SAMPLE INDICATORS FOR PREDICTING U.S. PUBLICLY-TRADED FOR-PROFIT HOSPITAL FINANCIAL SOLVENCY

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ABSTRACT

The performance of all health care organizations is dependent on balancing the interrelationships of three dynamic dimensions - quality of care, access to care, and cost containment, called the "iron triangle" (Federal Trade Commission & Department of Justice, 2004). Administrators of U.S. hospitals and health systems must contend with the increasing pressures of changing economic conditions in response to the current regulatory changes in the health care industry. The detection of early warning signs of financial distress is imperative for management to be able to align strategic plans in advance to meet these challenges and prevent financial insolvency and bankruptcy. Research on financial and non-financial measures as indicators of financial solvency of U.S. hospitals is limited at the hospital system level; particularly U.S. publicly traded for-profit hospitals.

The Healthcare Negative Feedback System Model served as the theoretical framework developed for this study. It is a significant contribution to the literature in the healthcare area. This theoretical framework was developed by collectively relating three solvency theories: (1) the cash flow theory, (2) the resource dependency theory, and (3) the organizational-environmental theory, to quality, access, and cost indicators of the "iron triangle". This idea is an unpublished concept adapted from peer-reviewed literature developed by Corbett and Gossett (2013). The purpose of this non-experimental quantitative study was to evaluate the effectiveness of financial and non-financial indicators in predicting financial solvency of U.S. publicly traded for-profit hospitals. Data was collected from annual audited financial reports electronically filed on Form 10-K by U.S. publicly traded for-profit hospitals with the Security and Exchange Commission. The use of publicly accessible archival audited data ensures data continuity negating reliability and validity concerns.

INTRODUCTION

Researchers have presented data and analyses to support various financial distress models comprised of financial ratios calculated from data obtained from standard financial statements that are prepared using both the accrual basis of accounting and the cash basis of accounting to analyze United States U.S. hospital financial statements in order to predict financial insolvency and potential bankruptcy (Altman, 2000; Coyne, Singh, & Smith, 2008; Kocakülâh & Austill, 2007; Langabeer, 2006; Morey, Scherzer, & Varshney, 2003; Price, Cameron, & Price, 2005; Vélez-González, Pradhan, & Weech-Maldonado, 2011). Researchers have developed models containing accrual-based financial ratios calculated from data obtained from the accrual-based income statement and balance sheet, such as the Altman Z-score (Altman, 2000) and the Financial Strength Index (FSI) (Cleverly et al., 2011) for study as indicators of hospital financial distress. Coyne, Singh, and Smith (2008) have also examined cash-based financial ratios

calculated from data obtained from the all three standard financial statements – income statement, balance sheet, and the statement of cash flows prepared on the cash basis – as indicators for inclusion in a model for predicting of hospital financial distress. However, the reliability of both types of indicators in assessing financial condition to predict hospital financial insolvency and bankruptcy has been questioned because of the examples of incorrect assessments when purely relying on either one of the two types of indicators (Price et al., 2005; Semritc, 2009). Instead of relying on either of the two types of indicators, Price, Cameron, and Price (2005) suggest that a balanced reporting system incorporating both types of financial indicators, accrual-based and cash -based, should provide a more reliable assessment of hospital financial condition to predict financial insolvency and bankruptcy.

FINANCIAL INDICATORS BASED ON HISTORICAL OUTCOMES

Boblitz (2006) emphasizes that financial indicators are based on historical outcomes reported in financial statements and may not be adequate to assess financial condition to reliably predict financial distress and insolvency. While most studies have focused on financial indicators, Semritc (2009) identified statistically significant indicators in three categories: financial, market, and operational. Because different types of health care organizations have different financing patterns and structures (Broyles, Brandt, and Baird-Holmes, 1998; McCue & Diana, 2007), a mix of indicators from all categories, financial, market, and operational, is suggested as more effective for predicting financial insolvency. From the results of a study of U.S. for-profit hospital systems, Vélez-González, Pradhan, and Weech-Maldonado (2011) find that non-financial measures (efficiency, productivity, and quality indicators) in combination with financial measures provide a useful mix of indicators of future hospital financial performance. In particular, their demonstration of the positive effect of quality on hospital financial performance may provide incentive for managerial and policy decisions to improve hospital quality of care. According to Vélez-González et al., (2011), the study of the influence of non-financial measures on financial performance in the health care industry is limited and requires more research.

PURPOSE OF THIS STUDY

The purpose of this quantitative study was to evaluate the effectiveness of financial and non-financial indicators in predicting financial solvency of U.S. publicly-traded for-profit hospitals. The criterion variable is the financial group status (solvent or insolvent) of the hospital. The independent predictor variables included Altman Z-score, Altman Z-score_2, Financial Strength Index, Financial Strength Index_2, debt service coverage ratio, cash flow margin ratio, operating cash flow ratio, and cash flow to total debt ratio as financial indicators and Medicaid revenue percentage, uninsured revenue percentage, average length of stay, occupancy rate, outpatient revenue percentage, salaries and benefits expense to total operating expenses ratio, salaries and benefits expense to net revenue, and interest expense to net revenue ratio as non-financial indicators. The sixteen indicators selected were reflective of a posteriori and a priori approach in researching scholarly literature to establish key indicators from the findings of multiple empirical studies. Data was collected from annual audited financial reports electronically filed on Form 10-K by U.S. publicly-traded for-profit hospitals through the SEC's Electronic Data Gathering, Analysis, and Retrieval (EDGAR) database system, electronically accessible by the public. The use of archival audited data ensured data continuity negating

reliability and validity concerns. The predictor variables were analyzed for significance as indicators for predicting hospital financial solvency using logistic regression.

