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# Predictors of Hospital Profitability:

# A Panel Study Including the Early Years of the ACA

by

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**Abstract**

Purpose: To assess the internal and external environmental factors that affect variations in hospital profitability. We are especially interested in examining the impact of the ACA regulations.

Methods: We used an unbalanced panel of 1,908 metropolitan U.S. hospitals in the 48 contiguous states during the period 2000-2015, resulting in 28,888 observations. The primary sources of data were Medicare Hospital Cost Reports and the American Hospital Association Annual Survey of Hospitals. Fixed-effect regression with correction for serial correlation, using total margin and operating margin as dependent variables, was employed.

Results: Hospital profitability was positively associated (at $p < 0.05$) with for-profit ownership, market power, hospital size, availability of high technology services and occupancy rate. Profitability was negatively associated with average length of stay and county unemployment rate. There was no discernible temporal trend. However, total margin spiked downward in 2008 during the Great Recession but recovered afterwards. The implementation of the Affordable Care Act was associated with an improved operating margin in states that expanded their Medicaid programs but not in other states.

Conclusions: Competitive advantages such as size, market power and availability of high-technology services are associated with higher hospital profitability. External market events such as the Great Recession can decrease hospital profits. For-profit hospitals tend to be more profitable than not-for-profit hospitals**.** The implementation of the ACA had only a one-time positive impact on operating margin.

Key words: hospital profitability, competition, payment policy, multi-hospital systems, for-profit ownership

## Introduction

This article provides a longitudinal analysis of U.S. hospital profitability from 2000 to 2015. During this period, the U.S. economy experienced two recessions, and the Affordable Care Act was passed and implemented. Moreover, the health care delivery industry experienced the emergence and proliferation of specialty hospitals and ambulatory surgery centers, which intensified the competitive pressures on hospitals (Al-Amin & Housman 2012). The economic situation, market competitiveness, reimbursement rates and pay-for-performance programs subjected hospitals to financial constraints, evidenced by some alarming financial indicators for hospitals based on Medicare Hospital Cost Reports (Schuhman 2008). The purpose of this article is to advance our understanding of variations in hospital profitability over a turbulent period. We specifically focus our study on hospital operating and total margins.[1] The operating margin is a key financial measure of hospital profitability since it accounts for profits accrued from hospital operations without including other sources of income (Je'McCracken, McIllwain and Fottler 2001).

Much of the focus in recent years has been on patient outcomes and ratings; however, hospital financial performance is an area of equal significance. Financial struggles hinder organizational efforts to adopt new technology (Hunag 2016), attract well-trained and gifted healthcare professionals and make contractual and structural changes needed to deliver patient care in today's value-based purchasing environment (Bazzoli, Fareed & Water 2014; Singh & Wheeler 2012). Moreover, poor financial performance influences quality of care and limits access by either reducing services or causing hospital closure (Bazzoli, Fareed & Waters 2014; Bazzoli et al. 2008). Not-for-profit hospitals rely on retained earnings (i.e., operating surplus) as their main source of equity since, unlike for-profit hospitals, they cannot sell shares to raise equity (Singh & Wheeler 2012). Therefore, hospital profitability is equally important for for-profit and not-for-profit hospitals.

Based on a literature review by Holt et al. (2011), there is "lack of consistency and conclusiveness" in research on the organizational determinants of hospital profitability. Understanding how profitability has changed over time and investigating the factors associated with operating and total margins is therefore paramount. The aim of this paper is to determine the organizational resources and market level factors that influence hospital profitability. We rely on the Resource Based Theory (RBT) to develop our model. Resource Based Theory argues that organizations can achieve a competitive advantage if they possess and appropriately exploit a bundle of resources and capabilities that are valuable and rare (Barney 1991). The competitive advantage in turn will allow organizations to outperform their competitors. Therefore, hospital financial performance is a product of resources and capabilities possessed and exploited by hospitals to deliver profitable services. In addition to hospital resources, we also investigate the association between market attractiveness and hospital profitability.

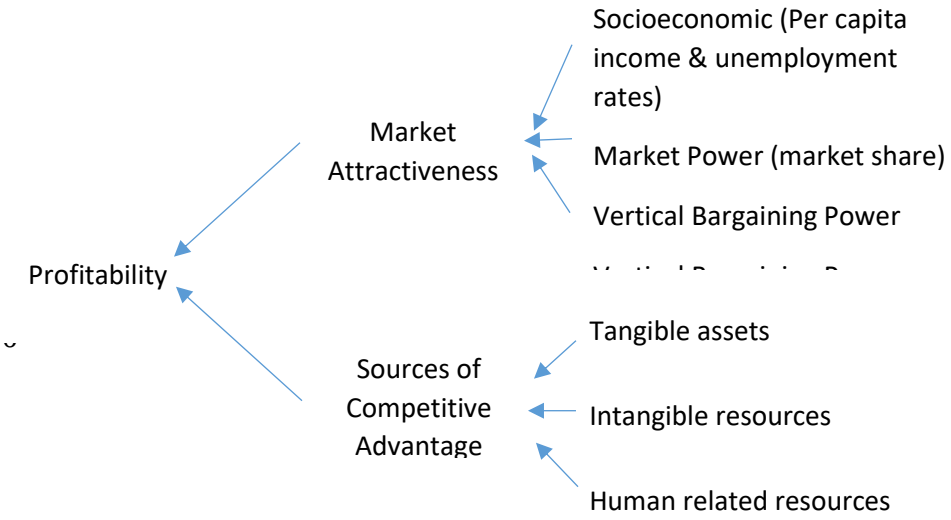
This study contributes to the literature on hospital profitability by examining how organizational and market levels factors influence hospital profitability over an extended period. The analysis includes the longest and most recent panel data (i.e., 2000 to 2015) of any study of US hospital profits. The panel design allows us to examine the impact of the Great Recession and the early implementation of the Affordable Care Act (ACA) on hospital performance. The ACA mandates that all U.S. legal residents and citizens obtain health insurance or face a tax penalty. Further, the ACA gave states the option to expand Medicaid coverage for low-income adults whose income is below 138% of the federal poverty level. Thirty-two states expanded their Medicaid coverage, while the rest of the states chose not to (Kaiser Family Foundation 2017). Therefore, ACA is expected to result in revenue growth for hospitals given the increased

pool of insured individuals (Bazzoli et al. 2016) and Medicaid expansion. However, the ACA also revamped reimbursement models and put certain hospitals under financial risk as patient outcomes and experience is now linked to financial penalties and rewards. To complicate matters further, Medicaid expansions occurred in most but not all states. This study will contribute to our understanding of how hospital profitability changed after the ACA and how profitability differs between Medicaid expansion and non-expansion states. Moreover, unlike most panel studies of hospital profits, our methods include a correction for serial correlation which otherwise would result in inflated t-values for the estimated regression coefficients. Blavin (2016), whose panel only included 2014 concluded that Medicaid expansion was associated with increased hospital profitability. However, while our results concur with Blavin's for 2014, by adding an extra year to the analysis, we found that this may have been a one-time event.

