research focuses on the sale of nonprofit hospitals to for-profit entities. Cutler and Horowitz (2000) note that between 1970 and 1995, about 7 percent of the not-for-profit hospitals in the U.S. had converted to for-profit corporate status. McCue and Furst (1986) studying acquired and non-acquired firms in the South from 1978 through 1982 found that investor-owned systems were typically acquiring financially distressed hospitals. Sloan, Ostermann, and Conover (2003) examining changes in ownership status from 1986 through 1995 found similar results. McCue, McCue, and Wheeler (1988) studying hospital acquisitions by investor-owned systems from 1978 through 1984 found that these systems were willing to pay higher prices for more highly utilized hospitals in high-income areas, but less for older hospitals that might require capital improvements. Leone, Van Horn, and Wedig (2005) studying hospital acquisition prices between 1990 and 2001 found no difference in market prices paid by investor-owned chains in their purchase of for-profit

and nonprofit facilities. McCue and Kim (2009) studying hospital acquisitions between 1999 and 2001 found acquiring hospital systems paid a higher price for facilities located between urban and rural markets; yet, no significant difference in acquisition price between for-profit and nonprofit hospitals.

As shown above, much of the hospital M&A literature has focused on some aspect of performance outcome (price, cost, financial or quality) within a specified market or between comparison groups or mergers specific to investor-owned entities. Little is known about out-of-market hospital acquisitions (Lewis and Pflum, 2017) or the characteristics that may play a role in determining in-state or out-of-state hospital acquisitions. The present study seeks to address determinants of location of hospital mergers and acquisitions. Specifically, we postulate that the ownership structure of both the selling and acquiring firms affect hospital acquisitions occurring within or without a state and geographic demographics (i.e., rural/mostly rural/urban). We choose to study M&As at the state level as hospitals are mainly regulated (e.g. license, certificate of need) at this level. Additionally, much of the M&A literature has focused on price, especially price of services acquired by commercial insurance. Commercial insurance has historically been regulated at the state level, and thus, commercial insurers create provider networks for individuals and employers primarily at the state level.

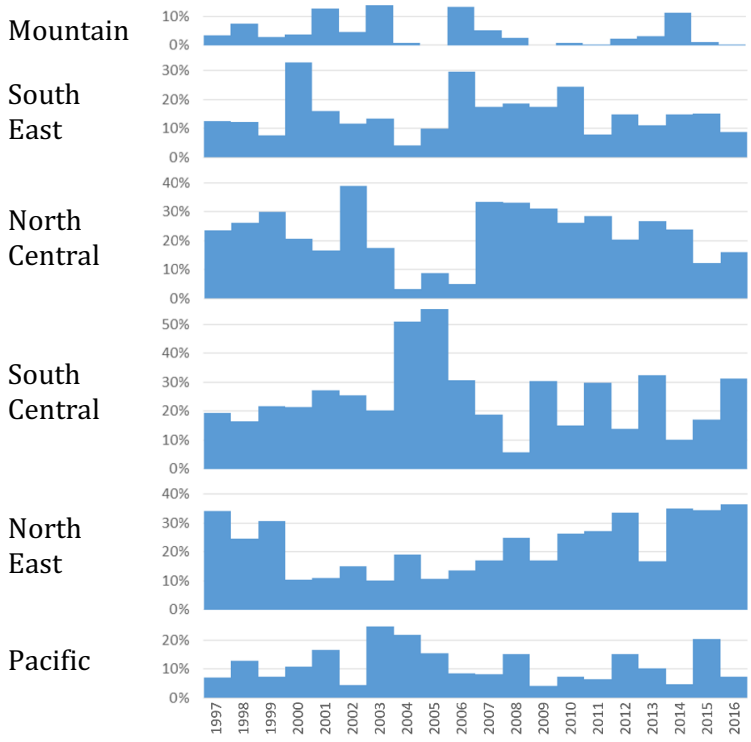
Figure 1 depicts the hospital M&A announcements from 1997 through 2016 derived from data from Irving Levin and Associates. From Figure 1, one can see that M&A announcements declined after the 1990s, but increased again after 2010 (perhaps, in response to the ACA).

Figure 1 Announcements by year



In a synthesis paper for the Robert Woods Johnson Foundation, Vogt and Towns (2006) found that for a person living in a metropolitan statistical area their choice of hospitals decreased from six to four based on an increase in the Herfindahl Hirschman Index between 1990 and 2003. Vogt and Towns (2006) found this consolidation to be greatest in the South. We examine announced hospital M&As between 1997 and 2016. Figure 2 shows the percentage of hospital M&A announcements by region of the country over time. From Figure 2, one can see that during the period under study the area of the country with the greatest amount of announcements is the northeast.