THEORETICAL FRAMEWORK

The research questions of this study were examined through a theoretical framework developed by collectively relating three solvency theories - the cash flow theory, the resource dependency theory, and the organizational-environmental theory - to quality, access, and cost indicators of the "iron triangle" within a Health Care Negative Feedback System model. This idea is an unpublished concept adapted from peer-reviewed literature developed by Corbett and Gossett (2013) shown below in Figure 1.

The performance of all health care organizations is dependent on balancing the interrelationships of three dynamic dimensions - quality of care, access to care, and cost containment, called the "iron triangle" (Federal Trade Commission & Department of Justice, 2004). Measures of quality of care, access to care, and cost containment (Cleverly et al., 2011; Flex Monitoring Team, 2005; Flex Monitoring Team, 2012; Health Care Cost Institute (HCCI), 2012) may be interrelated within the financial, market, and operational categories (Gapenski, 2012; Semritc, 2009) to create a comprehensive collective set of financial and non-financial indicators of hospital financial solvency. This comprehensive set of hospital solvency indicators, specifically developed for managers, investors, and analysts of U.S. publicly-traded for-profit hospital systems, may be a more effective tool to identify those components most influencing hospital performance. The integration of this set of specific financial and non-financial indicators into a balanced scorecard, as a strategic performance measurement and management tool, may further enhance the likelihood of correctly detecting components negatively affecting hospital performance as early warning signs of financial distress and predicting financial insolvency.

The cash flow theory (Jensen, 1986) and two financial distress models - the Altman Z-score (Altman, 2000) and Cleverly's Financial Strength Index (Cleverly et al., 2011) - provided support for the use of financial indicators. The resource dependency theory (Pfeffer & Salancik, 1978) and the organizational-environmental theory (Thompson & McEwen, 1958) provided support for the use of market and operational solvency indicators. This theoretical framework linked the three categories of solvency indicators - financial, market, and operational (Gapenski, 2012; Semritc, 2009) to the measures of the three dynamic dimensions of the "iron triangle" of health care (Federal Trade Commission & Department of Justice, 2004) – quality of care, access to care, and cost containment – in establishing a set of reliable indicators that enhances the assessment of financial condition for predicting U.S. publicly-traded for-profit hospital financial solvency.

The premise of the three solvency theories within the "iron triangle" of health care was that an organization's ability to survive financially is dependent on management's ability to adapt operations to changing environmental conditions. According to the resource dependency theory developed by Pfeffer and Salancik (1978), the key to an organization's survival is its capability to secure and maintain limited and valuable resources, critical to an organization's continued existence, from the changing market environment in which it operates. The premise of the organizational-environmental theory developed by Thompson and McEwen (1958) is that an organization's survival depends upon its ability to interact with its changing environment and develop sustainable resource relationships with patients, physicians, suppliers, contractors, and the community. According to the cash flow theory developed by Jensen (1986), an

organization's ability to maintain an "optimal" amount of debt to generate positive cash flow is dependent on the organization's access to capital resources. In the current economic environment, voluntary hospital health systems tend to rely more heavily on liquid reserves, such as cash and marketable securities, before resorting to debt or equity financing (Kim & McCue, 2008), primarily due to the high correlation between leverage and risk, particularly the risk of bankruptcy (Jensen, 1986), whereas, investor-owned hospital health systems tend to rely more on the ability to raise new equity funds (Cleverly et al., 2011). Kim and McCue (2008) found a positive feedback loop where increases in cash flow from new capital investments increases hospital financial solvency, which facilitates increases in capital investments, further securing hospital financial solvency by increasing cash flow.

