

Is There a Relationship Between Value-Based Purchasing and Hospital Profitability? An Exploratory Study of Missouri Hospitals

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Abstract

Recent US legislation is attempting to transition inpatient Medicare payments to a value-based purchasing (VBP) program. The VBP program is a pay-for-performance (P4P) system that incentivizes hospitals to improve patient satisfaction, health outcomes, and adherence to clinical protocols while simultaneously holding down costs. Our study evaluates (1) the impact of financial performance on the VBP adjustments and (2) whether there is a correlation between the VBP adjustment and the financial performance of Missouri hospitals that opted into the program. While upward and downward adjustments to the inpatient base rate may be related to hospital financial performance, prior financial performance may also be related to the adjustments. Financial health may allow facilities to invest and position the hospital for favorable future P4P adjustments. The results of our analysis indicate the VBP adjustment to the inpatient base rate is very small ($\pm 0.18\%$), clustered around zero, and is not correlated with financial performance. We also find that financial performance and improvement in the years prior to the adjustment are not related to the VBP adjustment or its respective components. This suggests that CMS is avoiding penalizing less profitable facilities, but the adjustment is also so small and tightly clustered around zero that it is failing to provide an adequate incentive to hospitals. The costs of improving patient satisfaction, clinical process adherence, health care outcomes, and efficiency above that of peers coupled with the growing number of metrics being used to calculate the VBP adjustments call into question the financial incentives of the hospital VBP program.

Keywords

hospital value-based purchasing, financial incentives, financial performance, CMS IPPS adjustment, P4P, pay-for-performance

Introduction

Medicare's Inpatient Prospective Payment System (IPPS) began a transition to value-based purchasing (VBP) with the passage of the Patient Protection and Affordable Care Act in 2010 and the Deficit Reduction Act of 2005. This legislation and the subsequent Center for Medicare and Medicaid Service (CMS) rules are intended to move hospitals from a payment system in which facilities are financially rewarded for volume to a pay-for-performance (P4P) system that will eventually account for patient experiences, adherence to predetermined processes of care, health outcomes, and cost efficiency in the delivery of care. Beginning in October 2012, high-performing hospitals that participate in the program could receive an upward adjustment of up to 1% in their Diagnosis-Related Group (DRG) base rate. The converse is also true, poorly performing hospitals could experience a downward adjustment in

the base rate of up to 1%. The adjustments are projected to incrementally increase to 2% of the IPPS base rate by 2017, with increases in the base rate for some hospitals being equally offset by decreases at other hospitals.

Hospital profit margins are already thin, with estimates centered between 3% and 5% depending on hospital ownership, location, and teaching status.^{1,2} In this thin-margin environment, small fluctuations in the IPPS can have a direct and

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Table 1. 2013 to 2015 Hospital VBP Adjustment Factors.

		2013	2014	2015
Patient experience (Hospital Consumer Assessment of Healthcare Providers and Systems - HCAHPS)	Nurse communication	30%	30%	30%
	Doctor communication			
	Responsiveness of staff			
	Pain management			
	Communication of medicines			
	Hospital cleanliness and quietness			
	Discharge information			
Clinical process of care measures	Overall rating			
	Fibrinolytic therapy within 30 minutes of hospital arrival (acute myocardial infarction)	70%	45%	20%
	Primary percutaneous coronary intervention (PCI) received within 90 minutes of hospital arrival (acute myocardial infarction)			
	Discharge instructions for patients (heart failure)			
	Blood cultures performed in emergency department (ED) prior to initial antibiotic (pneumonia)			
	Initial antibiotic selection for community-acquired pneumonia (CAP) in immunocompetent patient (pneumonia)			
	Prophylactic antibiotic received within 1 hour prior to surgical incision (health care-associated infections)			
	Prophylactic antibiotic selection for surgical patients (health care-associated infections)			
	Prophylactic antibiotics discontinued within 24 hours after surgery end time (health care-associated infections)			
	Cardiac surgery patients with controlled 6 AM postoperative serum glucose (health care-associated infections)			
	Postoperative urinary catheter removal on postoperative day 1 or 2 (<i>new in 2014</i>)			
	Surgery patients on a beta blocker prior to arrival who received a beta blocker during the perioperative period (surgical care improvement)			
	Surgery patients who received appropriate venous thromboembolism prophylaxis within 24 hours prior to surgery to 24 hours after surgery (surgical care improvement)			
	Surgery patients with recommended venous thromboembolism prophylaxis ordered (<i>New in 2014—discontinued in 2015</i>)			
Outcome measures	Acute myocardial infarction 30-day mortality rate		25%	30%
	Heart failure 30-day mortality rate			
	Pneumonia 30-day mortality rate			
	Composite patient safety indicator (<i>new in 2015</i>)			
	Central line-associated bloodstream infections (<i>new in 2015</i>)			
Efficiency measure	Medicare spending per beneficiary			20%
	Potential Medicare IPPS adjustment to base rate	1.0%	1.25%	1.50%

Abbreviations: VBP, value-based purchasing; IPPS, inpatient prospective payment system.

immediate impact. A 1% to 2% change in Medicare IPPS revenue can dramatically impact hospitals' financial well-being. The impact of the Medicare changes can then be compounded by commercial payers who tend to use Medicare payments as the baseline for reimbursements. However, early modeling of the financial impact of VBP indicates that base rate adjustments may be negligible.³ This article attempts to clarify the relation between VBP and hospitals' financial performance: (1) Are the hospital VBP adjustments influenced by financial performance and (2) is a hospital's financial performance influenced by the VBP adjustments?

