

The Impact of Financial Crisis on the Financial Asset in California Hospitals*

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During the financial crisis in 2008, the US economy experienced a massive economic collapse and financial market meltdown. However, how this financial crisis affected the healthcare industry has not been well investigated. Thus, this study examines the impact of the 2008 financial crisis on the financial assets of not-for-profit hospitals in California from 2006 to 2010. The data are analyzed using a generalized estimating equation with a normal distribution and log link function. This study found that not-for-profit hospitals were suffering in investing in financial assets during the financial crisis. This short of financial asset investment may lead to poor quality of care and the inability to meet growing demands for care and services.

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1. INTRODUCTION

The US experienced a massive economic collapse and financial market meltdown in 2008. This financial crisis reduced household wealth, increased the unemployment rate, and eventually led to government interventions such as bailouts. This crisis led to a 9 percent drop in production in the economy, 7 percent increase in the unemployment rate, 50 percent decline in equity prices, 35 percent decline in real home prices and 86 percent increase in public debt, on average (Reinhart and Rogoff, 2009). The International Monetary Fund (IMF) estimated that US banks lost over \$1 trillion in loans and assets due to the collapse (Chang, 2011).

The impact of the financial crisis on the overall economy has been well investigated (Congressional Budget Office, 2010; Reinhart and Rogoff, 2009; Swagel, 2009; Kim, Hammoudeh, and Choi, 2014). However, the impact of the 2008 financial crisis on the healthcare sector has not been investigated. Healthcare is a capital-intensive industry; hospitals invest in capital to keep pace with new medical and information technology and maintain facilities for patient care. Recently, health care policy and research have focused on hospital investment strategies (Reiter and Song, 2011). In particular, investments in financial assets such as stocks and bonds have increased, and concerns about this practice have brought attention to the role of financial assets in the asset structure of hospitals.

Not-for-profit hospitals are unique in that they hold a significant amount of financial assets compared to for-profit hospitals. These financial assets could create new opportunities for hospitals to achieve significant returns, but may also make hospitals vulnerable to financial market fluctuations. According to a recent survey of 143 not-for-profit hospitals and health systems, not-for-profit hospitals invest more than 50 percent of their endowments in cash and low-risk liquid securities (Evans, 2009). However, they invest the remaining endowment funds in stock, venture capital, real estate, hedge funds, and private equity. While this financial investment may increase return, it may also introduce higher risk and lead to substantial losses during financial

crises. The financial market performance of not-for-profit hospitals can directly affect their resources available for capital investment. For example, one not-for-profit hospital lost more than \$500 million of its financial assets, resulting in a downgrade in its bond rating and delays in capital investment (Cowan, 2003).

Gains or losses from financial assets may have significant impacts on capital investments including outlays for new medical technologies, up-to-date information systems, and efficient building designs. These tangible investments can contribute in important ways to the practice of improved quality of care (Levitt, 1994). For example, some studies provide evidence of a relationship between quality and investment in property, plant, and equipment (Levitt, 1994; Cleverley and Harvey, 1992; Kuhn *et al.*, 1991). They generally argued that hospital failure to invest in capital may result in poor quality of care and the inability to meet growing demands for care and services.

However, even though financial assets play significant roles in capital investment by hospitals, there are no guidelines for the appropriate management of hospital financial assets (Reiter *et al.*, 2008). The restricted environment arising from the 2008 financial crisis increased the attention of hospitals paid to their financial assets, as evidenced by decreases in capital expenditure.

This paper is the first study to examine the effects of the 2008 financial crisis on the financial assets of not-for-profit hospitals in California. Previous studies focused on investment in capital assets (Calem and Rizzo, 1995; Reiter *et al.*, 2008; Rivenson *et al.*, 2000; Song *et al.*, 2010), but did not consider how market performance (e.g., financial crisis or economic depression) affect the financial assets of not-for-profit hospitals. Prior studies also used old data gathered before 2006. In contrast, the present study employed more recent data, from 2006 to 2010.