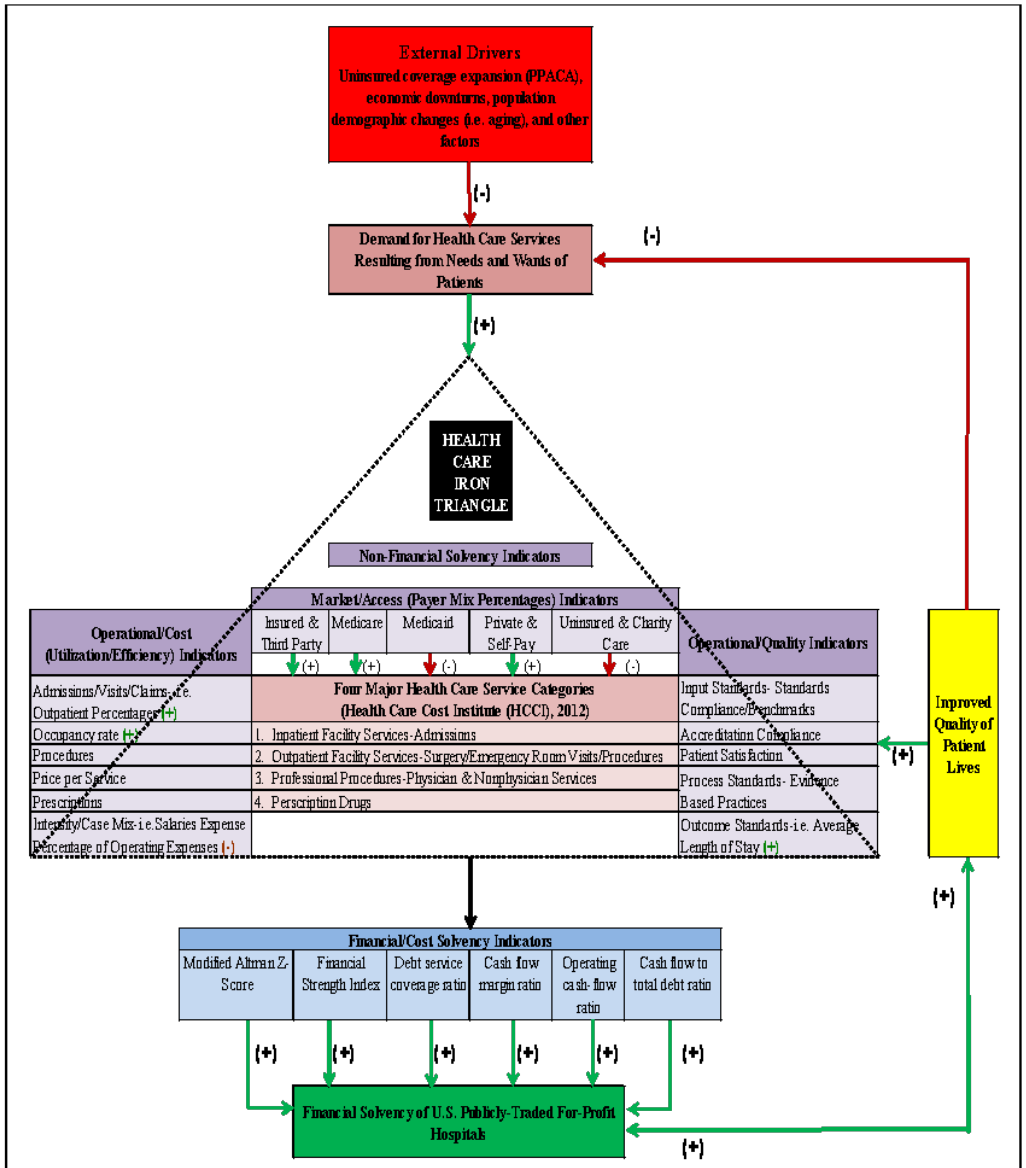

Figure 1. Health Care Negative Feedback System. An unpublished concept adapted from peer-reviewed literature by Rena Biniek Corbett and Dr. Kenneth D. Gossett (2013). The sign (+) indicates a direct positive relationship in the direction of the arrow connecting the objects. An increase in the object at the beginning of the arrow results in an increase in the object at the end of the arrow. A decrease in the object at the beginning of the arrow results in a decrease in the object at the end of the arrow. The sign (-) indicates an inverse negative relationship in the direction of the arrow connecting the objects. An increase in the object at the beginning of the arrow results in a decrease in the object at the end of the arrow. A decrease in the object at the beginning of the arrow results in an increase in the object at the end of the arrow. (Copyrighted 2014)

HYPOTHESES

Management must continuously assess the hospital's financial condition, considered as the viability or capacity of the hospital to continue pursuing its strategic goals, to successfully adapt to changing economic and political environments in the short-run and long-run (Cleverly et al., 2011). To be viable, a hospital must be a solvent hospital, which is in good financial condition to operate as an ongoing business and meet short-term and long-term obligations when due within the current market environment (Fraser & Ormiston, 2007). While solvency measures may be considered primary financial indicators for assessing hospital financial condition (Morey et al., 2003), several other non-financial measures have been found effective in many hospital studies for assessing financial condition to predict financial distress and financial insolvency (Semritc, 2009). The central research question was whether financial/cost indicators, market/access indicators, operational/quality indicators, and operational/cost indicators can be used to determine if any are effective as predictive discriminators of financially solvent or financially insolvent U.S. publicly-traded for-profit hospitals. The following hypotheses were developed to guide the research.

$H1_0$ *Financial/cost indicators (Altman Z-score, Altman Z-score_2, Financial Strength Index, Financial Strength Index_2, debt service coverage ratio, cash flow margin ratio, operating cash flow ratio, and cash flow to total debt ratio) are not statistically significant in predicting between financially solvent and financially insolvent U.S. publicly-traded for-profit hospitals.*

$H2_0$. *Market/access indicators (Medicaid revenue percentage and uninsured revenue percentage) are not statistically significant in predicting between financially solvent and financially insolvent U.S. publicly-traded for-profit hospitals.*

$H3_0$. *Operational/quality indicator (average length of stay) is not statistically significant in predicting between financially solvent and financially insolvent U.S. publicly-traded for-profit hospitals.*

$H4_0$. *Operational/cost indicators (occupancy rate, outpatient revenue percentage, salaries and benefits expense to total operating expenses ratio, salaries and benefits expense to net revenue ratio, and interest expense to net revenue ratio) are not statistically significant in predicting between financially solvent and financially insolvent U.S. publicly-traded for-profit hospitals.*

RESEARCH METHOD AND DESIGN

The research design for this quantitative predictive research study is a nonexperimental correlational design used as the technique to analyze independent ratio variables - financial/cost, market/access, operational/quality, and operational/cost indicators - to determine if any serve as predictive discriminators of the dependent criterion variables, financially solvent or financially insolvent U.S. publicly-traded for-profit hospitals. A step-by-step view of the nonexperimental correlational research design and implementation sequence for this quantitative predictive research study is depicted below in a schematic diagram in Figure 2 followed by descriptions of the steps.

