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Assessing How Well Hospitals Budget Operating Results by Examining the Relationship Between Budget Variances and Operating Margin

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ABSTRACT

There is a near-universal assumption in both practice and literature that greater accuracy and management of the budget improves profitability (Libby & Lindsay, 2010; Umapathy, 1987). Prior to this study, this assumption has gone untested, and we know little about the wisdom of such an assumption.

The results of this study indicate greater accuracy in forecasting and/or tighter management to the budget, or favorably exceeding it, are associated with improved profitability. More specifically, smaller unfavorable budget variances are associated with greater operating margins as are greater favorable budget variances. A single standard deviation reduction in unfavorable revenue and expense are associated with higher operating margins of 5.2% and 6.3%, respectively. An equivalent favorable deviation in revenue and expense are associated with higher operating margins of 3.2% and 2.7%, respectively. Managers can improve hospitals' operating margins by first prioritizing the reduction and/or eliminating unfavorable variances, and second increasing favorable variances.

INTRODUCTION

There is an increasing sentiment in the United States that healthcare costs too much. Federal spending is increasing faster than tax revenues and elevating the national debt with an overwhelming majority of federal spending for entitlements–Medicare, Medicaid, and Social Security. The largest entitlement, Medicare and Medicaid, is a primary driver of federal debt because these health care costs are disproportionately rising faster than other segments of government spending. Legislators in the United States are responding with extensive reforms to lower payment rates for providers.

Hospitals were the target of significant payment reductions (Medicare Payment Advisory Commission, 2012), which occurred at a time when hospitals were experiencing declining operating margins, with median margins at only 3% (American Hospital Association, 2013). Hospital margins continued to be low with reductions in Medicare, disproportionate share, and other payments that were scheduled in the Patient Protection and Affordable Care Act (ACA) (Steingart & Smith, 2014).

There is extensive evidence to support reducing hospital capacity to lower costs for services without compromising quality. Eliminating waste and inefficiency are some of the most cited opportunities for hospitals in reducing the cost of care (Delaune & Everett, 2008; Institute of Medicine, 2001; Kelley, 2009; Smith, Saunders, Stuckhardt, & McGinnis, 2013). Berwick, a leading champion of reducing inefficiencies, estimated that waste exceeds 20% of total health care expenditures (Berwick & Hackbarth, 2012).

These findings are consistent with an earlier study by Zuckerman, Hadley, and Iezzoni (1994) which identified inefficiency opportunities specific to hospitals. The opportunity to lower costs is also supported by The Dartmouth Institute research related to variations in care. Fisher et al. (2003a) found regional Medicare spending differences were largely explained by the practice patterns of inpatient and specialist physicians. These higher spending differences did not correlate to improved quality, access, health outcomes, or satisfaction with care (Fisher et al., 2003a, 2003b).

To pursue lower-cost strategies, many hospitals adopted "break-even on Medicare" budget plans that establish stepwise reductions in cost structure (Alkire, 2014; Herman, 2012; Minich-Pourshadi, 2011). In general, these strategies focused on reducing the annual growth rate in expenses over five or more years from roughly 5% down to 1-2% per year (Kerns, Koppenheffer, & Drayton, 2013). Over time, these strategies were intended to achieve a cost structure that is at or below hospital Medicare payments and emphasize the importance of setting and achieving performance measures that build upon successive improvements targeted in a hospital's budget. Thus, it seems plausible that the ability of hospitals to respond to payment reductions and delivery system changes is tied closely to budget performance since hospitals plan responses and program these into capital and operational budgets.

The purpose of this study was to examine the relationship between hospital budget variances and profitability. Specifically, this study examined the following research question: Are smaller budget variances (more accurate forecasting and/or tighter management) associated with greater operating margins? The relevance of this current study to hospitals is its potential to

improve operational effectiveness and strategic management. A more in-depth understanding of budget variance influences on profitability could aid hospitals in setting and adjusting day-to-day operational performance.

In addition to operational relevance for hospitals, a better understanding of budgeting could improve a hospital's ability to select, measure, and achieve strategies. Budgets are a quantitative reflection of the strategies or expectations hospitals set in response to the market. The evolving health care environment is placing greater emphasis on strategy for hospitals. Porter and Lee (2015) suggested that this emphasis is relatively foreign to a sector that equates strategy to good operational performance. As operational effectiveness and strategy assume greater importance for hospitals, so too does an understanding of the measures of success recognized in the budget.