2. BACKGROUND

Hospitals hold different amounts of financial assets across ownership. Not-for-profit hospitals hold 29.6 percent of their total assets as financial assets, while for-profit hospitals hold only 14.5 percent as financial assets (Lee, 2013). This difference results from the inability of not-for-profit hospitals to raise funds by selling stock, their use of debt, and deliberate strategies to hold cash to enhance bond ratings (Robinson, 2002). Because not-for-profit hospitals cannot sell stocks, their operating and capital investments are supported by financial assets that provide savings and a source of untaxed interest income to supplement earnings from patient care (Rivenson *et al.*, 2000). Financial assets also strengthen the balance sheets of not-for-profit hospitals and allow them to achieve secure bond ratings, resulting in reduced cost of borrowing (McCue, 2001). Not-for-profit hospitals can also hold tax-exempt bonds, which are substituted over internal reserve to support capital investment (Gentry, 2002).

Few studies have examined the effects of financial market performance on hospital asset structure. Bazzoli *et al.* (2007) examined financial pressure during the late 1990s and found that increasing financial pressure led to cutbacks in hospital investments in plants and equipment and on hospital standards compliance with selected Joint Commission on Accreditation of Healthcare Organization performance areas. They concluded that patient poor outcomes may result from deterioration in supporting infrastructure and organizational processes. According to Smith *et al.* (2000), the chief financial officers (CFOs) of 12 leading not-for-profit health care systems confirmed that cash and debt play significant roles in supporting capital investment, and stressed that not-for-profit hospitals hold financial assets for use as investments and to improve bond ratings. Wedig *et al.* (1996) also found that debt was positively associated with capital expenditure. While tax-exempt debt held by not-for-profit hospitals stimulates capital investment, risky debt is more likely to result in lower levels of investment. Calem and Rizzo (2008) found that cash flow from operating revenue was positively

associated with capital expenditure during capital market imperfections, resulting in increased costs of borrowing. More recently, Reiter and Song (2011) found a positive association between stock performance and capital investment by hospitals.

Overall, the results of previous studies suggest that financial market performance plays a critical role in hospital assets and capital investment, affecting non-operating income and debt. However, no previous empirical studies have examined the effects of the 2008 financial crisis on the financial assets of not-for-profit hospitals. To address this question, we examined the relationship between the 2008 financial crisis and financial assets held by California not-for-profit hospitals, controlling for financial and operating factors and hospital and market characteristics.

3. DATA

3.1. Data Sources

This study used hospital panel data from two sources, the Hospital Annual Financial Disclosure (HAFD) report from the Office of Statewide Health Planning and Development (OSHPD), and the American Hospital Association (AHA), over a period between 2006 and 2010.

California is the largest state in the US that requires hospitals to report financial data (OSHPD) and therefore provides the most comprehensive publicly available source of hospital financial data (Lee *et al.*, 2013). Also, the AHA Annual Survey data profiles more than 6,500 hospitals throughout the United States. The response rate on the AHA Annual Survey has been more than 70% each year. The survey process is conducted to maximize accuracy and participation. AHA data are used by government agencies, media and the industry for accurate and timely analysis and decision-making.

The study sample includes all non-federal, not-for-profit, general acute care hospitals in California except for the Kaiser hospital system, which was

dropped from this sample because it was not required to report its financial variables to OSHPD. For data consistency, hospitals with balance sheets that covered fewer than 365 or more than 366 days per year were also dropped. We excluded for-profit and investor-owned hospitals because they have different motivations for holding financial assets that may be affected by financial asset performance due to effects on the market value of their stock (Reiter and Song, 2011). The final study sample includes 199 unique non-federal, not-for-profit, general acute care hospitals, and 974 hospitals with data pooled over 5 years, and represented an unbalanced panel.