Figure 2 Percent of Announcements by Year and Region



Note: Percent calculated as (# of announcements for the region)/(# announcements for the year)

Keeler, Melnick, and Zwanziger (1999) find that nonprofit hospital mergers lead to higher prices, and that the price increases resulting from nonprofit mergers are increasing over time. In a similar study, Melnick, Keeler, and Zwanziger (1999) note that the majority of hospital acquisitions from 1994 to 1997 were made by nonprofit hospitals. They perform simulation models on hypothetical mergers of both nonprofit hospitals and for-profit hospitals. They (Melnick et al. 1999) find that mergers that consolidate markets lead to price increases at both merging hospitals and competitors regardless of ownership status. Related to price increases, Berenson (2015: 722) notes "[m]arket power might not have been the primary motivation for the merger but can easily become the result—and persist for years to come."

Given the effect of consolidation on price, there remains debate among academicians and policy makers as to whether the M&A activity of nonprofits has led or would lead to a change in culture and purpose (Sloan, 2000; Sloan et al., 2003). This is to say that debate remains as to whether or not nonprofit hospitals have become more attuned to the profit motive and less community focused than in years past. Similarly, for-profit firms have acquired nonprofit firms and converted the acquired firms to for-profit status (Sloan, 2000), raising concerns about community benefits (Picone, Chou, and Sloan, 2002). Table 1 shows hospital M&A announcements by ownership status. Similar to Melnick, et al. (1999), the study finds nonprofits as the largest acquirers of other hospitals in terms of transactions and beds, with the transactions of nonprofits merging or acquiring other nonprofits being the largest category.

Table 1 Announcements by Ownership Status 1997 - 2016

Ownership of acquirer	Ownership of target	Transactions	Total beds of target	Total revenue of target*
Nonprofit	All	898	216,262	$131,315
	Nonprofit	709	179,766	$114,736
	Private	69	10,416	$6,484
	Publicly Traded	120	26,080	$10,095
Private	All	272	73,261	$35,456
	Nonprofit	137	33,362	$17,741
	Private	60	16,450	$8,473
	Publicly Traded	75	23,449	$9,242
Publicly Traded	All	264	66,507	$31,224
	Nonprofit	172	39,459	$18,584
	Private	50	13,572	$8,091
	Publicly Traded	42	13,476	$4,548

N= 1,434, * In millions

Mark (1999), on the other hand, found an improvement in financial performance following hospital conversions from nonprofit to for-profit status and suggests that this may be a benefit to the community, as many hospital M&As are prompted by financial distress (McCue and Furst, 1986). This may be because M&As in some settings are often an alternative option to hospital closure (Sinay, 1998). Furthermore, Cutler and Horowitz (2000) note that nonprofits often follow for-profit hospitals' behavior such as exploiting Medicare loopholes. Sloan et al. (2003) studying hospital M&As from 1986 through 1996 found that the most common change of ownership was from public to private (33.4 percent), followed by public to for-profit (28 percent). Table 2 shows change in ownership status by 5-year groupings. As can be seen during these periods, there was no change in ownership status between 43.9 percent and 66.7 percent of the time. The 5-year period of 2002 through 2006 saw the greatest change of ownership status with about 56 percent of the announcements. For those firms that did change ownership status, there was great

variation during the time periods. For example, hospitals that changed from nonprofit status to private ranged from about 3 percent to about 22 percent of the announcements depending on the 5-year period.

Table 2 Percentage Change in Ownership Grouping by Year

	1997-2001	2002-2006	2007-2011	2012-2016
No change	66.68%	43.96%	48.40%	66.57%
Private to Nonprofit	2.37%	0.74%	6.54%	2.77%
Publicly Traded to Nonprofit	9.47%	7.98%	6.18%	4.17%
Nonprofit to Private	2.96%	10.86%	21.83%	8.88%
Publicly Traded to Private	5.37%	15.65%	4.45%	2.88%
Nonprofit to Publicly Traded	11.22%	19.62%	8.69%	5.80%
Private to Publicly Traded	1.94%	1.21%	3.92%	8.94%

Note: Grey brings out larger changes in ownership status. N= 1,434

Much of the M&A literature assumes little difference among hospitals (Alexander and Morrisey, 1988; Sloan et al. 2003). Alexander and Morrisey (1988: 161) note that systems "may employ, as part of their corporate strategy, acquisition criteria that direct them to market themselves in particular geographic areas and/or to hospitals possessing specific, predefined characteristics." An area that has not been examined in the academic literature is characteristics related to who the seller and acquirer are in different settings. Alexander and Morrisey (1988) begin to answer this question, but it has been nearly 30 years since this study, and the landscape for M&As, perhaps, has changed.