## Conceptual Framework

This study focuses on the financial domain of hospital performance. Financial performance is important for all hospitals. Regardless of ownership, hospitals need to generate sufficient returns to "replace capital, finance growth, provide community benefits or generate benefits that inure to shareholders" (Turner et al. 2015). Therefore, determining the organizational characteristics that influence hospital profitability over time is important. Previous research indicates that organizational characteristics such as ownership status, teaching status, and occupancy rates influence financial performance (Turner et al 2015; Burkhardt & Wheeler 2013; Gapenski, Vogel & Langland-Orban 1993). We extend the literature on hospital profitability by examining data from 2000 through 2015, and adopting the Resource Based Theory (RBT) to identify predictors of hospital financial performance. Figure 1 illustrates our predictive model.

**Figure 1. Predictors of Hospital Profitability**



In our classification of hospital resources and capabilities that might result in superior financial performance, we rely on RBT's classification of assets as tangible, intangible and human resources (Grant 1991; Chatterjee & Wernerfelt 1991; Short. Palmer & Ketchen 2002). While our selection of resources is guided by the RBT, we are limited by the availability of data over the study's time period. Unfortunately, data on human-based resources is not available for all years from 2000-2015. Accordingly, despite their importance, we excluded human resources variables from our study, and we limit our focus to tangible and intangible resources.

Tangible or physical resources include resources such as hospital location, facilities and equipment (Goldstein, Ward, Long & Butter 2002; Short, Palmer & Ketchen 2002; Chatterjee & Wernerfelt 1991). Hospitals which possess physical resources such as renovated facilities or advanced clinical technology have a competitive advantage over hospitals with outdated buildings and technology. We include clinical technology only in our model, since data on other forms of technology, such as electronic medical records (information technology), are not available for all of the years included in the study. Hospitals that provide open heart surgery or major organ transplants are considered hospitals with high levels of clinical technology (Aiken et al., 2008). Previous research shows that investment in clinical technology is associated with higher revenues (Goldstein et al. 2002). The effect on profitability, however, could be signed in either direction, depending upon the relative magnitudes of the revenue effect, and the probable increase in costs incurred through the adoption of advanced clinical technologies.

We argue that academic medical center status is an intangible asset that may assist hospitals in generating higher revenue, but also imposes additional costs (Rosko et al., 2017). Although the role and reputation of teaching hospitals in their communities may afford them a competitive advantage, issues over costs and inefficiency could constrain their profitability (Rosko et al, 2017). Accordingly, and for reasons similar to those for high-technology hospitals, we infer that academic medical center status could exert either a positive or a negative influence on profitability.

Another intangible resource which we believe is associated with hospital profitability is system membership. Previous research on the impact of system membership on hospital profitability is inconclusive. Bazzoli et al. (2000) found that hospitals in centralized systems achieve stronger financial performance, while Tennyson and Fottler (2000) found that the impact is negative or not significant at best. In a more recent study of German hospitals, Buchner, Hinz and Schreyogg (2016) found only a transitory impact of system membership on hospital profitability. System membership enables hospitals to gain better-access to capital financing, market information, management expertise, and innovation (Goes & Park, 1997). A literature review by Bazzoli et al (2004) concluded that hospital mergers were associated with slight cost reductions and that hospitals can use the increased bargaining power from consolidation to raise prices. We therefore predict that system membership is associated with increased profitability.

It is important to note that the ability of a hospital to achieve sustainable financial performance is not solely influenced by its resources. Identification of a hospital's competitive advantage requires the examination of the context the hospital operates in (Douglas & Ryman 2003). Grant (1991) argues that an organization's ability to generate profits, in addition to the possession of a competitive advantage, depends on the attractiveness of the industry. Factors such as the firm's bargaining power, measured by firm size and financial resources, and market power, measured by market share, can enable firms to generate profit by affording them discretion in setting prices (Bai and Anderson 2016). Hospital size is associated with "plant-level" economies of scale and enhanced bargaining power in

negotiations with suppliers (Kazley & Ozcan 2007) and with payers. Accordingly, we argue that hospital size and market share are associated with superior financial performance.

Another factor which influences market attractiveness for healthcare organizations is the demand for healthcare services. We control for demand using unemployment rate (Zinn, Weech & Brannon 1998). Hospitals located in areas with higher demand for health care services and more stable economic environments benefit from more favorable market conditions than hospitals located in areas with low demand or high demand uncertainty. Therefore, hospitals located in areas with lower unemployment rates are likely to achieve superior financial performance.

The provisions of the ACA reflect both spatial and temporal dimensions that could impact hospital profits. For example, the increase Medicaid eligibility beginning in 2014 reduced the number of uninsured in Medicaid expansion states and this, ceteris paribis, reduced uncompensated care (Blavin 2016, Dranove, Garthwaite and Ody, 2016), which historically impeded hospital profits. The impact of the ACA on hospital profits should be greater in the 30 states that expanded their Medicaid programs in 2014 and 2015 (Kaiser Family Foundation 2017). However, at the same time as the Medicaid expansions, Medicare reduced Disproportionate Share Hospital (DSH) payments. Further, many of the newly private insured obtained insurance with high deductibles which may make healthcare unaffordable (Witgert & Hess 2012). Thus, it is uncertain whether hospital profits would improve in 2014 and 2015. To examine the impact of the ACA (including Medicaid expansion and changes in Medicare payments) it is necessary to include temporal and spatial variables. These are discussed below in the methods section.

**Methods**

The dependent variables are operating margin (i.e., [(net operating revenue - total operating expenses)/ net operating revenue)] and total margin (i.e., [(total net revenue - total expenses)/ (total net revenue)]. We estimate the model using fixed-effect regression. We considered random-effects regression (RER), but our analysis could not support the assumption used in RER that the hospital component of the error term is uncorrelated with the explanatory variables included in the regression model. The individual hospital fixed-effects control for time-invariant hospital-level influences on profitability. Given the long panel, we corrected for auto-correlation using the Cochrane-Orcutt technique in LIMDEP.

Data on metropolitan (i.e., non-rural) private hospitals located in the contiguous United States and the District of Columbia were used. Hospitals in rural areas were excluded from the analysis because these market areas tend to be different (less competition and less managed care penetration) from urban areas. Rural hospitals are typically much smaller than those located in urban areas. Many small rural hospitals chose to exit the Medicare Prospective Payment System (PPS), which was not well suited for small hospitals, and resulted in financial stress and bankruptcy for some small hospitals that remained in the PPS. Hospitals that exited were able to claim payment on a retrospective cost-basis under the provisions of the Medicare Rural Hospital Flexibility Program (Rosko & Mutter 2010).