3.2. Empirical Model and Specifications

We applied the generalized estimating equation (GEE) to examine the effects of the 2008 financial crisis on not-for-profit hospital financial assets. The GEE is generally used to estimate parameters with possible unknown correlations between outcomes. The GEE is the extension of generalized linear model (GLM) to longitudinal data analysis using quasi-likelihood estimation. It is derived without full specification of the joint distribution of a subject's observation. Moreover, GEE parameter estimates are consistent even when the covariance structure is misspecified (Hardin and Hilbe, 2003). The model of hospital financial assets is presented in the equation below:

$$FA_i = \alpha + \beta_1 OPT_{it} + \beta_2 FR_{it} + \beta_3 HC_{it} + \beta_4 MC_{it} + \beta_5 FC_t + Time + Time^2 + \varepsilon_{it}. \quad (1)$$

FA is financial assets, which include unrestricted cash, marketable securities, all assets whose use is limited, and investment in other assets (Song and Reiter, 2010). OPT reflects a vector of variables that captures hospital operating characteristics. Hospital operating characteristics include measures of return on capital investment and hospital output; return on capital investment reflects the information value of investment performance

and is measured as the return on assets, or net income divided by total assets, while hospital output reflects the demand for a hospital's services and is measured by the total number of discharges, the total number of outpatient visits and net patient service revenue. FR reflects a vector of variables that captures hospital's financial resources such as debt capacity and cash flow. Debt capacity reflects the existing level of debt and is measured as the ratio of total liabilities to total assets. Cash flow measures hospital operating profitability. HC represents hospital characteristics, including academic status, location, system affiliation, case mix index (CMI) and size. Academic status is a dummy variable that stands for being a Council of Teaching Hospital (COTH) member. Location is a dummy variable for a rural hospital. System affiliation also is dummy variable for system hospital. Case mix index controls for the average diagnosis-related group (DRG) weight for all of a hospital's Medicare volume and is used to adjust the average cost per patient for a hospital relative to other hospitals. Size is the number of licensed beds. These hospital characteristics were reported in the AHA annual survey. MC reflects market characteristics, including competition measured by the Herfindal-Herschman Index (HHI) based on patient demand. Hospital competition is measured based on the market shares of individual hospitals. To calculate the competitiveness of a given geographical market, each hospital's share of discharges and outpatient visits is calculated. Then, these shares are squared and summed to calculate the HHI. Geographic market was defined as the health service area (HSA).

The key variable is FC, representing the financial crisis, which is set to '1' if the year is after 2007, or '0' otherwise. Linear and quadratic time trends are included as time effects. All expenditure values are adjusted for inflation to the 2010 dollar using the consumer price index (CPI). The GEE with normal distribution and log link function is used. Robust standard errors are calculated to address heteroskedasticity, and standard errors are adjusted to account for clustering of observations within hospitals. The AR(1) correlation matrix is used to control for the first degree of autoregressive error, a common problem in financial data (Blundell and Bond, 1998). All

analyses are performed using STATA 11.1.

4. RESULTS

Descriptive statistics are presented in table 1. Over the sample period, the mean annual financial assets are approximately \$82 million. The average return on assets is 1.21. The average net patient revenue is \$245.92 million. The numbers of discharges and outpatient visits are 11,122 and 176,462, respectively. The average debt to asset ratio is 67.07%, and the average cash flow is \$18.79 million. Teaching, rural and system hospitals account for 8.01%, 2.36%, and 19.82% of all hospitals, respectively. The average CMI is 1.14 and the average number of licensed beds is 267. Competition measured by HHI is 68.8%.

Table 1 Descriptive Statistics (199 Unique Hospitals)

Variable	Mean / Percent	Std. Dev
Financial Assets (in millions)	\$81.68	\$156.79
Hospital Operating Characteristics		
Return on Assets	1.210	0.619
Net Patient Revenue (in millions)	\$245.92	\$273.57
Number of Discharges	11,122	8,880
Number of Outpatient Visits	176,462	3,583
Financial Resources		
Debt-to-Assets	65.07%	37.41%
Cash Flow (in millions)	\$18.79	\$42.69
Hospital Characteristics		
Teaching Hospitals	8.01%	27.16%
Rural Hospitals	2.36%	15.19%
System Member	19.82%	39.88%
Case Mix Index	1.14	0.23
Number of Beds	267.243	197.324
Market Characteristics		
Competition	68.77%	31.71%