Given the above, we suggest that there may be different purposes for hospitals engaging in M&As based on geographic location. Most of the literature focuses on within market consolidation, with hospitals supposedly seeking economic efficiencies. Alexander and Morrisey (1998) note that there are other reasons for M&As, such as survival of mission. For example, the "graying" of Catholic religious persons has led to the consolidation of Catholic hospitals. Alexander and Morrisey (1988) imply that private, religious organizations may wish to keep their mission ongoing despite the need for consolidation, with many of these organizations residing across state boarders. Additionally, publicly traded firms tend to acquire financially distressed hospitals regardless of location, seeking to lower costs and discard unprofitable units within the facility. As Robinson (1996: 158) notes "horizontal expansion or mergers across different local markets can achieve efficiencies through spreading administrative overhead expenses and by volume purchases of suppliers…economic theory views across-market expansion as conducive to competition and efficiency." Thus, we hypothesize:

> H_1 Private and publicly traded hospitals are more likely to engage in M&As of hospitals residing outside of the state compared to nonprofit hospitals.

Distinctions can also be made for firms engaged in urban and rural M&As. Sinay (1998) notes there are two distinctions between the creation of rural hospital system development and others: (1) geographic distance between hospitals; and (2) the need for rural hospitals to gain access to managed care contracts, especially within the managed Medicaid market. Berenson (2015) observes that rural hospitals have a monopoly like power based on distance between hospitals. National hospital organizations, regardless of ownership status, often times have national insurance contracts allowing rural hospitals access to commercial managed care contracts in which they might otherwise not have access (Berenson et al., 2012). Many rural hospitals also are critical access hospitals (CAH), which have special status with Medicare. CAH hospitals receive cost based reimbursement from Medicare, with the owner's administrative costs being covered at a greater rate than in a prospective reimbursement system (Stensland, Davidson, and Moscovice, 2004). Similar to the Medicare loopholes mentioned above (e.g. Cutler and Horowitz, 2000), national firms may be more aware of how to apply advantages learned in one market to other markets. Thus, we hypothesize:

> H_2: Private and publicly traded hospitals are more likely to engage in M&As of hospitals that are rural or mostly rural compared to nonprofit hospitals.

Methods

We use a database from Irving Levin Associates, which is widely used in the hospital M&A literature (e.g. McCue and Kim, 2005; Noles et al. 2015; Schmitt, 2017). The database includes announcements of all hospital M&As occurring in the U.S. We use data from the 20-year period of 1997 through 2016. There were 1,797 announcements of which 1,434 (79.8 percent) had usable data. As the announcements are about both actual M&As and the intention to merge or acquire, we take a sample of the population of announcements (i.e., from 2010-2016) and perform an Internet search to verify that the M&A actually occurred. We were able to verify 467 out of 490 (or 94.0 percent) announcements occurred. We do not check to see if the M&A did not occur. Our inability to verify this does not necessarily imply that the M&A did not occur, but rather that we were not able to confirm via an Internet search. We run a t-test based on number of beds and revenue to determine differences in the population and the sample and found non-significant results (p= 0.63; p=0.29). As there is no statistical difference, we use the entire announcement set from Irving Levin Associates that had usable data (N=1,434).

The dataset includes the city, state, and zip code for both sellers and acquirers. Additional work was done to code the dependent variable for in-state and out-of-state acquisitions. If a selling firm and acquiring firm are within the same state, the announcement was coded as one (1), if not it was coded as zero (0). Other control variables include a continuous variable for the date of the announcement, a continuous variable for the total revenue for the selling hospital(s), and a continuous variable for the number of inpatient beds of the selling hospital. Both of the variables for total revenue and number of inpatient beds are log transformed to assist with non-normality issues. Additional work was also done to control for the target hospital being a rural facility. The U.S. Census Bureau's 2010 list of counties was used to determine rural or urban status. Using the U.S. Census Bureau's division of rural/mostly rural/urban, we found 19.6% of M&As involved rural or

mostly rural hospitals. We combine the mostly rural designation into the rural variable. The independent variables include controls describing the ownership type of the selling hospital (i.e., Nonprofit; Private; Publicly traded) and the acquiring hospital (i.e., Nonprofit; Private; Publicly traded). Finally, the dataset controls for the geographic region in which the target facility is located in the same manner that previous work has done (e.g. Furukawa et al., 2008).

Results

A logistic regression was employed to test the effects of the acquirer's ownership status on purchasing hospitals outside of the buyer's state (H_1). The regression included 1,434 announcements (37.4% of which were outside the acquirer's state). The overall model was significant ($p<0.001$) and explains approximately 36.86 percent of the variance in the target (i.e., purchasing hospitals outside of the buyer's state). Control variables included the region in which the target hospital was located, whether the target hospital was rural, logged revenue and logged beds of the target hospital, and the ownership status of the target hospital (see Table 3).

The regression supports hypothesis 1. Table 3 shows that private and publicly traded organizations were 17 and 46 times (respectively) more likely to engage in out-of-state M&A than were nonprofit organizations ($p<0.001$). Further interesting findings included rural hospitals were more likely to be targets of out-of-state M&A activities than were urban hospitals. Some regional differences in out-of-state M&As are visible in the dataset.