During the study period, new hospitals were built, existing hospitals closed or were incorporated into larger systems, and some hospitals did not report data. The fixed-effects regression model used in this study incorporates an unbalanced panel design. Hospitals that reported complete information for at least 10 of the 16 years of the study period were included in

the analytical file. Following past practices (Goddard, Tavakoli, and Wilson 2009; Bazzoli, Fareed, & Waters 2014), we eliminated hospitals that fell outside the 1st through 99th percentiles of operating margin and total margin, to avoid outliers and/or implausible values for these margins. The final analytical file included 28,888 observations from 1,908 hospitals. The number of hospitals ranged from a minimum number of 1,717 in 2015 to a maximum number 1,860 in 2006. Around 88% of the hospitals in the original analytical file had 10 or more years of data. As a simple robustness check we also estimated equations for the full sample (i.e., without the exclusion of hospitals with fewer than 10 years of data but excluding profit margin outliers) and found little impact of the sign or significance ($p < 0.05$) of the parameter estimates.

Data for the financial variables were obtained from Medicare Hospital Cost Reports. The American Hospital Association (AHA) Annual Survey was used for hospital characteristics. The Area Health Resources File was used for market-level (i.e., county) data for the unemployment rate. AHA data for hospital admissions was aggregated to the county-level to create a market competition variable. Wong, Zhan and Mutter (2005) reported that the definition of the market (i.e., county or geographical radius from the hospital) had little impact on association of the impact of competition on hospital expenditures.

Binary variables (0/1) were entered for the following hospital characteristics: academic medical center (i.e., member of the Council of Teaching Hospitals); for-profit ownership (i.e., investor-owned); system member (i.e., member of a multi-hospital system); and HITECH or high technology hospital (i.e., hospital performed open heart or any major organ transplant (Liu et al. 2012)).

We used Medicare and Medicaid share of admissions (i.e., Medicaid or Medicare admissions divided by total admissions) to reflect financial pressures and incentives associated with serving patients funded by the two dominant public payers in the U.S. Medicare's PPS, which has operated since 1983, sets rates in advance and provides a financial incentive to reduce costs, because the PPS creates pressure for hospitals to maintain expenses below the administered rate. During the study period, the generosity of Medicare payments has varied, with diminished profitability from Medicare patients in recent years. Medicaid is a joint federal/state program for the categorically needy. Payment generosity varies by state; however, Medicaid payments tend to be less than the costs incurred in treating Medicaid patients in most states (Cunningham, et al. 2016).

We also included variables for average length of stay (i.e., total patient days divided by total admissions) and occupancy rate (total patient days divided by total bed days available). The latter variable reflects capital efficiency and should be positively associated with profits (Schneider et al 2007). The former variable might reflect inefficient care processes or unobserved variations in the patient burden of illness. We expect this variable to be inversely associated with profitability, a proposition supported by Rauscher and Wheeler (2012).

We included the number of beds as a control for the size of the hospital. Larger hospitals might be able to negotiate higher payment rates from private health plans, and this should contribute to enhanced profitability. We also included three market-level variables. We used the hospital's share of admissions in the county as a measure of market power (note: we also examined the share of beds in the county and a Hirschman-Herfindahl Index based on admissions and found that they

were highly correlated, i.e., r > 0.90). We expect profits to be positively associated with market power. The unemployment rate is used to reflect the level of demand for health services and ability to pay.[3] This variable should be negatively associated with profits. To control for unmeasured variations in profits due to factors that occurred over time, we include a vector of year binary (0/1) variables for the entire study period, using 2000 as the omitted reference category. We also were interested in the effects of Medicaid expansion, authorized by the ACA. To assess the impact of Medicaid expansion, we created two interaction variables created by multiplying the year binary variables for 2014 and 2015 times a binary variable for Medicaid expansion state.[4,5] Descriptive statistics for the variables are presented in Table 1.

Table 1 Descriptive Statistics

| Variable | Mean | Std. Dev. | Minimum | Maximum |
|---|---|---|---|---|
| Operating margin | 0.0070 | 0.0989 | -0.4228 | 0.3279 |
| Total margin | 0.0445 | 0.0789 | -0.3204 | 0.3413 |
| Academic medical center | 0.0983 | 0.2977 | 0.0000 | 1.0000 |
| Average length of stay | 5.1062 | 2.1514 | 1.1065 | 26.5524 |
| Beds | 265.05 | 206.24 | 10.00 | 2,654.00 |
| For-profit | 0.1947 | 0.3960 | 0.0000 | 1.0000 |
| High-technology | 0.5615 | 0.4962 | 0.0000 | 1.0000 |
| Medicaid share of admissions | 0.1419 | 0.1039 | 0.0000 | 0.7712 |
| Medicare share of admissions | 0.3771 | 0.1127 | 0.0007 | 0.8651 |
| Occupancy rate | 0.6233 | 0.1549 | 0.0407 | 1.2382 |
| Share of admissions in county# | 0.3908 | 0.3449 | 0.0003 | 1.0000 |
| System member | 0.6861 | 0.4641 | 0.0000 | 1.0000 |
| Unemployment rate (%)# | 6.3157 | 2.4964 | 0.9000 | 27.7000 |

**# indicates a variable measured for the county in which the hospital is located**

## Results

The mean values of the continuous variables that were used in the hospital profitability regressions, calculated separately for hospital-year observations classified as either 'yes' or 'no' for each of the following four binary variables: academic medical center, for-profit, high levels of technology, and system member, are presented in Table 2. As this table shows, hospitals that are for-profit, classified as high-technology or belong to a system tend to be more profitable than those that do not share these characteristics. Academic medical centers tend to have lower operating margins than other types of hospitals but the difference between them for total margin is very small. This suggests that academic medical centers can make up for poor operating performance by obtaining non-operating revenue such as investment income and donations. Similar results were found for not-for-profit (NFP) hospitals. While FP hospitals had an average operating margin of over 6%, NFP hospitals tended to operate with a negative operating margin with a mean of -0.62%. However, NFPs made up for these losses from non-operating sources of revenue and their average total margin was 3.96%. The FP hospitals showed a negligible increase of total margin over operating margin.

Mean values, by year, for operating margin and total margin are shown in Tables 3 and 4, respectively. These values are shown for all hospitals, hospitals located in Medicaid expansion states and hospitals located in non-expansion states. A persistent trend is not evident for either variable. For all states, the only year in which the mean operating margin was negative was in 2000, the year in which the Early 2000s Recession started. The mean total margin was always positive but took a substantial dip in 2008, the first year of the Great Recession, and recovered in 2009. This might be due to a substantial drop in investment earnings as the stock market plunged. Charitable donations, another important source of investment income, also were impacted adversely by the Great Recession. However, the mean total margin recovered in the following year.