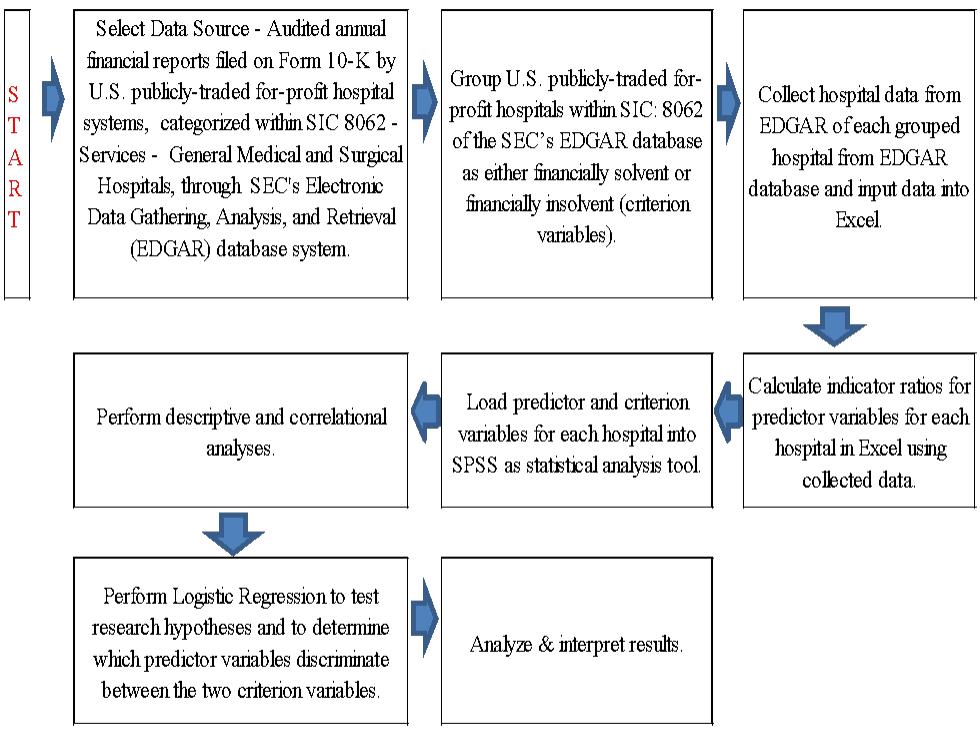

Figure 2. Schematic Diagram of Steps of Proposed Research Design and Implementation Sequence

The data for the calculation of the independent predictor variables were collected from the three most current consecutive 10-K filings of annual audited financial reports for each grouped hospital. The extracted data was inputted into a Microsoft Excel 2007 spreadsheet created for calculating three-year averages of the sixteen financial and non-financial independent predictor variables in four categories - financial/cost, market/access, operational/quality, and operational/cost ratio indicators. The indicators within these categories chosen as independent predictor variables for this study are reflective of a posteriori and a priori approach in researching scholarly literature to establish key indicators for predicting hospital financial solvency from the findings of multiple empirical studies (Altman, 2000; Aziz & Dar, 2006; Broyles et al., 1998; Cleverly et al., 2011; Coyne et al., 2008; Flex Monitoring Team, 2005; Griffith, Alexander, & Warden, 2002; Kim & McCue, 2008; Kocakülâh & Austill, 2007; Langabeer, 2006; McCue & Diana, 2007; Price et al., 2005; Semritc, 2009; Younis & Forgoine, 2005; Vélez-González et al., 2011).

The following independent predictor variables have been shown to have a direct or positive effect on hospital financial solvency. These independent predictor variables are expected to have significantly higher values, considered stronger positive correlational relationships, for the grouped financially solvent hospitals as compared to the grouped financially insolvent hospitals. The selected sixteen specific indicators, categorized as financial/cost, market/access, operational/quality, or operational/cost indicators, the studies identifying significance of indicators, and other researchers and professional organizations recommending indicators for study.

Financial/cost indicators:

Altman Z-score,

Altman Z-score_2

Financial Strength Index,

Financial Strength Index_2,

Debt service coverage ratio,

Cash flow margin ratio,

Operating cash flow ratio,

Cash flow to total debt ratio,

Operational/quality indicator:

Average length of stay, and

Operational/cost indicator:

Occupancy rate,

Outpatient revenue percentage.

Interest expense to net revenue ratio.

The following independent predictor variables have been shown to have an inverse or negative effect on hospital financial solvency. These independent predictor variables are expected to have significantly lower values, considered stronger negative correlational relationships, for the grouped financially solvent hospitals as compared to the grouped financially insolvent hospitals.

Market/access indicator:

Medicaid revenue percentage,

Uninsured revenue percentage,

Operational/cost indicator:

Salaries and benefits expense to total operating expenses ratio, and

Salaries and benefits expense to net revenue ratio.

The strength of the correlation of each independent predictor variable, either positive or negative, was evaluated as part of determining the appropriate independent variables included in the study. A correlation matrix was also used to identify multicollinearity and singularity problems, which occur when independent variables are too correlated (a correlation coefficient of .90 and above) and may negatively affect the validity of the research design, both logically and statistically (Huberty & Olejnik, 2006; Norusis, 2008; Tabachnick & Fidell, 2007). Problems of multicollinearity, where variables are very highly correlated, and singularity, where variables

are redundant, were evaluated to determine which independent predictor variables are appropriate for inclusion in the study.

RESULTS

This section provides a systematic description and analysis of each finding and the incremental steps that were needed to address the research questions and hypotheses. Descriptive and correlational statistics for each of the predictor variables are provided, followed by the results from logistic regression analyses for both single-predictor and multi-predictor models. Each step, with detailed findings is provided in the paragraphs following the research questions and related hypotheses below.

The following guidelines were used in the selection of the independent predictor variables for testing each research hypothesis using logistic regression:

> From the observed correlation coefficients (*r*), any two independent predictor variables with Pearson correlation coefficients showing a strong relationship (large effect where $r \geq .8$) were removed to minimize multicollinearity concerns (Cohen, 1992).

> Further exclusion of independent variables from testing was to obtain a reliable regression model, resulting in obtainable hospital cases of 23% of the population of 99 (Peduzzi, Concato, Kemper, Holford, & Feinstein, 1996).

Using the guidelines for each hypothesis, the resulting independent predictor variables selected for testing and the results of testing using logistic regression are shown in Table 1.