Table 3 Logistic Regression of Acquirer Ownership Status on Out-of-State M&A

	MLE	p	Odds Ratio
Intercept	-6.0390	0.001	
DateContiguous	-0.0034	0.810	0.997
LNRevenue	0.1727	0.204	1.189
LNBeds	0.1862	0.237	1.205
Target Region*			
Mountain	1.0604	0.005	2.888
North Central	0.4350	0.072	1.545
North East	-0.2339	0.363	0.791
Pacific	-0.5882	0.059	0.555
South Central	0.1469	0.539	1.158
Target is Rural	0.6255	0.003	1.869
Target is Private	-0.4071	0.080	0.666
Target is Publicly Traded	-0.3273	0.123	0.721
Acquirer is Private	2.8439	<.001	17.183
Acquirer is Publicly Traded	3.8242	<.001	45.794

Note: n = 1434 announcements. 898 were outside the acquirer's state. *South East is the reference region

Logistic regression was also used to test the effects of the acquirer's ownership status on purchasing rural hospitals (H_2). The regression used the same sample, with 19.6% of the announcements including rural targets. Table 4 shows that the overall model significantly ($p<0.001$) explains approximately 27.55 percent of the variance around whether the announcements were for rural or non-rural purchases. Control variables included the region in which the target hospital was located, logged revenue and logged beds of the target hospital, and the ownership status of the target hospital.

The regression does not show support for hypothesis 2. It appears that privately held organizations are less likely to engage in M&A activities with rural hospitals than are nonprofit organizations. Further, we cannot say that publicly traded organizations are any more or less likely to engage in M&A activities with rural hospitals than are nonprofit organizations. Estimates related to other control variables reveal that the percent of M&A activity related to targeting rural hospitals is increasing over time. Further, estimates related to revenue and beds appear to have logical relationships (i.e., smaller hospitals are more likely to be rural).

Table 4 Logistic Regression of Acquirer Ownership Status on Rural Purchases

	MLE	p	Odds Ratio
Intercept	20.2504	<.001	
DateContiguous	0.0726	<.001	1.075
LNRevenue	-1.0479	<.001	0.351
LNBeds	-0.6068	<.001	0.545
Target Region*			
Mountain	-1.8184	<.001	0.162
North Central	-1.2005	<.001	0.301
North East	-1.1988	<.001	0.302
Pacific	-2.3628	<.001	0.094
South Central	-0.5394	0.022	0.583
Target is Private	-1.0575	<.001	0.347
Target is Publicly Traded	-0.6002	0.014	0.549
Acquirer is Private	-0.8500	0.001	0.427
Acquirer is Publicly Traded	0.0103	0.962	1.010

Note: n = 1434 announcements. 281 were rural or mostly rural.
*South East is the reference region

The unexpected findings from the test of H_2 justified a follow up analysis. This dataset provides the opportunity to test whether the percent of M&A activity with rural facilities is changing over time for each of the types of acquiring firms (nonprofit, publicly traded, and private). The logistic regression in Table 5 allows tests of differences in the change of the percent of rural M&A activities across different types of acquiring firms. Recognizing there are many ways to set up this regression, the form in Table 5 provides the simplest interpretation. Different forms (such as retaining the ContiguousDate variable separately) provide the same conclusions (results not shown).

Results in Table 5 show that the percent of M&A activity related to rural facilities is increasing for nonprofit and publicly traded firms ($p<0.001$ and $p=0.008$ respectively). Though the estimate for private firms is negative, it is not significantly different from zero. Further, linear combinations of the three estimates were run in three post-estimation tests. Nonprofit and publicly traded firms both had significantly higher rates of increase over 20 years than did private firms ($p<0.001$ and $p=0.005$ respectively). The rates of increase for publicly traded firms and nonprofit firms were not significantly different from one another ($p=0.798$).

Table 5 Logistic Regression of Changes in the relationship of Acquirer Ownership Status on Rural Purchases over time

	MLE	p	Odds Ratio
Intercept	20.5734	<.001	
LNRevenue	-1.0996	<.001	0.333
LNBeds	-0.5463	0.002	0.579
Target Region*			
Mountain	-1.9197	<.001	0.147
North Central	-1.2095	<.001	0.298
North East	-1.2225	<.001	0.294
Pacific	-2.4004	<.001	0.091
South Central	-0.5926	0.013	0.553
Target is Private	-0.9673	<.001	0.38
Target is Publicly Traded	-0.6600	0.008	0.517
Acquirer is Private	0.6895	0.145	1.993
Acquirer is Publicly Traded	0.1141	0.778	1.121
ACQ_NFP_DC	0.0960	<.001	1.101
ACQ_PRI_DC	-0.0479	0.195	0.953
ACQ_PUB_DC	0.0872	0.008	1.091

Note: n = 1434 announcements. 281 were rural or mostly rural.
*South East is the reference region

The results provide unexpected and interesting findings for discussion. Hypothesis 1 that publicly traded and private firms were more likely to engage in out-of-state M&A activities was supported. Hypothesis 2 that nonprofit firms were more likely to engage in rural M&A activities is not supported. Further analysis suggests that nonprofit and publicly traded firms are increasing their rates of rural M&A activity over time.