Table 2 GEE Regression of Hospital Financial Assets

		Coefficient	Std. Err.	p-value
Financial Resource	Debt-to-Asset	-0.347**	0.134	0.010
	Cash Flow	0.243***	0.016	0.000
Hospital Operating Characteristics	Return On Asset	-0.854***	0.071	0.000
	Net Patient Revenue	1.070***	0.107	0.000
	Total Discharges (per1000)	0.000	0.000	0.978
	Total Outpatient Visits (per1000)	0.002	0.000	0.804
Hospital Characteristics	Teaching	-0.572**	0.283	0.043
	Case Mix Index	-0.217	0.304	0.476
	Licensed Beds (per1000)	-0.482	0.001	0.403
	Rural	0.226	0.394	0.565
	System Member	-0.164*	0.090	0.067
Market Characteristics	HHI	0.326*	0.197	0.097
Financial Crisis		-0.162**	0.063	0.011
Time Trend	Time	0.050	0.077	0.519
	Time-square	-0.008	0.011	0.466
Constant		-5.331***	1.854	0.004

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. HHI: Herfindal-Herschman Index, Robust standard errors are calculated to address heteroskedasticity. Standard errors are adjusted to account for clustering of observations within hospitals. AR(1) correlation matrix is used.

The GEE regression estimates are presented in table 2. We calculated the multi-collinearity between independent variables and found the variance inflation factors (VIF) of all variables to be less than 4 except time and time square. This result indicates that multi-collinearity was not a problem (O'Brien, 2007). The coefficient of the financial crisis is statistically significant ($b = -0.162$, $p\text{-value} = 0.011$), indicating that financial assets were reduced by approximately 15% of their value, or \$12.2 million, after the 2008 financial crisis.

Significant explanatory variables include debt to asset, cash flow, return on asset, net patient revenue, teaching status and competition. As expected,

financial resources play significant roles influencing financial assets. Cash flow is positively associated with financial assets, with an additional \$1 million of revenue predicting \$243,000 in financial assets (p -value <0.01). The debt-to-asset ratio is negatively associated with financial assets.

Hospital operating characteristics are important variables. Net patient revenue is positively associated with financial assets, with an additional \$1 million of revenue predicting \$1.07 million in financial assets (p -value <0.01). Surprisingly, return on assets is negatively associated with financial assets.

Lastly, some of the hospital and market characteristics are statistically significant. Teaching hospitals and system member hospitals are negatively associated with financial assets. Hospital competition is negatively associated with financial assets, indicating that lower levels of competition lead to higher financial assets. However, time and squared time variables are not statistically significant.

5. DISCUSSION

The 2008 financial crisis may have prevented hospitals from gaining access to equity capital for capital investment. Not-for-profit hospitals hold more financial assets than do for-profit hospitals. This difference is consistent with their goal of maximizing cash holdings.

Financial asset holdings play a significant role in maintaining secure bond ratings to support borrowing for investment and provide a non-trivial source of non-operating income (Reiter and Song, 2011). Given this strategic role, financial assets could be more important to not-for-profit hospitals during financial crises, when debt financing is not easily accessible.

The findings of this study suggest that the financial assets of not-for-profit hospitals in California were significantly affected by the 2008 financial crisis. The financial assets of not-for-profit hospitals were reduced by approximately 15% after the 2008 financial crisis, which implies that downturns in the economy may constrain the amount of resources available

to support investments in assets when a state of economic financial crisis is substantial and persistent. This finding confirms that not-for-profit hospitals were suffering in investing in capital assets during the financial crisis and suggests that investment strategies should change substantially during financial crises.