Table 1
Model Statistical Results for Logistic Regression Testing of Research Hypotheses

Hypothesis	Research Category	Independent Predictor Variable	Odds Ratio	Individual Wald Pr > ChiSq	Model $\chi 2$ Pr>ChiSq
H1	Financial/Cost	ALT2	0.68	0.23	0.18
		FSI2	0.27	0.22	
H2	Market/Access	MRP	61.66	0.68	0.60
		URP	60.84	0.63	
H3	Operational/Quality	ALS	0.94	0.74	0.74
H4	Operational/Cost	INTNETREV	>999.99	0.12	0.05

ANALYSIS OF RESULTS

Logistic regression was used to create a statistically significant model to predict the classification of future hospital cases as either financially solvent or financially insolvent. Four models, using financial/cost indicators (ALT2 and FSI2), market/access indicators (MRP and URP), the operational/quality indicator (ALS), and the operational/cost indicator (INTNETREV) as independent predictor variables, were used in testing the four research hypotheses using logistic regression. Prior to logistic regression testing, all predictor variables were found to be insignificantly ($p \geq 0.05$) correlated with hospital financial solvency. As shown above in Table 18 in the Evaluations of Findings section, according to Pearson correlation coefficients, ALT2 and FSI2, financial/cost indicators tested in Hypothesis 1, were found to be negatively correlated with hospital financial solvency, although expected, given the literature, to have a positive effect on hospital financial solvency. MRP and URP, market/access indicators tested in Hypothesis 2, were found to be positively correlated with hospital financial solvency, although expected, given the literature, to have a negative effect on hospital financial solvency. ALS, the operational/quality indicator tested in Hypothesis 3, was found to be negatively correlated with hospital financial solvency, although expected, given the literature, to have a positive effect on hospital financial solvency. INTNETREV, the operational/cost indicator tested in Hypothesis 4, was found to be positively correlated with hospital financial solvency, as expected, given the literature. Differences between these findings and the expected relationships, given the literature, may potentially be the result of the small number of hospitals used in the analysis and not necessarily because of the quality of the independent predictor variables.

As shown above in Table 1 in the Evaluations of Findings section, according to Model χ^2, Pr>ChiSq, the overall predictive models using, ALT2 and FSI2, as financial/cost indicators tested in Hypothesis 1, MRP and URP, as market/access indicators tested in Hypothesis 2, and ALS, as operational/quality indicator tested in Hypothesis 3, were not statistically significantly better in predicting hospital financial solvency, than the model with only the intercept. The overall predictive model, using INTNETREV as the operational/cost indicator tested in Hypothesis 4, was minimally significantly better in predicting hospital financial solvency than the model with only the intercept. According to the Wald criterion (Pr > ChiSq), the independent predictor variables - ALT2 and FSI2, as financial/cost indicators tested in Hypothesis 1, MRP and URP, as market/access indicators tested in Hypothesis 2, ALS, as operational/quality indicator tested in Hypothesis 3, and INTNETREV as the operational/cost indicator tested in Hypothesis 4, did not significantly ($p \geq .05$) contribute individually to the prediction of hospital financial solvency.

Therefore, each of the four null hypotheses cannot be rejected. There were two primary reasons why the predictors were not a good fit for each of the models. Although variables with strong relationships were deleted from the models to minimize multicollinearity concerns, there may have been correlations among predictor variables which could have influenced the results. The number of hospitals (23% of the population) included in the analysis may not have been large enough to have the power to identify statistically significant relationships or were not representative of the population.

POTENTIAL LIMITATIONS

Differences between these findings from testing the hypotheses and the expected predictor variable relationships to hospital financial solvency, based on the literature, may potentially be the result of the small sample size of hospitals that was used in the analysis and not necessarily because of the quality of the independent predictor variables. The inclusion in the analyses of the 23% of the population of hospitals in SIC 8062, fitting the criteria of having at least three consecutive 10-K filings, was not under the control of the researcher, but may have been a potential limitation of the study. The use of a small sample size should not prevent this study to contribute additional value to the knowledge base in this research area (Aziz & Dar,2006; Semritc, 2009; Vélez-González et al., 2011).

Another potential limitation to the study is the method of grouping of the hospitals as either financially solvent or financially insolvent. Hospitals operating as an ongoing business with current 10-K filings of annual audited financial reports were categorized as solvent hospitals. Although the lack of current 10-K filings of annual audited financial reports were considered indicative of the hospital no longer operating as an ongoing business and of hospital financial insolvency, the lack of current 10-K filings may have been the result of hospital and hospital system mergers and acquisitions. From the available data, this was impossible to determine. Hospitals, particularly non-profit hospitals, with deteriorating financial condition, are found to merge or consolidate into health systems to maintain solvency and to avoid bankruptcy (Zuckerman, 2011). A case in point is the recent partnership of LifePoint, Inc. with Duke University Health System to create the joint venture, Duke LifePoint Healthcare in 2011 and the multiple hospital system mergers since then. A review of the annual audited financial reports provided on the 10-K filings also revealed that LifePoint, Inc., a hospital used in this study analyses as financially solvent, was the result of the merger, in 2005, of Historic LifePoint Hospitals, Inc. and Province Healthcare Corp., two hospitals used in this study analyses as financially insolvent. Sixty hospitals in twenty states were listed as properties of LifePoint Hospitals, Inc. In the annual audit report as of December 31, 2013, According to Management's Discussion and Analysis of Financial Condition and Results of Operations as part of the reports, these mergers and acquisitions are the pursuit of the coalignment of strategies to provide complimentary outcomes-focused services with a range of management, financial, and operational resources, including access to capital for ongoing investments in new technology and facility renovations (LifePoint Hospitals, Inc., 2014). This growing trend of consolidations in the industry that results in ever-changing hospital organization structures potentially clouded the analyses. The limited number of financial solvency indicators and the lack of market and operational indicators, identified in the literature, and at the hospital system level potentially indicates that the financial solvency indicators at the hospital level may not also be applicable at the hospital system level (Semritc, 2009). Hospitals and hospital systems may have different patterns of financing and methods of cash management, which potentially yield significant differences in solvency analyses using financial/cost, market/access, operational/quality, and operational/cost indicators.