Discussion, areas for further research, and limitations

The present study has sought to examine the characteristics related to hospital M&As and how these affect the location of the merger or acquisition. The study contributes to the hospital M&A literature by verifying that much of the activity in the multi-state hospital M&A market over the past 20 years has been by private and publicly traded firms, as compared to nonprofit hospitals. This suggests that over the past 20 years private and publicly traded firms may have had different reasons for M&A expansion than nonprofit hospitals. In other words, nonprofit firms' reasons for M&A have been more localized than private and publicly traded firms. It also suggests that nonprofit hospitals have been more involved with localized market consolidation than other types of hospitals.

Our results also confirm that there is a recent trend of localized nonprofit health systems seeking to expand their reach into statewide systems in a return to the "hub-and-spoke" model (Kacik, 2017). This may be because many urban, metropolitan markets have been at least in part consolidated or as Berenson (2015: 725) notes, "the horse has already left the barn." For example our study found that 20.7 percent of all acquirers were single hospitals in 1997. In 2016, this number had changed to 10.0 percent. According to the American Hospital Association (2017) there were 4,862 total community hospitals in the U.S. in 2015. There were 1,829 rural hospitals and 3,033 urban hospitals. Of these hospitals 3,198 (or 66 percent) were in a system (AHA, 2017). Perhaps what these trends and our findings suggest is that there are both national systems that are more private or publicly traded in nature and an increasingly burgeoning development of nonprofit state-wide systems. Our finding is different than in years past where rural hospitals mainly were reported as being acquired by either private or publicly traded firms.

More recently, hospital M&As are on pace in 2017 to exceed those in 2016 (Kacik, 2017). It has been noted that many national health systems, regardless of ownership status, are recently in retreat from M&A activity (Barkholz, 2017). This is presumably due to the large debt burden many of these systems have undertaken as part of the most recent wave of M&As. Yet this is not the case for all as mega-mergers between health systems continue (Evans and Mathews, 2017). Thus, we may expect to see further hospital consolidation at both the state and national levels. Given this changing environment, we outline where we believe additional research is needed based on our findings and a review of the literature.

Due the preponderance in the literature on price increases, debate remains related to the efficacy of hospital mergers and acquisitions. Melnick et al. (1999) found that mergers that consolidate markets lead to price increases regardless of ownership status. We do not know if hospital M&As by private or publicly traded firms lead to higher prices compared to hospital prices of nonprofit hospitals in non-consolidated or non-localized markets (i.e., if a publicly traded firm acquires a rural hospital does it increase its prices for similar services relative to nonprofit hospitals within state in a urban market consolidated by nonprofit hospitals). Similarly, as nonprofits expand into rural markets are they able to raise rural hospital commercial prices? We do not know but suspect that Dranove and Shanley's 1995 statement, perhaps, remains relevant: "even when economies of scale and scope are present in a production or retail process, it is not always necessary for firms to combine under common ownership to achieve them…For example, firms can achieve purchasing economies by joint purchasing without any ownership change." (Dranove and Shanley, 1995: 55). It also would be

valuable to further examine performance factors of hospitals in alternative structures (e.g. joint ventures, under management contracts) compared with hospitals in wholly owned health systems.

As mentioned in the literature review, there is a paucity of research on the effects of hospital M&As on quality. Likewise, there is a scarcity of research examining hospital M&As and access to providers. We do not know the extent to which providers reduce, combine, or eliminate services (or the kinds of services) post acquisition. From an operational efficiency perspective, one may assume that organizations would seek to combine some services. Likewise, other than trade press announcements, we do not know if M&As led to the expansion of services. For example, when a tertiary facility acquires a rural primary hospital does the tertiary hospital send physicians to the rural hospital to perform outpatient procedures? Does the use of tele-health technology increase between merging hospitals?

Additionally, the majority of research has examined the acquired hospital. We do not know much about the acquiring hospital post acquisition. For example, we do not know the financial effects on the acquiring hospital post M&A. Most strategic management research on M&As is interested in the effect M&As have on the surviving or acquiring firm. Yet, we know of no study that specifically examines the acquiring firm's financial status post acquisition. Nor do we know the effects of quality on an acquiring firm. One could assume that an acquiring firm may also learn from an acquired firm.