When data is analyzed by expansion state status, different patterns emerge. For example, in expansion states the mean operating margin is negative every year until 2014. During the first year of the ACA, the mean operating margin improved, and the mean operating margin was positive at 0.0012. However, it returned to the red figures in 2015 at -0.0004. In expansion states, the mean total margin was positive every year. Similar to expansion states, hospitals in non-expansion states enjoyed an increase in operating margin 2014. Unlike expansion states, their mean operating margin also increased slightly in 2015. No change in the total margin was evident in 2014, but it dropped almost 1% (i.e., from 6.03% to 5.06%) from 2014 to 2015. The pattern for mean total margin in expansion and non-expansion states was similar to that described in the all-state analysis. The mean total margin was higher in non-expansion states than in expansion states for every year of the study.

Pearson correlation coefficients for all pairs of continuous variables used in the hospital profitability regressions are reported in Table 5. Among the pairs of independent variables with the highest correlations, occupancy rate is positively correlated with average length of stay and with number of beds. Medicare share of admissions is positively correlated with number of beds and with hospital share of county admissions; and is negatively correlated with Medicaid share of admissions. Medicaid share of admissions is negatively correlated with household income. None of these

Table 2 Mean Values for Binary Variables in Regression Equation

| | **Academic medical center** | | **For-profit** | | **High-technology** | | **System member** | |
|---|---|---|---|---|---|---|---|---|
| | Yes | **No** | **Yes** | **No** | **Yes** | **No** | **Yes** | **No** |
| No. of observations | 2,840 | 26,048 | 5,625 | 23,263 | 16,221 | 12,667 | 19,819 | 9,069 |
| **Variable** | | | | | | | | |
| (1) Operating margin | -0.0211 | 0.0100 | 0.0613 | -0.0062 | 0.0109 | 0.0019 | 0.0201 | -0.0217 |
| (2) Total margin | 0.0442 | 0.0445 | 0.0647 | 0.0396 | 0.0507 | 0.0365 | 0.0511 | 0.0299 |
| (3) Average length of stay | 5.5475 | 5.0581 | 4.7604 | 5.1898 | 5.0113 | 5.2278 | 4.9575 | 5.4312 |
| (4) No. of beds | 596.88 | 228.87 | 199.36 | 280.93 | 335.49 | 174.85 | 274.89 | 243.55 |
| (5) Medicaid share of admissions | 0.1479 | 0.1412 | 0.1629 | 0.1368 | 0.1342 | 0.1517 | 0.1395 | 0.1471 |
| (6) Medicare share of admissions | 0.3099 | 0.3845 | 0.3700 | 0.3789 | 0.3611 | 0.3977 | 0.3677 | 0.3977 |
| (7) Occupancy rate (%) | 0.7561 | 0.6088 | 0.5565 | 0.6394 | 0.6550 | 0.5826 | 0.6232 | 0.6233 |
| (8) Share of admissions | 0.2856 | 0.4022 | 0.3297 | 0.4055 | 0.3447 | 0.4498 | 0.3606 | 0.4567 |
| (9) Unemployment rate (%) | 6.2956 | 6.3179 | 6.5247 | 6.2652 | 6.2739 | 6.3693 | 6.3549 | 6.2302 |

This table reports the sample mean values of continuous variables used in the hospital profitability regressions, calculated separately for hospital-year observations classified as either ‘yes’ or ‘no’ for each of the following four binary variables: academic medical center, for-profit, high-technology, and system member.

Table 3 Mean Operating Margin by year and Medicaid Expansion Status

| Year | n (all states)* | All States | Expansion States | Non-Expansion States |
|---|---|---|---|---|
| 2000 | 1,746 | -0.0071 | -0.0241 | 0.0158 |
| 2001 | 1,761 | 0.0008 | -0.0182 | 0.0249 |
| 2002 | 1,823 | 0.0045 | -0.0131 | 0.0274 |
| 2003 | 1,836 | 0.0032 | -0.0113 | 0.0217 |
| 2004 | 1,852 | 0.0058 | -0.0075 | 0.0226 |
| 2005 | 1,825 | 0.0100 | -0.0038 | 0.0277 |
| 2006 | 1,860 | 0.0071 | -0.0071 | 0.0255 |
| 2007 | 1,857 | 0.0039 | -0.0091 | 0.0206 |
| 2008 | 1,832 | 0.0056 | -0.0086 | 0.0236 |
| 2009 | 1,835 | 0.0136 | -0.0033 | 0.0348 |
| 2010 | 1,827 | 0.0135 | -0.0007 | 0.0316 |
| 2011 | 1,810 | 0.0118 | -0.0029 | 0.0302 |
| 2012 | 1,791 | 0.0072 | -0.0076 | 0.0258 |
| 2013 | 1,747 | 0.0023 | -0.0139 | 0.0225 |
| 2014 | 1,769 | 0.0146 | 0.0012 | 0.0315 |
| 2015 | 1,717 | 0.0144 | -0.0004 | 0.0330 |
| All years | 28,888 | 0.0059 | -0.0082 | 0.0262 |

*Number of observations in expansion states ranged from 972 in 2015 to 1051 in 2006.

The number of observations in non-expansion states ranged from 775 in 2015 to 818 in 2004.

Table 4 Mean Total Margin by year and Medicaid Expansion Status

| Year | n (all states)* | All States | Expansion States | Non-Expansion States |
|---|---|---|---|---|
| 2000 | 1,746 | 0.0375 | 0.0294 | 0.0483 |
| 2001 | 1,761 | 0.0353 | 0.0254 | 0.0479 |
| 2002 | 1,823 | 0.0330 | 0.0233 | 0.0456 |
| 2003 | 1,836 | 0.0402 | 0.0339 | 0.0482 |
| 2004 | 1,852 | 0.0393 | 0.0343 | 0.0458 |
| 2005 | 1,825 | 0.0445 | 0.0391 | 0.0514 |
| 2006 | 1,860 | 0.0479 | 0.0440 | 0.0530 |
| 2007 | 1,857 | 0.0388 | 0.0350 | 0.0437 |
| 2008 | 1,832 | 0.0118 | 0.0031 | 0.0229 |
| 2009 | 1,835 | 0.0485 | 0.0437 | 0.0546 |
| 2010 | 1,827 | 0.0563 | 0.0509 | 0.0632 |
| 2011 | 1,810 | 0.0453 | 0.0369 | 0.0558 |
| 2012 | 1,791 | 0.0618 | 0.0550 | 0.0705 |
| 2013 | 1,747 | 0.0615 | 0.0554 | 0.0693 |
| 2014 | 1,769 | 0.0603 | 0.0544 | 0.0678 |
| 2015 | 1,717 | 0.0506 | 0.0437 | 0.0591 |
| All years | 28,888 | 0.0445 | 0.0379 | 0.0529 |

*Number of observations in expansion states ranged from 972 in 2015 to 1051 in 2006.