SIGNIFICANCE AND CONTRIBUTIONS

The theoretical framework developed for this study is a significant contribution to the literature in the healthcare area. The research questions and related hypotheses of this study

were examined through this theoretical framework for the purpose of establishing a set of reliable indicators that enhances the assessment of financial condition for predicting U.S. publicly-traded for-profit hospital financial solvency. The conceptual; framework was developed by collectively relating three solvency theories - the cash flow theory, the resource dependency theory, and the organizational-environmental theory – and linking the three categories of solvency indicators - financial, market, and operational (Semritc, 2009) to the measures of the three dynamic dimensions of the "iron triangle" of health care (Federal Trade Commission & Department of Justice, 2004) – quality of care, access to care, and cost containment indicators of the "iron triangle" of healthcare.

The secondary data of U.S. publicly-traded for-profit hospitals used in this study was obtained from data included on Form 10-K: Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934, which is available for public inspection accessed through the SEC EDGAR database, considered an under-utilized source of reliable data (Yazdipour, 2011). The use of publicly accessible archival audited data was expected to ensure continuity of data quality negating reliability and validity concerns. The quality of the data was evaluated by exercising reasonable care to provide accuracy of the data to the extent possible. During the process of collecting data from the annual audited financial reports filed on Form 10-K by U.S. publicly-traded for-profit hospitals for the study, the need for greater transparency in financial reporting of these hospitals was noted. A lack of the availability of data in the 10-K filings for certain independent predictor variables was noted. In particular, the market/access indicator, Medicare revenue percentage (MRP), was not provided by three hospitals categorized as financially solvent and three hospitals categorized as financially insolvent. The market/access indicator, uninsured revenue percentage (URP), was not provided by four hospitals categorized as financially solvent and five hospitals categorized as financially insolvent. The operational/quality indicator, average length of stay (ALS), was not provided by four hospitals categorized as financially solvent and three hospitals categorized as financially insolvent. The operational/cost indicator, occupancy rate (OCR), was not provided by four hospitals categorized as financially solvent and three hospitals categorized as financially insolvent. The operational/cost indicator, outpatient revenue percentage (ORP), was not provided by three hospitals categorized as financially solvent and three hospitals categorized as financially insolvent. Salaries and benefits expense, for the calculation of the operational/cost indicators, salaries and benefits expense to total operating expenses (SBT) and salaries and benefits expense to net revenue (SBNETREV), was not provided by one hospital categorized as financially solvent and one hospital categorized as financially insolvent. A summary of the hospitals with unavailable indicators is shown in Table 2, potentially reflecting a lack of transparency in reporting.

Further review of filings by hospitals, categorized as financially insolvent, provided additional insight and a better understanding of the SEC's EDGAR database. The independent auditor reports of two of the ten hospitals, Paracelsus Healthcare Corp. and RX Medical Services Corp., categorized as financially insolvent, included an explanatory paragraph noting uncertainties raising substantial doubt about the hospital's ability to continue as a going-concern. Statement on Auditing Standards (SAS) 59: The Auditor's Consideration of an Entity's Ability to Continue as a Going Concern requires the auditor to evaluate whether there is substantial doubt about the entity's ability to continue as a going concern (Auditing Standards Board, 2010). Potential indicators of going-concern problems include negative trends, negative cash flows, adverse key financial ratios, loss of key personnel, new legislation, pending litigation, and loan

defaults or restructurings. According to Moore and Baker (2010), auditors may be reluctant to issue an audit report highlighting going-concern problems for several reasons. Issuance of a going-concern opinion, by itself, might cause the company to go bankrupt, creating a "self-fulfilling prophecy." The auditor may be worried that issuing a report when the company might survive will cause the auditor to lose the client and future audit fees. A final explanation is that it may be very difficult to know beforehand whether or not a financially distressed client will actually cease operations or will somehow survive the expected outcome.

Table 2
Hospitals with Unavailable Indicators

Hospital	Solvency	MRP	URP	ALS	OCR	ORP	SBT	SBNETREV
First Physicians Capital Group, Inc.	S	X	X	X	X	X	X	X
Nova Natural Resources Corp	S	X	X	X	X	X		
Tongi Healthcare Group, Inc.	S	X	X	X	X			
United Surgical Partners International, Inc.	S			X	X	X		
Universal Health Services, Inc.	S		X					
American Hospital Management Corp	I	X	X	X	X	X		
IASIS Healthcare Corp	I		X					
MHM Services, Inc.	I	X	X	X	X	X	X	X
Quorum Health Group, Inc.	I		X					
RX Medical Services Corp	I	X	X	X	X	X		

Managers of publicly traded companies, required by federal securities laws to submit information to the SEC, must report certain unscheduled material events on Form 8-K, Current Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934. Significant events disclosed on Form 8-K include bankruptcy, changes in the certifying accountant of the registered company, departure of directors or certain officers, and business combinations. Unscheduled material events, such as termination of registration or suspension of duty to file, are required to be reported on Form 15-15D, Certification and Notice of Termination of Registration under Section 12(g) of the Securities Exchange Act of 1934 or Suspension of Duty to File Reports under Sections 13 and 15(d) of the Securities Exchange of 1934. Electronic filings of Form 8-K and Form 15-15D are available in the EDGAR database (SEC, 2011). Form 15-15D A review of the Forms 8-K and Forms 15-15D filed by each hospital, categorized as financially insolvent in the study, was conducted. Two hospitals, MHM Services, Inc. and Paracelsus Healthcare Corp., categorized as financially insolvent, had 8-K filings that noted pending dissolution and bankruptcy, respectively. RX Medical Services Corp. filed Form 8-K including independent auditor going-concern opinion. Five hospitals filed Form 8-K noting mergers supporting the trend in increased hospital combinations. Reasoning for the mergers, such as to improve financial performance, were not provided. Two hospitals, American Hospital Management Corp. and Ardent Health Services, LLC, filed Form 15-15D. Results of the review of the Forms 8-K and Forms 15-15D filed by each hospital, categorized as financially insolvent in the study, is shown below in Table 3.