There is also little research on the various performance outcomes across markets. This is to ask if systems engaged in hospital M&As in certain states or markets (e.g. rural, urban) perform better across performance outcome dimensions (e.g. quality, costs, cash-flow, profitability).

There is also little research on the effect of hospital M&As on buyers and suppliers. Berenson (2015) notes that the insurance market is even more concentrated in most markets than the hospital market. Other than studies on price of hospital services, there is little direct empirical work on the effects that hospital M&As may have on buyers in a particular market (i.e., how has hospital M&As led to insurance market consolidation, or vice versa). Additionally, there is much pre-acquisition discussion in the trade press about the consolidation of suppliers or vendors, but little empirical work or case studies on how consolidated hospitals used their combined leverage to reduce supply costs. Similarly, how do consolidated hospitals deal with combining health records (i.e., how do merging hospitals deals with consolidating health information [and other] systems).

During the time of our study there has also been much activity with the acquisition of physician practices and the employment by hospitals of physicians. Yet, we know little of how hospital M&As have affected this (i.e., has hospital M&As reduced the effect of the medical arms race—are physicians less able to "play" one hospital against another in order to acquire the services and equipment they request). We also do not know how hospital M&As affect referral patterns in consolidated markets. These and many other questions related to hospital M&As remain unanswered.

The study is not without limitations. Although the manuscript controls for the number of beds and revenue of the acquired hospitals, it does not control for the number of hospitals (or their specific location) in each transaction. This is to say that many of the transactions had multiple hospitals. The study uses the data specified by Levin and Associates to determine location. For private hospitals, the study does not distinguish

between private for-profit and private nonprofit hospitals. Our initial review of the data suggests that all for-profit hospitals are included in the publicly traded category. We did not control for the size of the acquiring hospital. We have studied announcements and are not certain that all announcements of hospital mergers and acquisitions were consummated, per our discussion in the Methods section.

In conclusion, the present study has sought to examine the characteristics related to hospital M&As and how these affect the location of the merger or acquisition announcement. We find that private and publicly traded hospitals have been more engaged in interstate hospital M&As, as compared to nonprofit hospitals. We also find that nonprofit and publicly traded firms are increasing their rates of rural M&A activity over time. We offer areas for further research based on our literature review, the findings, and the changing dynamics of the hospital market. Our findings should be of interest to researchers, policy makers, and the public.

References

Advisory Board. 2013. Has the ACA Triggered a Wave of Hospital Mergers? https://www.advisory.com/daily-briefing/2013/09/30/has-the-aca-triggered-a-wave-of-hospital-mergers. Accessed September 15, 2017.

Alexander, J.A., Halpern, M.T., & Lee, S.Y.. 1996. The Short-term Effects of Merger on Hospital Operations. *Health Services Research, 30*(6): 827.

Alexander, J. A., & Morrisey, M.A. 1988. Hospital Selection into Multihospital Systems: The Effects of Market, Management, and Mission. *Medical Care*, 26(2): 159-176.

Barkholz, D. 2017. Nation's Largest Investor-owned Hospital systems are in Full Retreat. *Modern Healthcare,* January 28, 2017.

American Hospital Association. 2017. Fast Facts. http://www.aha.org/research/rc/stat-studies/ 101207fastfacts%20with%20picture%202017.pdf. Accessed October 10, 2017.

Berenson, R. 2015. Addressing Pricing Power in Integrated Delivery: The Limits of Antitrust. *Journal of Health Politics, Policy and Law* ,40(4): 711-744.

Berenson, R. A., Ginsburg, P.B., Christianson, J.B. & Yee, T. 2012. The Growing Power of Some Providers to Win Steep Payment Increases from Insurers Suggests Policy Remedies May Be Needed. *Health Affairs,* 31(5): 973-981.

Brooks, G.R., & Jones, V.G. 1997. Hospital Mergers and Market Overlap. *Health Services Research, 31*(6): 701.

Cartwright, S., & Schoenberg, R. 2006. Thirty Years of Mergers and Acquisitions Research: Recent advances and Future Opportunities. *British Journal of Management* 17: S1-S5.

Clement, J.P., McCue, M.J., Luke, R.D., Bramble, J.D. Rossiter, L.F., Ozcan, Y.A. & Pai, C.W. 1997. Strategic Hospital Alliances: Impact on Financial Performance. *Health Affairs, 16*(6): 193-203.

Conners, J.R. 2003. A Critical Misdiagnosis: How Courts Underestimate the Anticompetitive Implications of Hospital Mergers. *California Law Review,* 91(2): 543-578.

Connor, R.A., Feldman, R.D. & Dowd, B.E. 1998.The Effects of Market Concentration and Horizontal Mergers on Hospital Costs and Prices. *International Journal of the Economics of Business, 5*(2): 159-180.

Cuellar, A.E., & Gertler. P.J. 2003. Trends in Hospital Consolidation: The Formation of Local Systems. *Health Affairs, 22*(6): 77-87.