BACKGROUND

The hospital industry has historically adapted to payment challenges such as the introduction of Medicare and Medicaid in 1967, diagnosis-related groups (DRGs) prospective payment system in 1983, managed care proliferation in the 1980s, and the Balanced Budget Act of 1997 (Whetsell, 1999) by resetting their targets and implementing strategies measured against new expectations. Budgets quantify these adjusted expectations and serve as a reference within a management control system. As such, control theory provides an appropriate theoretical framework for examining the relationship between budget variances and operating margin.

Control Theory

The premise of control theory is that organizations and their management activities (including budgets) are self-regulatory systems. According to control theory, feedback loops are essential for driving action (Carver & Scheier, 1982; Wiener, 1948). The purpose of a feedback loop is to minimize deviations from the target. To minimize deviations, Klein (1989) identified four critical elements in the feedback loop: (1) a referent standard, (2) a sensor, (3) a comparator, and (4) an effector. The metaphor often invoked for control theory is a thermostat, where feedback loops help regulate temperature to achieve a desired climate.

In a similar manner, the feedback loop of a budget control system functions to achieve the desired organizational results. The budget target is set as a referent standard or desired state. Perception of performance or present state is measured by a sensor such as an interpretation of a financial report. The perception of the present state (i.e., financial report) is then compared to the desired state (i.e., budget). If there is a perceived discrepancy between the present and desired states, an action is performed with the intent of reducing the discrepancy. The budget control loop is closed with regular monitoring by the sensor and ongoing discrepancy adjustments by the effector.

Carver and Scheier (1981) identified two primary elements of human behavior within control theory, cognitive and affective elements. The cognitive element describes individuals' evaluation of their perceived performance against the referent or goal standard. To assess performance, humans need to know the performance discrepancy and its impact on the individual, the organization, and other stakeholders (Fellenz, 1997). The affective element relates to an

individual's actions or behavioral modifications in resolving any perceived discrepancy between his or her actual and desired performance.

As a complement for human behavior deficiencies in control theory, goal setting theory by Locke and Latham (1990, 2002) asserts that performance improves when setting specific, difficult goals such as a budget (Chow, 1983; Hirst & Lowy, 1990; Rockness, 1977; Stedry & Kay, 1966). Evidence supports the favorable relationship between setting goals and improving performance (Locke & Latham, 1990, 2002; Locke, Shaw, Saari, & Latham, 1981).

Goal setting theory is consistent with the fundamental incentive of business, to remain viable, and in most cases, maximize profit (Alchian, 1950; Demsetz, 1983). These goals are quantified in the budget and become the measurement standard for the organization; budget goals are then translated to the business units and managers. A manager's ability to achieve the budget becomes the primary incentive for performance (Merchant & Manzoni, 1989).

Goal setting theory also incorporates measures of expectancy. As reviewed in the motivational studies related to budgeting, Vroom (1964) introduced expectancy theory that states, "people choose the option (course of action) they believe will result in the greatest benefit to them, provided there is a good chance they actually can attain the benefit" (Smith & Hitt, 2005, p. 36). In weighing expected value, people are motivated by difficult goals if they are achievable (Merchant & Manzoni, 1989). Cherrington and Cherrington (1973) provided support for expectancy theory related to budgeting by suggesting that an appropriate reward for high budget participation improved performance and job satisfaction.

Budgeting

For this current investigation, the control theory framework was applied by measuring hospital budget variances (referent standard) association with operating margins (sensor–actual performance). The assumption was that smaller budget variances would be associated with improved operating margins.

Budgeting is a component of management control systems (MCS). As defined early on by Anthony (1965), management control is "the process by which managers ensure that resources are obtained and used effectively and efficiently in the accomplishment of the organization's objectives" (p. 17). This definition identifies a fundamental reason that organizations budget–to provide managers a process of influence on performance and a tool to achieve organizational plans. Organizations that maintain appropriate controls are likely to favorably influence performance toward plan objectives, "regardless of whether these objectives are to maximize shareholder returns, heal the sick, or educate the young" (Merchant & Otley, 2006, p. 785). Merchant and Van der Stede (2012) consolidated the interdependent functions of planning and budgeting into four main purposes: (1) planning, (2) coordination, (3) oversight, and (4) motivation.

Planning

Budgeting has a complementary role in planning; planning positions organizations for the future while budgeting measures the performance of the plan (Gapenski, 2011). Budgets play an

important role in translating planning strategies into measurable expectations for managers (Merchant, 1981; Simons, 2013). While there is a functional purpose of budgets in planning, little healthcare research has been conducted examining the relationship between these two activities.