This study has limitations. First, it was limited to not-for-profit hospitals in California. In particular, California hospitals tend to be in worse financial health than those in other states. This finding may therefore not reflect the national population of US not-for-profit hospitals. Second, this study does not employ any investment theory. There is well-established investment theory for investor-owned companies (Reiter and Song, 2011), but such theories do not exist for not-for-profit hospitals. Thus, important variables may have been omitted, and our resulting estimates may be biased. Third, there may be some unobserved confounder factors related to financial crisis, such as decision-making of corporate managers. For example, if the corporate managers increase the capital investment aggressively to improve quality of care after financial crisis, the coefficients may be underestimated. Thus, these unobserved confounder factors may lead to biased estimates.

Despite these limitations, the results suggest that not-for-profit hospitals suffered during the 2008 financial crisis in terms of financial asset holdings. Other studies have reported that when access to debt financing is constrained, hospitals are reliant on internally generated cash flow to support investment. Hospitals also experienced declines in investment portfolios during the crisis (Pollard, 2010). Such lower investment earnings and loss of financial assets may halt capital investment. Hospitals invest in capital to keep pace with new medical and information technology, and to maintain facilities for patient care needs. Hospitals that are unable to make investments in infrastructure and innovation may experience significant impacts on patient quality of care. For example, the Critical Access Hospital (CAHs) provides access to appropriate healthcare services of high quality in rural areas. However, these hospitals have aged over forty years and need immediate renovation or replacement. The total capital need for these hospitals was

reported as \$2 billion. However, they could not afford this renovation because of the short of capitals (Flex Monitoring Team, 2008). Also, a study found that the death rates for Medicare beneficiaries being treated at CAH in rural areas increased from 2002 to 2010, while rates in other hospitals fell (Joynt, Orav, and Jha, 2013). They conclude that the high death rate in rural CAH resulted from fewer financial and human capital resources and care for a rapidly aging population. Thus, the future quality of care of patients is significantly affected by current financial asset through capital investment.

6. CONCLUSION

This is the first study to examine the impact of the 2008 financial crisis on financial assets in California not-for-profit hospitals from 2006 to 2010. Understanding financial asset holdings during the financial crisis is important, given that there are no guidelines for financial asset holding by not-for-profit hospitals. It is important that managers and policymakers in the healthcare industry understand how financial assets are influenced by financial market fluctuations, because financial asset investments eventually affect the future quality of hospitals by influencing capital investment. Thus, to improve future quality of care, the managers of hospitals may be cautious in capital investment during the financial crisis. If they reduce the capital investment during financial crisis, their future revenue may reduce because of poor quality of care. This study illustrates hospital response in terms of financial asset holdings during the 2008 financial crisis and lays an important foundation for the study of asset strategies and performance by not-for-profit hospitals in the US.

REFERENCES

Bazzoli, G. J., J. P. Clement, R. C. Lindrooth *et al.*, "Hospital Financial

- Condition and Operational Decisions Related to the Quality of Hospital Care,” *Medical Care Research and Review*, 64, 2007, pp. 148-168.
- Blundell, R. and S. Bond, “Initial Conditions and Moment Restrictions in Dynamic Panel Data Models,” *Journal of Econometrics*, 87, 1998, pp. 115-143.
- Calem, P. S. and J. A. Rizzo, “Financing Constraints and Investment: New Evidence from Hospital Industry Data,” *Journal of Money, Credit, and Banking*, 27(4), 1995, pp. 1002-1014.
- Chang, W., “Financial Crisis of 2007-2010,” *Keio Economic Studies*, 47, 2011, pp. 25-56.
- Cleverley, W. O. and R. K. Harvey, “Is There a Link between Hospital Profit and Quality?,” *Healthcare Financial Management*, 46(9), 1992, pp. 40-45.
- Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2010 to 2020*, Washington, D.C.: The Congress of the United States, 2010 (<http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/108xx/doc10871/01-26-outlook.pdf>).
- Cowan, A. L., “Investment Losses Hurt Major Hospital,” *The New York Times*, New York, March 10, 2003.
- Evans, M., “Dippin’ Endowments,” *Modern Healthcare*, October 26, 2009 (<http://www.modernhealthcare.com/article/20091026/NEWS/910229985>).
- Flex Monitoring Team, “The Capital Investment Needs of Cash: Fire and Life Safety Code Compliance and Organizational Performance,” Briefing Paper, 21, 2008.
- Gentry, W. M., “Debt, Investment and Endowment Accumulation: The Case of Not-for-Profit Hospitals,” *Journal of Health Economic*, 21, 2002, pp. 845-872.
- Hardin, James and Joseph Hilbe, *Generalized Estimating Equations*, London: Chapman and Hall/CRC, 2003.
- Joynt K. E., J. Orav, and A. K. Jha, “Mortality Rates for Medicare