Cuellar, A.E. and P.J. Gertler. 2005. "How the Expansion of Hospital Systems has Affected Consumers." *Health Affairs 24*(1): 213-219.

Cutler, D.M. & Horwitz, J. 2000. Converting Hospitals from Not-for-Profit to For-Profit Status Why and What Effects? In *The Changing Hospital Industry: Comparing For-Profit and Not-for-Profit Institutions* University of Chicago Press 45-90.

Cutler, D.M., & Morton, F.S. 2013. Hospitals, Market Share, and Consolidation. *JAMA,* 310(18): 1964-1970.

Dafny, L. 2014. Hospital Industry Consolidation—Still More to Come? *New England Journal of Medicine,* 370(3): 198-199.

Dafny, L., Ho, K. & Lee, R.S. 2016.The Price Effects of Cross-market Hospital Mergers. No. w22106. *National Bureau of Economic Research*. https://www.kellogg.northwestern.edu/docs/faculty/dafny/price-effects-of-cross-market-hospital-mergers.pdf. Accessed October 5, 2017.

Deloitte. 2014. Hospital Consolidation: Analysis of Acute Sector M&A Activity. https://www2.deloitte.com/content/dam/Deloitte/us/Documents/life-sciences-health-care/us-chs-hospital-consolidation.pdf. Accessed September 12, 2017.

Demirbag M., Ng, C.K. & Tatoglu, E. 2007. Performance of Mergers and Acquisitions in the Pharmaceutical Industry: A Comparative Perspective. *Multinational Business Review,* 15(2): 41–62.

Dranove, D., & Shanley, M. 1995. Cost Reductions or Reputation Enhancement as Motives for Mergers: The Logic of Multihospital Systems. *Strategic Management Journal, 16*(1): 55-74.

Evans, M., & Mathews, A.W. 2017. Hospital Giants in Talks to Merge to Create Nation's Largest Operator. https://www.wsj.com/articles/hospital-giants-in-talks-to-merge-to-create-nations-largest-operator-1512921420. Accessed December 12, 2017.

Furukawa, M.F., Raghu, T.S., Spaulding, T.J., & Vinze, A. 2006. Adoption of Health Information Technology for Medication Safety in U.S. Hospitals. *Health Affairs*, 27(3): 865-875.

Haleblian, J., Devers, C.E., McNamara, G., Carpenter, M.A., & Davison, R.B. 2009. Taking Stock of What We Know about Mergers and Acquisitions: A Review and Research Agenda. *Journal of Management* 35(3): 469-502.

Harris, J., Ozgen, H. & Ozcan, Y. 2000. Do Mergers Enhance the Performance of Hospital Efficiency? *Journal of the Operational Research Society,* July: 801-811.

Harrison, J.P., McCue, M.J., Wang, B.B., & Wolfe, P.R. 2003. A Profile of Hospital Acquisitions. *Journal of Healthcare Management,* 48(3): 156-170.

Harrison, J.P., & McDowell, G.M. 2005. A Profile of US Hospital Mergers. *Journal of Health Care Finance,* 31(3):15-24.

Harrison, T.D. 2011. Do Mergers Really Reduce Costs? Evidence from Hospitals. *Economic Inquiry, 49*(4):1054-1069.

Hayford, T.B. 2012. The Impact of Hospital Mergers on Treatment Intensity and Health Outcomes. *Health Services Research, 47*(3pt1): 1008-1029.

Henderson BD. 1979. *Henderson on Corporate Strategy*, Mentor: New York.

Ho, V., & Hamilton, B.H. 2000. Hospital Mergers and Acquisitions: Does Market Consolidation Harm Patients? *Journal of Health Economics, 19*(5): 767-791.

Kacik, A. 2017. Mergers and Acquisitions on Track to Best 2016 Deals. *Modern Healthcare* October 17, 2017.

Keeler, E. B., Melnick, G., & Zwanziger, J. 1999. The Changing Effects of Competition on Non-profit and For-profit Hospital Pricing Behavior. *Journal of Health Economics,* 18(10: 69-86.

Klein, B.R., Crawford, R.G. & Alchian, A.A. 1978. Vertical Integration, Appropriable Rents, and the Competitive Contracting Process. *Journal of Law and Economics,* 21(2): 297-326.

Krishnan, R. 2001. Market Restructuring and Pricing in the Hospital Industry. *Journal of Health Economics, 20*(2): 213-237.

Krishnan, R.A., & Krishnan. 2003. Effects of Hospital Mergers and Acquisitions on Prices. *Journal of Business Research, 56*(8): 647-656.

Leone, A.J., Lawrence Van Horn, R. & Wedig, G.J. 2005. Abnormal Returns and the Regulation of Nonprofit Hospital Sales and Conversions. *Journal of Health Economics,* 24(1): 113-135.