Emmanuel, Otley, and Merchant (1990) regarded financial forecasting as an element of budgeting and an essential component of the planning process. Many research studies examine financial forecasting as it relates to the accuracy of analysts predicting future earnings. Evidence is building to support the idea that select factors (e.g., past performance, experience, resources, portfolio complexity, forecast period) are positively associated with forecast accuracy (Brown, 2001; Clement, 1999; Sinha, Brown, & Das, 1997; Stickel, 1992); contradicting early findings that did not control for these differences (Brown & Rozeff, 1980; Butler & Lang, 1991; O'Brien, 1990; Richards, 1976). These studies are limited to factors associated with forecast accuracy and do not address the research question in this study: Are smaller budget variances (e.g., forecast accuracy) associated with greater operating margins (e.g., higher earnings)?

Coordination

Budgets are used to coordinate and communicate activity in an organization. The financial strategies and goals of the organization are communicated down to management control units or responsibility centers in the budget (Cleverley et al., 2010). The vertical sharing of information suggests a relationship to budget participation, organizational commitment, and job performance (Parker & Kyj, 2006).

Communication also occurs laterally to various divisions, businesses, and functional areas to align budget expectations across the organization. For example, the finance and operational departments cross reference and align their budgeted volume targets with the marketing department. Emmanuel et al. (1990) identified the importance of budgets in coordinating the interrelated and aggregate activities of the various responsibility centers as well as heightening the visibility of priorities in the organization.

Oversight

The most fundamental purpose of budgeting is oversight controls. Oversight controls focus on the accounting function of budgets that set estimates and establish financial expectations over a specified period of time. Budgeted financial expectations serve as an essential management control process (Hansen, Otley, & Van der Stede, 2003) and remain a universally adopted business practice (Ekholm & Wallin, 2000; Hansen & Van der Stede, 2004; Libby & Lindsay, 2010; Otley, 1999; Umapathy, 1987).

As outlined in the coordination role, the budget is translated to the various responsibility centers and respective managers. The dissemination of accountability serves as a formal authorization to define a manager's discretion in controlling production and spending as well as his or her overall scope of responsibility (Emmanuel et al., 1990). With regard to budgetary motivation, the tiered goal application from the organizational level down to the individual level has an effect on performance (Baum, Locke, & Smith, 2001; Latham & Locke, 1975; Locke & Latham, 2002; Martocchio & Frink, 1994; Rodgers & Hunter, 1991).

Motivation

As an MCS, budgets are a tool for influencing behavior (Flamholtz, Das, & Tsui, 1985). Budgets quantify desired returns while measuring both unit and manager performance against these expected targets (Brownell & Dunk, 1991). If targets are attached to a valued reward, then a manager's motivation is enhanced and he or she is more likely to achieve the budget (Argyris, 1952). The budget-incentive combination serves to attract attention in an *effort-directing* role as well as to motivate with an *effort-inducing* purpose (Merchant & Van der Stede, 2012).

Vroom's (1964) expectancy theory of motivation is often used to describe budgetary motivation. The theory suggests that goals are effective in motivating individuals if they have (1) a positive correlation between effort and performance–that is reasonably attainable; (2) a positive relationship between performance and a valued reward; (3) a valued reward that satisfies a need; and (4) a desire that exceeds the required effort. All of these elements are dependent on how deeply the employee values the reward (valence), how competent and capable the employee feels about achieving the goal (expectancy), and the level of trust the employee has in receiving the reward if the goal is achieved (instrumentality).

Ronen and Livingstone (1975) examined expectancy theory more specifically related to budgets and identified five assumptions in the research literature: (1) budgets should be reasonably attainable; (2) budgets should include participation between manager and superior; (3) budgets emphasize management by exception with attention drawn to unfavorable deviations as opposed to favorable variations; (4) budgets require an appropriate level of controllability where the manager has the competency, capability, and authority to make decisions and execute them; and (5) budgets are well-suited for evaluating performance because they are limited to quantitative, monetary measures.

Summary

This review suggests that budgeting is a complex process that aims to provide accurate forecasting of future activities, internal coordination across units and appropriate control mechanisms. If properly designed and implemented, it may serve to motivate managers to enhance revenue and/or reduce costs. Despite the potential contribution of this management process to organizational performance, the link between effective budget control systems (i.e., budget variance) and financial performance has not been adequately researched in hospitals. This may be partially explained because payers and hospital trade associations collect annual financial performance data for hospitals but do not capture budget information, thus the dearth of studies on the relationship between budget variances and profitability.