The number of observations in non-expansion states ranged from 775 in 2015 to 818 in 2004.

correlations exceeds 0.38, suggesting that multicollinearity between independent variables is not a severe problem in the profitability regressions. When binary variables are considered (not shown in Table 5) a moderate correlation (r = 0.53) between academic medical center and total beds was found. The next highest correlated pair of variables was high-technology and beds at 0.39.

Table 5 Pearson Correlation Coefficients for all pairs of continuous variables used in the hospital profitability regressions.

| Variable | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| (1) Operating margin | | | | | | | | |
| (2) Total margin | .748 | | | | | | | |
| (3) Average length of stay | -.160 | -.126 | | | | | | |
| (4) No. of beds | -.054 | .044 | .196 | | | | | |
| (5) Medicaid share of admissions | -.041 | -.040 | .022 | .019 | | | | |
| (6) Medicare share of admissions | -.037 | -.081 | .096 | -.251 | -.263 | | | |
| (7) Occupancy rate | -.052 | .005 | .292 | .376 | -.070 | -.117 | | |
| (8) Share of admissions | .076 | .067 | -.050 | -.098 | .054 | .248 | -.156 | |
| (9) Unemployment rate | -.022 | .001 | -.012* | .009 | .119 | -.080 | -.041 | -.037 |

The parameter estimates, corrected for serial correlation, for the fixed-effect regressions, when operating margin and total margin were used as dependent variables, are reported in Table 6. In the discussion of our results we use $p < 0.05$ as our threshold for the significance of the parameter estimates. The results for the correlates of profitability for the most part are similar in both equations and are consistent with the expectations developed from Resource Based Theory. The only exception was that the coefficient of high technology was positive and significant in the total margin equation but was insignificant in the operating margin equation. The other difference between the two equations was that the interaction term for 2014 and location in an expansion state was positive and significant in the operating margin equation but insignificant in the total margin equation.

Consistent with our expectations we found that profitability was positively associated with for-profit ownership and increases inoccupancy rate, size[6] (as measured by inpatient bed capacity) and the hospital's share of admissions in the county in which it is located. Profitability was also positively associated with increases in high levels of clinical technology in the total margin

equation but not in the operating margin equation. Profitability was negatively associated with increases in average length of stay and county unemployment rate.

Table 6 Fixed-effects Parameter estimates, Operating Margin and Total Margin, 2000-15 (n = 28,888)

| | **Operating Margin** | | | **Total Margin** | |
|---|---|---|---|---|---|
| **Variable** | **Reg Coef** | **z-score** | | **Reg Coef** | **z-score** |
| Academic medical center | 0.00346 | 0.61 | | 0.00453 | 0.83 |
| Average length of stay | -0.00302*** | -5.06 | | -0.00257*** | -4.48 |
| Beds | 0.00005*** | 4.68 | | 0.00003*** | 3.04 |
| For-profit hospital | 0.02307*** | 6.09 | | 0.01263*** | 3.46 |
| High-technology hospital | 0.00215 | 1.56 | | 0.00494*** | 3.74 |
| Medicaid share of admissions | 0.00500 | 0.68 | | 0.00024 | 0.03 |
| Medicare share of admissions | -0.00827 | -0.83 | | 0.00015 | 0.02 |
| Occupancy rate | 0.03039*** | 5.58 | | 0.02067*** | 3.94 |
| Share of admissions # | 0.02215** | 2.48 | | 0.03023*** | 3.51 |
| System member | 0.00066 | 0.27 | | -0.00108 | -0.46 |
| Unemployment rate # | -0.00118** | -2.47 | | -0.00106** | -2.31 |
| 2001 | 0.02616** | 2.10 | | 0.02393** | 2.00 |
| 2002 | 0.03969** | 2.21 | | 0.03523** | 2.03 |
| 2003 | 0.04238** | 2.05 | | 0.04784** | 2.40 |
| 2004 | 0.04432** | 2.02 | | 0.04772** | 2.25 |
| 2005 | 0.04823** | 2.13 | | 0.05335** | 2.45 |
| 2006 | 0.04531** | 1.98 | | 0.05679** | 2.58 |
| 2007 | 0.04317* | 1.87 | | 0.04891** | 2.20 |
| 2008 | 0.04597** | 1.99 | | 0.02246 | 1.01 |
| 2009 | 0.05759** | 2.47 | | 0.06332*** | 2.82 |
| 2010 | 0.05787** | 2.48 | | 0.07095*** | 3.16 |
| 2011 | 0.05411** | 2.32 | | 0.05836*** | 2.60 |
| 2012 | 0.04798** | 2.06 | | 0.07441*** | 3.32 |
| 2013 | 0.04121* | 1.77 | | 0.07282*** | 3.25 |
| 2014 | 0.04805** | 2.06 | | 0.06907*** | 3.08 |
| 2015 | 0.04683** | 2.01 | | 0.06083*** | 2.71 |
| Expansion State x 2014 | 0.00591** | 2.22 | | 0.00010 | 0.04 |
| Expansion State x 2015 | 0.00401 | 1.28 | | -0.00306 | -1.01 |

***, **, * Significance at 1%, 5%, 10% level
# county-level variable

The coefficients of the year binary variables were significant ($p < 0.05$) in most years in both equations. The exceptions were the variables for 2007 and 2013 in the operating margin equation and 2008[7] in the total margin equation. These results, in general, mirror those of the yearly means of operating and total margin in Tables 3 and 4, i.e., mean operating margin was very small in all years with an uptick in 2014; and total margin was larger than average in all years after 2008 except for 2011. Given the mean values for total margin in Table 4 and the results reported by Bazzoli et al (2014), we were surprised that the coefficient of the binary variable for 2008 in the total margin model was not significant and negative. However, while not significant, it did decrease from the 2007 value. The year 2000 is the omitted reference category and mean values for both margins were close to their lowest that year. NASDAQ values crashed in March 2000, signaling the end of the bull market that began in the 1990s. Thus, our results for total margin suggest that downturns in the economy affected the average total margin of hospitals in both 2000 and 2008. Serial correlation can inflate the estimated t-values for the regression coefficients. As a simple test, we re-estimated the fixed-effects model without correction for serial correlation and found that the estimated parameter for 2008 was now negative and highly significant ($p < 0.001$). The coefficients of the time variables in the total margin equation were larger than the coefficients in earlier years and this might be attributed to the recovery of the stock market which allowed hospitals to gain more income from their investments and promoted more charitable contributions.