Table 3
Form 8-K or Form 15-15D Filings by Hospitals Categorized as Financially Insolvent

Hospital	Form 8-K or Form 15-15D Filings
American Hospital Management Corp	2004 Form 15-15D Registration Termination or Filing Suspension
Ardent Health Services LLC	2005 Form 15-15D Registration Termination or Filing Suspension
Historic Lifepoint Hospitals, Inc.	2005 Merger with LifePoint Hospitals, Inc.
IASIS Healthcare Corp	2004 Merger with IASIS Healthcare, LLC
MHM Services, Inc.	2000 Corporate Dissolution
Paracelsus Healthcare Corp	2001 Chapter 11 Bankruptcy
Province Healthcare Corp	2005 Merger with LifePoint Hospitals, Inc.
Quorum Health Group, Inc.	2000 Merger with Triad Hospitals, Inc.
RX Medical Services Corp	2002 Auditor Going-Concern Opinion
Triad Hospitals, Inc.	2007 Merger with Community Health Systems, Inc.

RECOMMENDATIONS

The trend in increased consolidation of U.S. healthcare organizations is expected to continue to combat the combined effects of the national recession of 2007, the credit crisis of 2008/2009, and the passage in 2010 of the Affordable Care Act. All of these combined are considered to have a significant impact on the financial condition and solvency of organizations, particularly hospital and hospital health systems (Semtitc, 2009; Zuckerman, 2011). Administrators of U.S. hospitals and health systems must detect early warning signs of financial distress to be able to adjust operational objectives in advance to meet the challenges of the changing economic environment in order to prevent financial insolvency and bankruptcy. Scholarly literature is a source of numerous empirical studies of various indicators and models of indicator groups for analyzing a health system's financial condition to access financial solvency of U.S. hospitals and health systems, but provides no conclusive evidence as to whether solvency indicators for individual hospitals are valid indicators for health systems (Semritc, 2009). Because different types of health care organizations, or sectors of the hospital industry, vary in complexity with different financing patterns and structures, indicators or a set of indicators, unique to each type of organization, enhances the capability of each administrator to focus on those critical measures pertinent in addressing the organization's specific needs (Cleverly et al., 2011; Semritc, 2009).

A combination of financial and non-financial indicators as measures of quality, access and cost impacting hospital performance (Federal Trade Commission & Department of Justice, 2004) categorized as financial, market, and operational, enhances the analysis of financial solvency of U.S. publicly-traded for-profit hospitals at the hospital system level (Cleverly et al., 2011; Flex Monitoring Team, 2005; Flex Monitoring Team, 2012; Health Care Cost Institute, 2012). As research is limited in this area (Aziz & Dar, 2006; Balcaen & Ooghe, 2006; Landry, Landry, & Nowak, 2009; Semritc, 2009; Vélez-González et al., 2011; Yazdipour, 2011), a unique set of financial and non-financial indicators comparable across peer organizations within the sector of U.S. publicly-traded for-profit hospitals would provide administrators valuable insight for aligning strategic plans for contending with the changing economic and regulatory environment. The research in this quantitative-predictive study addressed the pressing issue of the lack of evidence of financial, market, and operational measures related to quality, access, and cost as indicators of financial solvency at the U.S. health system level. Research in this area

extended the use of financial and non-financial indicators into a balanced scorecard for analyzing and predicting financial solvency in U.S. hospitals and health systems. Findings related to available data and the consistency of data within 10-K filings submitted by hospitals to the SEC is useful to the SEC for setting policies, regarding requirements for the inclusion of specific data and the presentation of that data within 10-K filings, to improve the usefulness to investors in making more informed decisions.

As the economic recession and healthcare legislation requirements continue to strain the financial condition of U.S. healthcare organizations and the trend of consolidations in the healthcare industry increases, the need for greater transparency in financial reporting increases, particularly for publicly-traded for-profit hospital systems. Investors need contextual information on important areas impacting performance, including nonfinancial performance indicators, to be included in Edgar filings with the SEC to make optimal and timely informed decisions. Disclosure of indicators of market environment and access to healthcare, of operations in providing quality healthcare, and of operations in cost containment in providing quality healthcare is imperative to the analysis of hospital system performance and solvency. The collaboration of investors, creditors, regulators, management, and other stakeholders to improve the quality, integrity, and transparency of information in addition to the traditional financial statements is suggested for the determination of the optimal level of disclosure in an enhanced reporting model for decision making. Standards of reporting disclosures of financial and nonfinancial indicators of financial solvency of U.S. publicly-traded for-profit hospitals must also be consistent within this sector in order to afford comparative analysis within and between hospital health systems by stakeholders and researchers.

A review of the information provided in filings by U.S. publicly-traded for-profit hospitals in the SEC's EDGAR database was conducted in connection with this study suggests the need for improved disclosures about the entity's ability to continue as a going concern to be included in Form 10-K filings to reveal problems prior to financial insolvency. Potential indicators of going-concern problems include the following (Auditing Standards Board, 2010):

> Negative trends, such as recurring losses, negative cash flows from operations, and adverse key financial ratios,
>
> Internal matters, such as loss of key personnel, employee strikes, outdated facilities and products, and uneconomic long-term commitments,
>
> External matters, such as new legislation, pending litigation, loss of a key franchise or patent, loss of a principal customer or supplier, and uninsured or underinsured casualty loss,
>
> Other matters, such as default on a loan, inability to pay dividends, restructuring of debt, violation of laws and regulations, and inability to buy from suppliers on credit, and
>
> Significant changes in the competitive market and the competitiveness of the client's products.