For this study, the relationship was grounded in a single research question, are smaller budget variances (more accurate forecasting and/or tighter management) associated with greater operating margins? This research question framed the corresponding three hypotheses:

H_1: Smaller budget variances are associated with greater operating margins.
H_2: Smaller unfavorable budget variances are associated with greater operating margins.

H_3: Greater favorable budget variances are associated with greater operating margins.

METHODS

Data Sources and Collection

Hospitals in the state of Washington had a unique requirement to submit both budget and year-end reports to inform leaders making public health and policy decisions. This study used a longitudinal dataset for the years 1987-2013 (27 years) from the Washington State Department of Health (DOH) Hospital and Patient Data Section (HPDS) of the Center for Health Statistics (CHS), which contained budget and year-end audited financial reports for 115 acute care hospitals (Huyck, 2013). In addition to budget information, the data set also included information on hospital characteristics such as ownership, system membership, bed size, and urban and rural locations. These data have been previously used to study hospital capacity planning (Upadhyay & Smith, 2020), readmission rates (Upadhyay, Stephenson & Smith, 2019), profitability (Upadhyay & Smith, 2016), and liquidity (Upadhyay, Sen & Smith, 2015; Upadhyay & Smith, 2016). The State of Washington no longer requires/publishes on their website the budget reports used for this work.

DOH/HPDS applied a standard data collection process using generally accepted accounting principles. The Washington State Department of Health (1990) Accounting and Reporting Manual for Hospitals provides uniform accounting and reporting standards based on the *Audits of Providers of Health Care Services*, July 1990, of the American Institute of Certified Public Accountants. In accordance with these standards, Washington hospitals submit required data to DOH/HPDS using department-supplied electronic forms for both budget and year-end reporting.

Measures

In addition to the hospital characteristics, the database consisted of over 60 financial (income statement) and utilization measures such as the number of admissions, patient days, and births. These metrics were narrowed in the study to common industry measures for revenue (Total Operating Revenue per Adjusted Patient Days), expense (Total Operating Expense per Adjusted Patient Days), and volume (Adjusted Patient Days). These metrics were then used to construct budget variances.

Data Preparation

Independent Variables

Hypothesis 1 addressed smaller budget variances (regardless of whether the variance is favorable or unfavorable). Variances reflected the percent variance for independent (budget variances) variables in the analysis. The percent variance was calculated as the difference between actual and budget for each revenue, expense, and volume variable, for each hospital, and for each year. The variables were initially constructed to reflect the absolute value of each variance to budget measures for revenue, expense, and volume (Figure 1).

Figure 1. Variance formula for independent variables (*X*):

$$X_{h_y} = \left(\frac{\left| A_{h_y} - B_{h_y} \right|}{\left| B_{h_y} \right|} \right)$$

X_{h_y} = actual to budget percent variance with each hospital (*h*) and respective year (*y*)

A_{h_y} = actual variable with each hospital (*h*) and respective year (*y*)

B_{h_y} = budget variable with each hospital (*h*) and respective year (*y*)

Hypotheses 2 and 3 addressed a more specific component of the budget variance–the associations of unfavorable and favorable variances with profitability. To address the unfavorable and favorable hypotheses, separate measures were constructed for favorable and unfavorable variances of revenue, expense, and volume. Revenue and volume have an unfavorable (negative) variance when actual is less than budget and favorable or no effect when actual is greater than or equal to budget. In contrast, expense has an unfavorable (negative) variance when actual is greater than budget and favorable or no effect when actual is less than or equal to budget (Figure 2). The favorable and unfavorable variables were then converted to binary dummy variables (favorable = 0, unfavorable = 1) for revenue, expense, and volume. In addition to understanding the favorable and unfavorable relationship, interaction variables were added to the model for revenue, expense, and volume. The interaction variables accounted for favorable/unfavorable as well as the magnitude of the variance. To calculate the budget interaction variables, the favorable/unfavorable dummy variables were multiplied by the original budget variances for revenue, expense, and volume.