**Discussion**

Since the implementation of the ACA would reduce the number of uninsured Americans, we expected that this would reduce uncompensated care which would favorably impact hospital profits, ceteris paribus. However, the estimated coefficients of the binary time variables for 2014 and 2015 were not significantly different from 0 ($p < 0.10$). This suggests, that after holding constant for the effects of the other variables in the model, no general observable impact of the ACA on operating margin was observed in 2014 or 2015. However, the estimated coefficient for the variable formed by interacting the 2014 time variable and location in a Medicaid expansion state was positive and significant ($p > 0.05$); but the coefficient of the interaction term for 2015 and location in an expansion state was not significant ($p < 0.10$). Considered together, these results suggest that the ACA had a one-time impact in 2014 on operating margin only in hospitals located in Medicaid expansion states. This is an interesting and important finding. One explanation is that the growth of the privately insured pool did not significantly influence hospital profitability because individuals recently absorbed by the private insurance markets were not historically contributing heavily to uncompensated care. However, the opposite is true for individuals who qualified for Medicaid in Medicaid expansion states. Another factor which could help explain this finding is that the financial penalties imposed on hospitals with poorer quality offset the gains from the growth of privately insured individuals. The impact of the ACA on hospital profits is determined by a complex set of factors which vary over space and time. The ACA had a desired effect of reducing the uninsured population. Long et al (2014) estimated that the number of uninsured nonelderly adults was reduced by an estimated 10.6 million between September 2013 and September 2014. This was achieved primarily by increased enrollment in private health plans, facilitated by subsidies and the development of health insurance exchanges and by the expansion of Medicaid programs in 30 states and the District of Columbia. As shown in Table 4 operating

profits were affected more in Medicaid expansion states than in non-expansion states. However, the estimated coefficient of the variable reflecting Medicaid expansion states in 2014, while significant, was quite small. The reason for this is that there were other factors in play that were detrimental to hospital profits and offset the decline in uncompensated care. For example, historically Medicaid has underpaid hospitals. H*ospital* payment-to-cost ratios (payments for services as a percentage of the cost of providing services) averaged 88.7 percent for Medicaid while the value of this ratio was 128.3 percent for private payers (AHA 2010). Further, the Great Recession and state budget problems have led to further reductions in Medicaid reimbursement rates to hospitals, including 33 states that cut rates in 2010 (Smith et al. 2014). Cunningham et al (2015) reported that Medicaid shortfalls – the difference between what Medicaid pays and the costs of treating Medicaid patients – increased 31.9 percent between 2013 and 2014. They concluded combining the decrease in charity care costs with the increase in Medicaid shortfalls, the net cost of caring for low income patients decreased among hospitals in expansion states, while these costs increased among hospitals in non-expansion states.

A very likely reason why the ACA had a one-time effect on operating margin in 2014 would be the changes in Medicare payment policy for hospitals that treat disproportionate shares (DSH) of low income patients. Starting in 2014, DSH payments were reduced to 25% of their previous levels. At the same time Medicare instituted uncompensated care (UC) payments. In 2014, the sum of UC and DSH payments increased by $0.1 billion over their 2013 value. However, in 2015 these payments fell by $1.3 billion. The overall Medicare margin (i.e., revenue minus costs, divided by revenue) fell from -5.0 in 2013 to -5.7 in 2014 to -7.1 in 2015 (MedPac 2017). The Medicare overall margin followed a pattern similar to the Medicare inpatient margin ((MedPac 2017). Further, revenue from new, privately insured patients might be limited to the extent that some services are not covered or will require high cost-sharing on the part of patients (Witgert and Hess 2012).

Regarding the other results, as mentioned earlier, the parameter estimates for the correlates of operating margin and total margin, except for high-technology, are very similar. Accordingly, we will discuss results for both margins under the label of profitability. For-profit (FP) ownership status was associated with increased profitability. This is not surprising since, by definition, profit is a key component of the mission of FP hospitals. While contradictory findings are available, a review of the stochastic frontier analysis (SFA) efficiency literature finds that FP hospitals tend to be more efficient than their NFP counterparts (Rosko & Mutter 2010).

As predicted in our framework section, organizational resources and capabilities measured by market share and hospital size are associated with higher levels of profitability. Larger hospitals were found to be more profitable and this may be due to their exploitation of scale economies or increased market power. Further, hospitals with a larger share of admissions in their market also were found to be more profitable. The fact that scale or market power has an impact on profits has important policy implications. On one hand, the increased profits of these types of hospitals might be a reward for increased efficiency. Further, the increased operating surpluses might be used to fund enhanced IT and other capabilities that are needed to facilitate population health management, an increasingly important activity in the wake of the passage of the ACA. On the other hand, the increased profits might reflect the ability of larger and more dominant hospitals to exercise market

power. Several studies have demonstrated that hospitals mergers are followed by increased prices (Gaynor and Town 2012).

Hospitals with a high level of clinical technology have higher total margins. This is consistent with RBT which argues that physical assets used in the production process can be a source of competitive advantage. The finding of a positive association with profitability suggests that the additional costs incurred by adopting advanced clinical technologies did not outweigh the positive effect on revenues. Previous research also supports this proposition. For example, Goldstein et al. (2002) found that hospitals with more extensive investment in clinical technology had better performance even after controlling for location. Consistent with some previous research, teaching status is not associated with superior financial performance. Jha et al. (2009) argue that teaching hospitals pursue a "costly mission", including research, teaching and charity care, which may tend to offset the reputational benefits of teaching hospital status for financial performance.

We also found that occupancy rate is associated with superior profitability, while the obverse held for average length of stay. American hospitals have an average of around 65% occupancy rate which is considered among the lowest when compared to other industrialized countries (Litvak & Bisognano 2011). Given our findings on the association between occupancy rate and profitability and the role higher levels of occupancy could play in providing inpatient care for the newly approximately eight million insured individuals (Collins et al. 2015), healthcare organizations should prioritize filling their beds to the recommended levels of around 80%. Alternatively, if population-based health efforts are successful in reducing inpatient demand, hospitals might consider downsizing to increase occupancy rate. The association between occupancy rates and profitability could reflect lower expenses associated with greater capital efficiency. However, it also might reflect the enhanced market power of high-occupancy hospitals when negotiating rates with health plans (Melnick et al, 1992). The finding of an inverse relationship between average length of stay and profitability might be explained by higher costs associated with poorer discharge processes. Alternatively, this finding might reflect deficiencies (i.e., unobserved variations in patient burden of illness) in case-mix adjustment of payments.

We also found that higher unemployment is associated with reduced profits. The unemployment rate is highly correlated with the pool of uninsured individuals that hospitals serve. Therefore, as the number of uninsured increase, hospital revenue should decrease, placing downward pressure on the hospital's profitability. Hospitals located in pockets of high unemployment might be in financial jeopardy and require government assistance. However, with the passage of the Affordable Care Act (ACA), the linkage between employment and insurance coverage may be weakened. Nevertheless, the absence of special provisions for uncompensated care is a weakness of the ACA that should be addressed.