Lewis, M.S., & Pflum, K.E. 2017. Hospital Systems and Bargaining Power: Evidence from Out-of-Market Acquisitions. *The RAND Journal of Economics, 48*(3): 579-610.

Lynk, W. J. 1995. Nonprofit Hospital Mergers and the Exercise of Market Power. *The Journal of Law and Economics,* 38(2): 437-461.

Mark, T.L. 1999. Analysis of the Rationale For, and Consequences Of, Nonprofit and For-profit Ownership Conversions. *Health Services Research,* 34(1): 83-101.

McCue, M.J., & Furst, R.W. 1986. Financial Characteristics of Hospitals Purchased by Investor-owned Chains. *Health Services Research,* 21(4): 515.-527

McCue, M.J., & Kim, T.H. 2005. Association of Market, Mission, Operational, and Financial Factors on Hospital Acquisition Prices: 1999 through 2001. *Health Care Management Review,* 30(10: 24-31.

McCue, M. J., McCue, T., & Wheeler, J.R.C. 1988. An Assessment of Hospital Acquisition Prices. *Inquiry, 25(2)*: 290-296.

McCue, M.J., Thompson, J.M., & Kim, T.H. 2015. Hospital Acquisitions Before Healthcare Reform. *Journal of Healthcare Management,* 60(3): 186-204.

Melnick, G., Keeler, E. & Zwanziger, J. 1999. Market Power and Hospital Pricing: Are Nonprofits Different? *Health Affairs,* 18(3): 167-173.

Mullner, R.M., & Anderson, R.M. 1987. A Descriptive and Financial Ratio Analysis of Merged and Consolidated Hospitals: United States, 1980-1985. *Advances in Health Economics and Health Services Research,* 7*:*41-58.

Noles, M.J., Reiter, K.L., Boortz-Marx, J., & Pink, G. 2015. Rural Hospital Mergers and Acquisitions: Which Hospitals Are Being Acquired and How Are They Performing Afterward? *Journal of Healthcare Management,* 60(6): 395-408.

Park, M., & Town, R. 2014. Industry Shock Expectations, Interindustry Linkages, and Merger Waves: Evidence from the Hospital Industry."*Journal of Economics & Management Strategy,* 23(3): 548-567.

Picone, G., Chou, S.Y. & Sloan, F. 2002. Are For-profit Hospital Conversions Harmful to Patients and to Medicare? *Rand Journal of Economics,* 33(3): 507-523.

Robinson, J.C. 1996. The Dynamics and Limits of Corporate Growth in Health Care. *Health Affairs,* 15(2): 155-169.

Romano, P.S., & Balan, D.J. 2011. A Retrospective Analysis of the Clinical Quality Effects of the Acquisition of Highland Park Hospital by Evanston Northwestern Healthcare. *International Journal of the Economics of Business, 18*(1): 45-64.

Sawler J. 2005. Horizontal Alliances and the Merger Paradox. *Managerial and Decision Economics,* 26(4): 243-248.

Schmitt, M. 2017. Do Hospital Mergers Reduce Costs? *Journal of Health Economics, 52*: 74-94.

Sinay, U. T. 1998. Hospital Mergers and Closures: Survival of Rural Hospitals. *The Journal of Rural Health,* 14(4): 357-365.

Sloan, F.A. 2000. Not-for-profit Ownership and Hospital Behavior. *Handbook of Health Economics,* 1: 1141-1174.

Stensland, J., Davidson, G., & Moscovice, I.S. 2004. *The Financial Benefits of Critical Access Hospital Conversion for FY 1999 and FY 2000 Converters*. University of Minnesota. http://rhrc.umn.edu/wp-content/files_mf/wpaper051.pdf. Accessed November 7, 2017.

Tenn, S. 2011. The Price Effects of Hospital Mergers: a Case Study of the Sutter–Summit Transaction. *International Journal of the Economics of Business,* 18(1): 65-82.

U.S. Census Bureau. 2010. https://www.census.gov/geo/reference/urban-rural.html. Accessed October 10, 2017.

Vita, M.G., & Sacher, S. 2001. The Competitive Effects of Not- for- profit Hospital Mergers: a Case Study. *The Journal of Industrial Economics,* 49(1): 63-84.

Vogt, W.B. 2009. Hospital Market Consolidation: Trends and Consequences. https://www.nihcm.org/pdf/EV-Vogt_FINAL.pdf. Accessed September 29, 2017.

Vogt, W.B. & Town, R. 2006. How has Hospital Consolidation Affected the Price and Quality of Hospital Care? https://folio.iupui.edu/bitstream/handle/10244/520/no9researchreport.pdf?sequ. Accessed October 10, 2017.

Wilke, C.L., & Choi, T. 1987. Changing Criteria for Hospital Acquisitions. *Health Care Management Review, 13*(3): 23-34.