Figure 2. Favorable/unfavorable variance formulas for independent variable (*X*):

Revenue and Volume

Unfavorable Variance *Actual less than Budget*	*Favorable or No Variance:* *Actual greater than or equal to Budget*
$X_{h_y} = If\ A < B\ then \left(-1 \times \frac{\left\| A_{h_y} - B_{h_y} \right\|}{\left\| B_{h_y} \right\|} \right)$	$X_{h_y} = If\ A \geq B\ then \left(\frac{\left\| A_{h_y} - B_{h_y} \right\|}{\left\| B_{h_y} \right\|} \right)$

Expense

Unfavorable Variance: *Actual greater than Budget*	*Favorable or No Variance:* *Actual less than or equal to Budget*
$X_{h_y} = If\ A > B\ then \left(-1 \times \frac{\left\| A_{h_y} - B_{h_y} \right\|}{\left\| B_{h_y} \right\|} \right)$	$X_{h_y} = If\ A \leq B\ then \left(\frac{\left\| A_{h_y} - B_{h_y} \right\|}{\left\| B_{h_y} \right\|} \right)$

X_{h_y} = actual to budget percent variance with each hospital (*h*) and respective year (*y*)

A_{h_y} = actual variable with each hospital (*h*) and respective year (*y*)

B_{h_y} = budget variable with each hospital (*h*) and respective year (*y*)

Dependent Variable

Operating margin is a common measure of profitability (Cleverley, 2008; Cleverley et al., 2015; Cleverley et al., 2010). Operating margin was measured as the net operating income divided by total operating revenue to determine quotient and the quotient is then multiplied by 100.

Control Variables

Hospital characteristics and time were included as control variables. Four sets of dummy variables were constructed to account for four hospital characteristics: ownership, system membership, bed size, and urban or rural. Time trends were accounted for with five dummy variables. Specifically, five macroeconomic dummy time variables represented periods of significant economic or regulatory change over the past 27 years that were identified by other studies (Dranove, Garthwaite, & Ody, 2014; Sisko et al., 2009; Truffer et al., 2010) (Figure 3). During positive economic periods, higher operating margins (greater than 4%) were assigned a 1 and lower operating margins a 0. During negative economic periods, lower operating margins (less than 4%) were assigned a 1; higher operating margins were assigned a 0. The use of a 4% operating margin was selected based on a review of the average and median operating margin trends for hospitals. The 2013 hospital medians by region ranged from 2.3% to 4.5% with the Northwest median at 4.5% (Cleverley et al., 2015). The 1994 to 2013 American Hospital Association (2014) reported the average hospital operating margin as 4.0%, and the median as 3.8%.

Figure 3. Five macroeconomic time variables representing periods of significant economic or regulatory change:

Time Period 1: 1990-97 Positive Economic Growth
Time Period 2: 1999-02 Adaptation to BBA of 1987
Time Period 3: 2003-07 Positive Economic Growth
Time Period 4: 2008-11 Market Downfall
Time Period 5: 2012-13 Positive Economic Growth

Data Analysis

Hypothesis 1 addressed the budget variance relationship to operating margin, regardless of whether the variance is favorable or unfavorable. Hypotheses 2 and 3 test an additional assumption that smaller unfavorable or greater favorable budget variances improve operating margin performance. In doing so, Hypotheses 2 and 3 help clarify the impact of unfavorable and/or favorable variances that could be masked in the results of Hypothesis 1. For example, the positive and negative interaction and effect of non-isolated absolute value measures in Hypothesis 1 could lead to statistically significant budget variance relationships with the operating margin but conflicting associations in comparing revenue, expense, and volume. To address this potential conflict, the 'full' model presented in this paper isolates unfavorable and favorable budget variance measures.

Using multiple regression analysis to test these hypotheses, the model presented in this study included a total of 21 independent variables—three budget variances, three favorable/unfavorable designations, three budget interaction variances, seven hospital characteristics, and five periods of time.

RESULTS

Descriptive Statistics

The study included time series data collected annually over a 27-year period (1987 to 2013) for 115 hospitals. Our analysis, however, focused on those hospitals with complete data; thus, after listwise deletion, the sample included 1,560 hospital-year observations. Compared to other hospitals throughout the U.S., our sample included a higher percentage of government and a lower percentage of for-profit hospitals. Half (50%) of all sample observations were not-for-profit hospitals, followed by government hospitals (43%) and for-profit hospitals (8%). There were significantly more independent hospitals in Washington (62%) versus the United States with a majority as members of a system (over 60%). Washington also had a lower percentage of rural hospitals (44%) versus the United States (60%).