## Conclusion

Most studies on hospital profitability were limited to few years of data. However, a longitudinal study on hospital profitability is necessary for appropriate assessment of hospital resources and characteristics associated with operating margin and total margin. Unlike most previous panel studies of hospital profits, we corrected for serial correlation and this should lead to more accurate parameter estimates. This is the first panel-based regression study to include the

first two years after the ACA was implemented. We found that the ACA only had a one-time effect on operating margin. This is most likely due to the off-setting effects of different provisions of the ACA (e.g., there were fewer uninsured individuals but Medicare cutbacks for DSH were made). This study is not without limitations. Given the longitudinal nature of this study, our selection of organizational factors was limited by the availability of complete data for the study period. Therefore, we excluded variables of interest such as nurse staffing levels and hospital physician integration strategy. Second, it is possible that the high-technology variable might be endogenous (e.g., if the hospital generates profits, it builds equity, enabling it to invest in technology). However, it was impossible to obtain a suitable instrument. Despite its limitations, this article provides a unique opportunity to examine the key sources of hospital profitability among a wide range of organizational and market-level factors, as well as the short-term impact of the ACA. For-profit hospitals, large hospitals, hospitals with large market share, hospitals with high occupancy rates, high-technology hospitals, and hospitals in low-unemployment localities, tend to be more profitable. Hospitals with long average length of stay tend to record lower operating and total margins.

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Notes:

1.The operating margin ratio includes only revenue and expenses from operating activities. It is calculated as follows: [(net operating revenue - total operating expenses)/ net operating revenue)]. The total margin ratio includes revenue and expenses from all sources. It is calculated as follows: [(total net revenue - total expenses)/ (total net revenue).

2. Data for income is not available in the Area Resources File for 2015. However, in preliminary analysis for the period 2000-13, the estimated coefficient of per capita income was not significantly ($p < 0.05$) different from 0.

3. We also consider using an income measure. However, data for this was not available for 2015. Analysis for earlier years which included per capita income resulted in an insignificant estimated coefficient for this variable.

4. New Hampshire and Pennsylvania did not expand their Medicaid programs until 2015. Therefore, their interaction variable (state* year) was set equal to 1 only in 2015.

5. The mean values for operating and total margin in "expansion" states were consistently lower than that in non-expansion states. However, while the analysis of our data indicated that mean operating margin was negative in expansion states every year from 2000 to 2013, mean operating margin was positive in expansion states in 2014 and 2015. Accordingly, in an earlier model we used a binary variable set equal to 1 if a hospital was located in a state that expanded its Medicaid program in 2014 or 2015. The estimated parameter for this variable was insignificant, a result we attribute to the time-invariant factors being captured by the fixed-effects regression model. In a random-effects model this coefficient was significant at $p < 0.01$.

6. In an earlier model we considered the possibility of scale effects by including a quadratic term (i.e., beds + bed-squared). However, this resulted in an insignificant coefficient that might be due to multi-collinearity ($r= 0.87$).

7. The estimates for the binary year variables are very sensitive to the choice of the reference category. For example, when 2015 was used as the reference category instead of 2000, the coefficient of 2008 in the total margin equation became negative and significant ($p < 0.01$). This is consistent with the analysis of yearly mean values of total margin which suggests that the Great Recession adversely affected total margin of hospitals in 2008.

**References**


Al-Amin, M., M. Schiaffino, S. Park, & J. Harman. "Sustained hospital performance on HVHPS: what are the determinants?" *Journal of Healthcare Management* (forthcoming)

Al-Amin, M., M. Housman. (2012). "Ambulatory surgery center and general hospital competition: entry decisions and strategic choices". *Health Care Management Review, 37,* 223-234.

Bai, G. & G. Anderson. (2016). "A more detailed understanding of factors associated with hospital profitability". *Health Affairs* 35, 889-897.

Barney J. (1991). "Firm resources and sustained competitive advantage". *Journal of Management* 17, 99–120.

Bazzoli, G., L. Dynan, L. Burns & C. Yap (2004). "Two decades of organizational change in health care: what have we learned?" *Medical Care Research and Review*, 61, 247-331.

Bazzoli, G. J., N. Fareed, & T. M. Waters. (2014). "Hospital financial performance in the recent recession and implications for institutions that remain financially weak". *Health Affairs, 33,* 739-745.

Bazzoli, G. J., H. F. Chen, M. Zhao, & R. C. Lindrooth. (2008). "Hospital financial condition and the quality of patient care". *Health Economics,17*, 977-995.

Bazzoli G., B. Chan, S. Shortell, & T. D'Aunno. (2000). "The financial performance of hospitals belonging to health networks and systems". *Inquiry* 37, 234–252.

Blavin, F. (2016). "Association between the 2014 Medicaid expansion and US hospital finances," *JAMA* 316, 1475-1483.

Büchner, V. A., V. Hinz, & J. Schreyögg. (2016). "Health systems: changes in hospital efficiency and profitability". *Health Care Management Science,19,* 130-143.

Burkhardt, J. H., & J. R. Wheeler. (2013). "Examining financial performance indicators for acute care hospitals". *J Health Care Finance, 39,* 1-13.

Chatterjee, S., & B. Wernerfelt. (1991). "The link between resources and type of diversification: theory and evidence". *Strategic Management Journal, 12,* 33-48.

Collins, S.R., Rasmussen, P.W., Doty, M.M., & Beutel S." The rise in health care coverage and affordability since health reform took effect". New York: The Commonwealth Fund, 2015 (http://www.commonwealthfund.org/publications/issue-briefs/2015/jan/biennial-health-insurance-survey).

Cunningham, P., R. Garfield, R. & R. Rudowitz (2015). How are hospitals faring under the Affordable Care Act? Early experiences from Ascension Health," Issue Brief (Washington, DC: Kaiser Commission on Medicaid and the Uninsured, April 2015).

Cunningham, P., R. Rudowitz, K. Young, R. Garfield, & J. Foutz. (2016). "Understanding Medicaid hospital payments and the impact of recent policy changes," Issue Brief (Washington, DC: Kaiser Commission on Medicaid and the Uninsured, June 2016)

Douglas, T. J., & J. A Ryman. (2003). "Understanding competitive advantage in the general hospital industry: evaluating strategic competencies". *Strategic Management Journal, 24,* 333-347.

Dranove, D., C. Garthwaite, & C. Ody. (2016) "Uncompensated care decreased at hospitals in Medicaid expansion states but not at hospitals in nonexpansion states", *Health Affairs 35,* 1471–1479.

Fisher, E. S., D. E. Wennberg, T. A. Stukel, & D. J. Gottlieb. (2004). "Variations in the longitudinal efficiency of academic medical centers". *Health Affairs,* VAR19-32.