- Beneficiaries Admitted to Critical Access and Non-Critical Access Hospitals, 2002-2010, *JAMA*, 309(13), 2013, pp. 1379-1387.
- Kim W. J., S. Hammoudeh, and K. Choi, "Effects of U.S. Macroeconomic Shocks on International Commodity Prices," *Korea and the World Economy*, 15(1), 2014, pp. 45-85.
- Kuhn, E. M., A. J. Hartz, M. S. Gottlieb, and A. A. Rimm, "The Relationship of Hospital Characteristics and the Results of Peer Review in Six Large States," *Medical Care*, 29(10), 1991, pp. 1028-1038.
- Lee, J., "Trends in the Asset Structure of California Hospitals during a Financial Crisis," *Journal of Hospital Administration*, 2(3), 2013, pp. 126-131.
- Lee, J., J. McCullough, and R. Town, "The Impact of Health Information Technology on Hospital Productivity," *RAND Journal of Economics*, 44(3), 2013, pp. 545-568.
- Levitt, S. W., "Quality of Care and Investment in Property, Plant, and Equipment in Hospitals," *Health Service Research*, 28(6), 1994, pp. 713-727.
- McCue, M. J., "A Trend Analysis of Hospitals with High Cash and Security Investments," *Hospital Topics*, 79, 2001, pp. 23-27.
- O'Brien, R. M., "A Caution Regarding Rules of Thumb for Variance Inflation Factors," *Quality and Quantity*, 41, 2007, pp. 673-690.
- Pollard, L., "Short-Lived Financing Options Can Make Capital Projects Feasible in Tough Economy," *Healthcare Financial Management Association Tarheel News*, 44, 2010, pp. 10-11.
- Reinhart, C. M. and K. S. Rogoff, "The Aftermath of Financial Crises," NBER Working Paper, No. 14656, 2009.
- Reiter, K. L., J. R. C. Wheeler, and D. C. Smith, "Liquidity Constraints on Hospital Investment When Credit Markets are Tight," *Journal of Health Care Finance*, 35(1), 2008, pp. 24-33.
- Reiter, K. L. and P. H. Song, "The Role of Financial Market Performance in Hospital Capital Investment," *Journal of Health Care Finance*, 37(3), 2011, pp. 38-50.

- Rivenson, H. L., J. R. Wheeler, D. G. Smith, and K. L. Reiter, "Cash Management in Health Care Systems," *Journal of Health Care Finance*, 26, 2000, pp. 59-69.
- Robinson, J. C., "Bond-Market Skepticism and Stock-Market Exuberance in the Hospital Industry," *Health Affairs*, 21, 2002, pp. 101-117.
- Smith, D. G., J. R. Wheeler, H. L. Rivenson, and K. L. Reiter, "Sources of Project Financing in Health Care Systems," *Journal of Health Care Finance*, 26, 2002, pp. 53-58.
- Song, P. H. and K. L. Reiter, "Trends in Asset Structure between Not-for-Profit and Investor Owned Hospitals," *Medical Care Research and Review*, 67(6), 2010, pp. 694-706.
- Swagel, P., "The Financial Crisis: An Inside View," *Brookings Papers on Economic Activity*, 2009, pp. 1-63.
- Wedig, G. J., M. Hassan, and M. A. Morrissey, "Tax-Exempt Debt and the Capital Structure of Nonprofit Organizations: An Application to Hospitals," *Journal of Finance*, 51, 1996, pp. 1247-1283.