Table 1. Hospital Characteristics

Ownership		
Categories	N	%
Non-Profit	57	49.6
For Profit	9	7.8
Government	49	42.6
Total	115	100.0

System Membership		
Categories	N	%
System	44	38.3
Stand Alone	71	61.7
Total	115	100.0

Bed Size		
Categories	N	%
> 300	18	15.7
300-101	37	32.2
100-26	40	34.8
≤ 25	20	17.4
Total	115	100.0

Urban or Rural		
Categories	N	%
Urban	64	55.7
Rural	51	44.3
Total	115	100.0

On average, over the entire study period, hospitals had positive operating margins of 4.6% (Table 2). Revenue budget variance and expense budget variance were the same (7.5%), on average, while volume variance was slightly higher at 7.9%. Thirty-six (36) percent of all observations experienced a favorable revenue variance, while 64% of all expense variances were favorable.

Table 2. Descriptive Statistics

Variables	N	Mean	Standard Deviation
Full Model			
Operating Margin	1560	4.628	6.059
Total Operating Revenue per APD	1560	0.075	0.067
Total Operating Expense per APD	1560	0.075	0.068
Adjusted Patient Days (APD)	1560	0.079	0.073
Revenue (Fav/Unf)	1560	0.360	0.479
Expense (Fav/Unf)	1560	0.640	0.479
Volume (Fav/Unf)	1560	0.500	0.500
Revenue Interaction	1560	0.023	0.049
Expense Interaction	1560	0.053	0.070
Volume Interaction	1560	0.038	0.060
For Profit	1560	0.080	0.263
Government	1560	0.420	0.494
System Membership	1560	0.490	0.500
Bed Size 300-101	1560	0.340	0.474
Bed Size 100-26	1560	0.330	0.470
Bed Size <=25	1560	0.110	0.318
Urban or Rural	1560	0.560	0.497
1990-97 Positive Economic Growth	1560	0.210	0.406
1999-02 Adaptation to BBA of 1987	1560	0.110	0.307
2003-07 Positive Economic Growth	1560	0.110	0.318
2008-11 Market Downfall	1560	0.060	0.230
2012-13 Positive Economic Growth	1560	0.030	0.164

Regression Results

The multiple regression analysis found a statistically significant relationship for all three budget variance variables, providing support for hypothesis 1 (Table 3). Specifically, operating margin was positively associated with absolute revenue budget variance ($b = 47.45$, $p<.001$), absolute expense budget variance ($b=39.73$, $p<.001$), and volume budget variance ($b=5.81$, $p<.001$).

The unfavorable measures of revenue, expense, and volume were isolated and the p-value for each unfavorable measure of revenue (0.972), expense (0.610), and volume (0.618) were greater than 0.05 confirming they were not statistically significant (see Table 3). An unfavorable budget variance, independent of magnitude, had no statistically significant relationship to operating margin. However, does the magnitude of the favorable or unfavorable variance have an association with a higher operating margin? The favorable/unfavorable variables were multiplied by the budget variance measures of revenue, expense, and volume to isolate the unfavorable budget variances and create revenue, expense, and volume interaction variables. Each of the budget variance interactions (revenue, expense, and volume) were statistically significant (p-value ≤ 0.05) and negatively or inversely associated ($-\beta$) with operating margin. As such, larger unfavorable budget variances were associated with lower operating margins. Restated, lower unfavorable

budget variances (revenue, expense, and volume) were associated with higher operating margins. Therefore, hypothesis 2 was supported.

By isolating the unfavorable budget variance interactions, the model also isolated the favorable excluded interactions (see Table 3). The favorable interactions were captured in the model by the measures for revenue, expense, and volume budget variances (Total Operating Revenue per APD, Total Operating Expense per APD, and Adjusted Patient Days (APD)). Each of the budget variances was statistically significant (p-value ≤ 0.05) and positively associated ($+\beta$) with operating margin. Larger favorable budget variances were associated with higher operating margins. Restated, higher favorable budget variances (revenue, expense, and volume) were associated with higher operating margins thus providing support for hypothesis 3.