Gapenski, L. C., W. B Vogel, & B. Langland-Orban. (1993). The determinants of hospital profitability". *Journal of Healthcare Management, 38,* 63-80.

Gaynor, M. & R. Town. (2012). "Competition in health care markets". *Handbook of Health Economics,* Volume 2,1st Ed. By Pauly, M., T. McGuire, and P. Barros, eds. North Holland Waltham MA

Goddard, J., M. Tavakoli, & J. Wilson. (2009). "Sources of variation in firm profitability and growth". *Journal of Business Research* 62, 495–508.

Goes, J. B., & S. H. Park. (1997). "Interorganizational links and innovation: the case of hospital services". *Academy of Management Journal, 40,* 673-696.

Goldstein, S. M., P. T. Ward, G. K. Leong, & T. W. Butler. (2002). "The effect of location, strategy, and operations technology on hospital performance". *Journal of Operations Management, 20,* 63-75.

Grant, R. M. (1991). "The resource-based theory of competitive advantage: implications for strategy formulation". *California Management Review, 33,* 114-135.

Huang, S. S. (2016). "Financial leverage and hospital technology adoption". J*ournal of Health Care Finance, 42*.

Holt, H., J. Clark, J. DelliFraine, & D. Brannon. (2011). "Organizing for performance: what does the empirical literature reveal about the influence of organizational factors on hospital financial performance"? *Biennial Review of Health Care Management, 11,* 21-62.

Je'McCracken, M., T. F. McIlwain, & M. D. Fottler. (2001). "Measuring organizational performance in the hospital industry: an exploratory comparison of objective and subjective methods". *Health Services Management Research, 14,* 211-219.

Jha, A. K., E. J. Orav, A. Dobson, R. A. Book, & A. M. Epstein. (2009). "Measuring efficiency: the association of hospital costs and quality of care". *Health Affairs, 28,* 897-906.

Kaiser Family Foundation (2017) State Medicaid Expansion Approaches Apr 06, 2017 http://www.kff.org/medicaid/fact-sheet/state-medicaid-expansion-approaches/

Kazley, A., & Y. Ozcan. (2007). "Organizational and environmental determinants of hospital EMR adoption: a national study". *Journal of Medical Systems,* 31, 375-384.

Litvak, E., & M. Bisognano. (2011). "More patients, less payment: increasing hospital efficiency in the aftermath of health reform". *Health Affairs, 30,* 76-80.

Liu, K., L. M. You, S. X. Chen, Y. T. Hao, X.W. Zhu, L. F. Zhang, & L. H. Aiken. (2012). "The relationship between hospital work environment and nurse outcomes in Guangdong, China: a nurse questionnaire survey". *Journal of Clinical Nursing, 21,* 1476-1485.

Long, S., M. Karpman, A. Shartzer, D. Wissoker, et al., (2014) Taking Stock: Health Insurance Coverage under the ACA as of September 2014 Urban Institute Health Policy Center

Marx, J. & V. Carter. (2014). "Factors influencing US Charitable giving during the Great Recession: implications for nonprofit administration", Administrative *Sciences,* 4, 350-372.

MedPac (2016) "Report to the Congress: selected Medicare payment issues". Washington, D.C. MedPAC

*MedPac 2017* MedPac (2017) "Report to the Congress: selected Medicare payment issues". Washington, D.C. MedPAC

Melnick, G., J. Zwanziger, A. Bamezai, & R. Pattison. (1992). "The effects of market structure and bargaining position on hospital prices". *Journal of Health Economics,* 11, 217-233.

Rauscher, S. & J. Wheeler. (2012). "The importance of working capital management for hospital profitability: evidence from bond-issuing, not-for-profit U.S. hospitals". *Health Care Management Review*, 37, 339-346.

Romley, J., D. Goldman & N. Sood. (2015). "US hospitals experienced substantial productivity growth during 2002–11". *Health Affairs*, 34, 511–518.

Rosko, M. & R. Mutter. (2010). "Inefficiency differences between critical access hospitals and prospectively paid rural hospitals". *Journal of Health Politics, Policy and Law* 35, 95-126.

Rosko, M, H. Wong & Ryan Mutter. (2017) "Characteristics of high- and low-efficiency hospitals," *Medical Care Research and Review* (forthcoming).

Rosko, M., J. Proenca, J. Zinn, & G. Bazzoli, "Hospital inefficiency: what is the impact of membership in different types of systems?" *Inquiry* 44, 335-349

Schuhmann, T. M. (2008). "Hospital financial performance: trends to watch: financial indicators derived from Medicare cost report data are reliable tools for assessing the effectiveness of a hospital's operations". *Healthcare Financial Management, 62,* 58-67.

Schneider, J., R. Ohsfeldt, M. Morrisey, P. Li, T. Miller, & B. Zelner. (2007). "Effects of specialty hospitals on the financial performance of general hospitals". 1997–2004, *Inquiry* 44, 321–334.

Short, J. C., T. B Palmer, & D. J Ketchen. (2002). "Resource-based and strategic group influences on hospital performance". *Health Care Management Review, 27,* 7-17.

Singh, S. R., & J. Wheeler. (2012). "Hospital financial management: what is the link between revenue cycle management, profitability, and not-for-profit hospitals' ability to grow equity? *Journal of Healthcare Management,* 7, 325-339.

Smith V,K. Gifford K, E. Rudowitz & R. Snyder L.(2014) *Medicaid in an era of health & delivery system reform: results from a 50-state Medicaid budget survey for state fiscal years 2014 and 2015.* (Washington, DC: The Kaiser Commission on Medicaid and the Uninsured), October 2014

Spaulding, A., B. Kash, C. Johnson, & L. Gamm. (2016). "Organizational capacity for change in health care: development and validation of a scale". *Health Care Management Review* (forthcoming).

Steinbook, R. (2009). "Health care and the American recovery and reinvestment act". *New England Journal of Medicine,* 360:1057-1060

Turner, J., K. Broom, M. Elliott, & J. F. Lee. (2015). "A decomposition of hospital profitability an application of DuPont analysis to the US market". *Health Services Research and Managerial Epidemiology,* 2, 1-10.

Tennyson D. H., M. D Fottler. (2000). "Does system membership enhance financial performance in hospitals?" Med Care Res Rev 57, 29–50.

Witgert, Katharine & and C. Hess. (2012) "Issues and policy options in sustaining a safety net infrastructure to meet the health care needs of vulnerable populations." Washington, DC: National Academy for State Health Policy, October 2012.

Wong, H. S., C. Zhan, & R. Mutter. (2005). "Do different measures of hospital competition matter in empirical investigations of hospital behavior." *Review of Industrial Organization* 26, 27–60.

Zinn, J. S., R. J. Weech, & D. Brannon. (1998). "Resource dependence and institutional elements in nursing home TQM adoption". *Health Services Research, 33,* 261.