The indicators of financial solvency tested in this study may be applied to individual hospitals and tested as an effective balanced scorecard. Another possible direction for future

research is the systematic analyses of which indicator(s) explain the largest percent of the variance of hospital solvency. Discriminate analysis has the ability to separate groups using multivariate measures and is used primarily to classify or make predictions in problems where the dependent variable appears in qualitative for, such as solvent and insolvent (Altman, 2000). An entire variable profile of hospital financial solvency may be analyzed simultaneously rather that sequentially to examine hospital characteristics.

SUMMARY AND CONCLUSIONS

The problem addressed in this study was the need to identify the most effective financial and non-financial indicators as predictive discriminators of financially solvent and financially insolvent U.S. publicly-traded for-profit hospitals. The purpose of this nonexperimental quantitative study was to evaluate the effectiveness of eight financial indicators (financial/cost) and eight non-financial indicators (market/access, operational/quality, and operational/cost) in the predicting financial solvency of U.S. publicly traded for-profit hospitals. To address the research questions and related hypotheses, from the population of ninety-nine (99) U.S. publicly-traded for-profit hospitals with filings within SIC 8062 of the SEC's EDGAR database, twenty-three percent of the hospitals, with at least three consecutive years of 10-K filings of annual audited financial reports, were grouped into two different categories as either solvent hospitals or insolvent hospitals for analysis in the study.

Six independent predictor variables were investigated under the four hypotheses, including Altman Z-score_2 (ALT2) and Financial Strength Index_2 (FSI2) used as financial/cost indicators, Medicaid revenue percentage (MRP) and uninsured revenue percentage (URP) used as market/access indicators, average length of stay (ALS) used as operational/quality indicator, and interest revenue expense to net revenue ratio (INTNETREV) used as operational/cost indicator. ALT2, FSI2, and ALS were expected, given the literature, to have a positive effect on hospital financial solvency. The findings showed that these independent predictor variables were insignificantly ($p \geq .05$) negatively correlated with hospital financial solvency. INTNETREV was expected, given the literature, to have a positive effect on hospital financial solvency and findings showed that this independent predictor variable was insignificantly ($p \geq .05$) positively correlated with hospital financial solvency. MRP and URP were expected, given the literature, to have a negative effect on hospital financial solvency. The findings showed that these independent predictor variables were insignificantly ($p \geq .05$) positively correlated with hospital financial solvency.

Unexpectedly, given the literature, findings also showed that the overall predictive models for testing all four hypotheses were not statistically ($p \geq .05$) significant in predicting hospital financial solvency and all predictors individually did not significantly ($p \geq .05$) contribute to the prediction of hospital financial solvency. Thus, all four null hypotheses that the indicators were not statistically significant in predicting between financially solvent and financially insolvent U.S. publicly-traded for-profit hospitals were not rejected. Differences between these findings and the expectations, given the literature, may potentially be the result of the small number of hospitals used in the analysis and not necessarily because of the quality of the independent predictor variables. The use of a small sample size should not prevent this study to contribute additional value to the knowledge base in this research area (Aziz & Dar, 2006; Semritc, 2009; Vélez-González et al., 2011).

In addition to a better insight and understanding of the SEC's EDGAR database and of the U.S. publicly-traded for-profit hospital sector of the healthcare industry, the theoretical framework developed for this study is a significant contribution to the literature in the healthcare area. The research questions and related hypotheses of this study were examined through this theoretical framework for the purpose of establishing a set of reliable indicators that enhances the assessment of financial condition for predicting U.S. publicly-traded for-profit hospital financial solvency. The conceptual framework was developed by collectively relating three solvency theories - the cash flow theory, the resource dependency theory, and the organizational-environmental theory – and linking the three categories of solvency indicators - financial, market, and operational (Semritc, 2009) to the measures of the three dynamic dimensions of the "iron triangle" of health care (Federal Trade Commission & Department of Justice, 2004) – quality of care, access to care, and cost containment indicators of the "iron triangle" of healthcare.

The ultimate purpose of this study was to address the gap in the scholarly literature and to expand the knowledge base in this area. A universal metric has not been identified in the literature that is successfully applied in the healthcare industry. Research that identifies insignificant measures of financial solvency in U.S. hospitals and hospital health systems may be useful for identifying the true solvency indicators.

As the economic recession and healthcare legislation requirements continue to strain the financial condition of U.S. healthcare organizations and the trend of consolidations in the healthcare industry increases, the need for greater transparency in financial reporting increases, particularly for publicly-traded for-profit hospital systems. Investors need contextual information on important areas impacting performance, including nonfinancial performance indicators, to be included in Edgar filings with the SEC to make optimal and timely informed decisions. Disclosure of indicators of market environment and access to healthcare, of operations in providing quality healthcare, and of operations in cost containment in providing quality healthcare is imperative to the analysis of hospital system performance and solvency. The collaboration of investors, creditors, regulators, management, and other stakeholders to improve the quality, integrity, and transparency of information in addition to the traditional financial statements is suggested for the determination of the optimal level of disclosure in an enhanced reporting model for decision making. Standards of reporting disclosures of financial and nonfinancial indicators of financial solvency of U.S. publicly-traded for-profit hospitals must also be consistent within this sector in order to afford comparative analysis within and between hospital health systems by stakeholders and researchers.

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