Table 3. Regression Results

*	Unstandardized Coefficients		Standardized Coefficients	t	Significance	
	B	Std. Error	Beta (?)	statistic	Level (Sig.)	
(Constant)	4.404	0.621		7.088	0.000	
Total Operating Revenue per APD	47.453	3.092	0.526	15.347	0.000	**
Total Operating Expense per APD	39.734	5.022	0.448	7.913	0.000	**
Adjusted Patient Days (APD)	5.811	2.711	0.070	2.143	0.032	**
Revenue (Fav/Unf)	-0.013	0.362	-0.001	-0.035	0.972	
Expense (Fav/Unf)	-0.189	0.370	-0.015	-0.510	0.610	
Volume (Fav/Unf)	0.168	0.336	0.014	0.499	0.618	
Revenue Interaction	-105.620	5.231	-0.854	-20.192	0.000	**
Expense Interaction	-89.532	6.168	-1.039	-14.516	0.000	**
Volume Interaction	-9.623	4.176	-0.095	-2.304	0.021	**
For Profit	-0.214	0.426	-0.009	-0.503	0.615	
Government	-0.195	0.317	-0.016	-0.615	0.538	
System Membership	0.132	0.282	0.011	0.467	0.640	
Bed Size 300-101	0.202	0.310	0.016	0.652	0.514	
Bed Size 100-26	0.505	0.403	0.039	1.252	0.211	
Bed Size <=25	0.076	0.514	0.004	0.149	0.882	
Urban or Rural	-0.116	0.351	-0.010	-0.331	0.741	
1990-97 Positive Economic Growth	3.429	0.292	0.230	11.758	0.000	**
1999-02 Adaptation to BBA of 1987	-3.324	0.371	-0.168	-8.961	0.000	**
2003-07 Positive Economic Growth	3.354	0.360	0.176	9.324	0.000	**
2008-11 Market Downfall	-3.059	0.483	-0.116	-6.339	0.000	**
2012-13 Positive Economic Growth	5.153	0.670	0.139	7.693	0.000	**

* Dependent Variable: Operating Margin

** The t statistic for the B coefficient is less than or equal to the level of significance of 0.05.

To assess the practical impact of an unfavorable variance in revenue, expense, and volume on operating margin, additional analysis was conducted that estimated the impact on operating margin of a one-standard-deviation and a 5% change in the budget variances (Table 4). According to this analysis, a one-standard-deviation unit favorable variance in revenue, expenses, and volume would be associated with a 3.2%, 2.7%, and 0.4% improvement in operating margin, respectively. In contrast, a one-standard-deviation unit unfavorable variance in revenue, expenses, and volume would be associated with a 5.2%, 6.3%, and 0.6% lower operating margin, respectively.

Table 4. Practical Impact of Budget Variance

Budget Variances	Standard Deviation		B		Operating Margin Impact	Example using a 4% operating margin and all other factors constant:
Favorable						A 1 standard deviation <u>favorable</u> expense budget variance improves the operating margin by 2.7%, raising the 4% example to a 6.7% operating margin.
Revenue	0.067	×	47.453	=	3.2 %	
Expense	0.068	×	39.734	=	2.7 %	
Volume	0.073	×	5.811	=	0.4 %	
Unfavorable						A 1 standard deviation <u>unfavorable</u> expense budget variance reduces the operating margin by 6.3%, lowering the 4% example to a -2.3% operating margin.
Revenue	0.049	×	-105.620	=	-5.2 %	
Expense	0.070	×	-89.532	=	-6.3 %	
Volume	0.060	×	-9.623	=	-0.6 %	

Budget Variances	5% Deviation		B		Operating Margin Impact	Example using a 4% operating margin and all other factors constant:
Favorable						A 5% <u>favorable</u> expense budget variance improves the operating margin by 2.0%, raising the 4% example to a 6.0% operating margin.
Revenue	0.050	×	47.453	=	2.4 %	
Expense	0.050	×	39.734	=	2.0 %	
Volume	0.050	×	5.811	=	0.3 %	
Unfavorable						A 5% <u>unfavorable</u> expense budget variance reduces the operating margin by 4.5%, lowering the 4% example to a -0.5% operating margin.
Revenue	0.050	×	-105.620	=	-5.3 %	
Expense	0.050	×	-89.532	=	-4.5 %	
Volume	0.050	×	-9.623	=	-0.5 %	

Control Variables

There were no statistically significant relationships between operating margin and any of the individual hospital characteristics. The time periods, however, were significantly associated with operating margin. Specifically, operating margin was higher from 1990-1997 (b=3.43, p<.001), 2003-2007 (b=3.35, p<.001), and 2012-2013 (b=5.15, p<.001) and lower during the periods of 1998-2002 (b=-3.32, p<.001) and 2008-2011 (b=-3.06, p<.001).

In summary, the study supported all three hypotheses. Hypothesis 1: Smaller budget variances are associated with greater operating margins. Hypothesis 2: Smaller unfavorable

budget variances are associated with greater operating margins. Hypothesis 3: Greater favorable budget variances are associated with greater operating margins. In addition, hospital characteristics did not affect the budget variance relationship to operating margin. A final interesting finding, the macro-economy had a significant impact on operating margin.

DISCUSSION

The initial focus of this study was on the extent to which lower budget variances are associated with greater operating margins. It was necessary to isolate and include both the favorable and unfavorable variables in the model to provide a clearer understanding of the relationships. Lower unfavorable budget variances are associated with greater operating margins while greater favorable budget variances are associated with greater operating margins.

The results of this study affirmed greater accuracy in forecasting and/or tighter management to, or favorably exceeding, the budget improves profitability. The study also provided an expected and measurable impact of these budget variances on the operating margin. In the study, almost 70% of the hospital expense budget variances were unfavorable. Managers would benefit from greater attention to unfavorable expense variances because of the impact on operating margin. A 5% deviation (less than a single standard deviation of 7.0%) in expenses was associated with a -4.5% reduction in operating margin, and a similarly favorable deviation in expenses was associated with a 2.0% increase in operating margin. Hospitals in the study performed better on revenue, achieving favorable variances in almost 60% of cases. Budget variances in revenue are also an area for management attention as a 5% unfavorable variance deviation (about one standard deviation of 4.9%) was associated with a -5.3% reduction in operating margin and a similarly favorable variance has a 2.4% operating margin improvement. Although management should be attentive to volume variances, their relationships have a weaker association and less impact on operating margin.

Negative deviations in both revenue and expenses have a greater impact on operating margin than positive deviations. A potential reason could be the level of fixed cost incorporated in expenses that do fluctuate when there are changes in revenue and volume. In sum, a budget variance in revenue and expense had a significant impact on operating margins. Managers can improve the hospital's operating margin by first prioritizing the reduction and/or elimination of unfavorable variances and second increasing favorable variances.

The hospital characteristics did not affect the budget variance relationship to operating margin while macroeconomic periods had a significant impact on operating margin.

Limitations

The dataset was limited to hospitals in the state of Washington. Extending the study findings more broadly should be done with caution as the hospitals in the state of Washington may not be representative of all hospitals in the U.S. For example, comparisons between hospitals from the state of Washington and other U.S. hospitals indicated Washington has a greater percentage of government, stand-alone, and urban hospitals. Additional research is needed to determine if the conclusions are consistent with the United States or the global hospital sector.

Future Research

This study focused on the budget variance relationship to operating margin. Additional areas to explore are actual to prior year and budget to prior year variance relationships to operating margin. Are prior year variances associated with operating margins? The results would address the degree to which hospitals continuously improve year over year and if this improvement is associated with greater operating margins. Is budget to prior year variances associated with operating margins? The results would address the degree to which hospitals set budgets above the prior year in targeting improved performance and whether or not this is associated with greater operating margins.

The study also focused on three selected measures for revenue, expense, and budget variance relationships to operating margin. Do other selected measures reinforce or detract from the operating margin relationship? The database had over 60 financial and utilization measures. With this breadth of metrics, future research could be more tailored to the research questions posed for both independent and dependent variables.

There are numerous studies cited in the literature review relating hospital characteristics to profitability, but they all suffer from omitted variable bias. These studies fail to account for internal operations including the budgeting process. The budgeting process could alter and/or reinforce the relationship of hospital characteristics to profitability if these omitted variables were incorporated into this research. Future studies could reevaluate previous research by taking into account the budgeting process.

Is budget variance associated with other outcomes such as patient safety, patient satisfaction, or quality of work-life for employees? For example, are positive budget variances associated with lower levels of patient satisfaction or lower levels of quality of care? It is possible that essential expenditures are reduced to achieve higher operating margins.

An area that could benefit from this type of reexamined analysis is in hospital ownership studies, more specifically for-profit ownership. Independent of budget factors, the evidence is building that for-profit hospitals achieve better financial performance. Examples for reexamination include findings that for-profit hospitals are more responsive to changes in profitability (Horwitz, 2005); operate at a lower cost (Jiang et al., 2006; McKay & Deily, 2005); improve financial performance following ownership conversions (Joynt et al., 2014); and conflicting negligible differences in profitability (Becker & Sloan, 1985).

The macroeconomic factors' association with operating margins would benefit from further research. These factors explained a significant percentage of the overall operating margin relationship in the study. Future research regarding the specific types of macroeconomic factors (e.g., change in the balance of power between elected parties, regulation, unemployment, inflation, investments) and quantifying the impact would benefit managers in responding to these changes.

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