Literature Review

The conclusions from prior research on the effects of VBP are mixed. Some studies have found no difference in health outcomes,⁴ whereas others have documented improvements in the composite measures of quality and have attributed the

improvements to financial incentives.⁵ Systematic reviews⁶ reinforce the mixed effectiveness findings. More recently, the Quality Incentive Program, the Medicare VBP program that is associated with end-stage renal disease, notes substantial improvement in clinical process measures.⁷

From a financial perspective, several survey studies have shown P4P initiatives to be cost effective; however, the interventions have tended to be more narrowly focused. Among the more narrowly defined P4P initiatives, Armour and Pitts found that physician bonuses/withholds reduced outpatient expenditures by 5%.⁸ Alternatively, Briesacher et al found that P4P increased access and improved outcomes in nursing facilities but increased costs.⁹ Although the P4P cost-effectiveness findings vary, the cost-effectiveness of a program appears to depend on the design of the interventions and incentives.¹⁰ Unlike prior P4P payment incentives that often employ more targeted performance metrics and incentives, the VBP adjustment to IPPS utilizes a broad spectrum of adjustments that

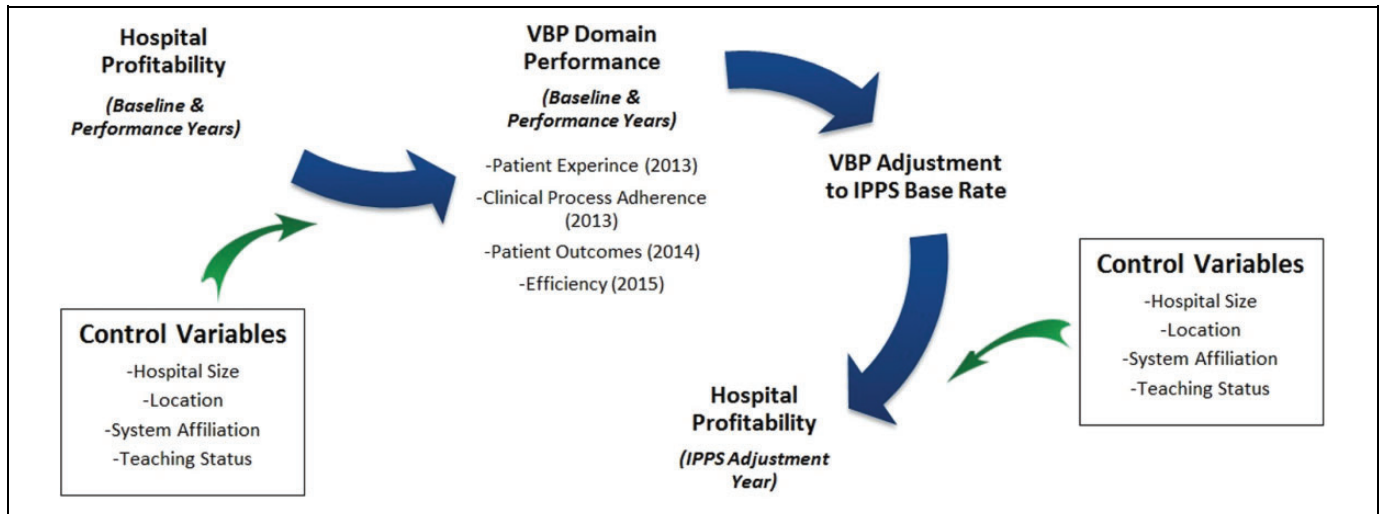


Figure 1. Conceptual relationship between VBP adjustment and financial performance.

apply to all Medicare inpatient payments. Multiple factors influence the adjustments, and these factors vary from focused clinical process adherence to more general patient satisfaction with staff. The 2013, 2014, and 2015 adjustment factors are detailed in Table 1. As the IPPS adjustment increases to 2%, the number of factors influencing the adjustment will also increase and include Medicare spending per beneficiary (MSPB) and additional clinical processes, outcomes, and efficiency measures.

In this study, we add to the literature by tying the hospital VBP adjustment to the hospital’s overall financial performance. Despite the potential for large financial adjustments, early evaluations of the VBP adjustment indicate that over 60% of hospitals nationally experience a change in IPPS reimbursement of less than 0.25%.^{3,11} Moreover, there is no relation between the bond rating and the factors that influence the VBP adjustment with the exception of MSPB.¹² Rangnekar et al found a positive relation between high levels of MSPB, which will result in downward VBP adjustments, and favorable bond ratings, which will decrease the borrowing costs for facilities. We explicitly evaluate whether financial performance influences the VBP adjustments and whether the VBP adjustments are correlated with hospital profitability.

Conceptually, we illustrate how a decline or increase in Medicare cash flows, that is a result of the IPPS rate adjustment, should impact the profitability of a hospital (Figure 1). In the case of a downward adjustment and all else equal, the hospital is generating less revenue while continuing to provide the same number of services at the same cost. Essentially, the Medicare contribution margin is squeezed. The opposite is true when there is an upward adjustment to the base rate. However, financial health and profitability in the baseline and profitability periods can also impact the VBP adjustment. Financially well-positioned hospitals may be better situated to implement initiatives that are designed to increase patient satisfaction, improve clinical outcomes, and promote

Table 2. Missouri Hospital Sample Composition.

Missouri adult acute care hospitals participating in hospital VBP program	65
Urban location	43 (66%)
Teaching affiliation	23 (35%)
System affiliation	39 (60%)
Average # of hospital beds	227

Abbreviation: VBP, value-based purchasing.

Table 3. Unweighted Missouri Hospital VBP Component Percentile Averages.

	2013	2014	2015
Clinical process	59.05 ± 16.84	59.73 ± 16.87	54.78 ± 19.33
Patient experience	43.58 ± 15.69	44.20 ± 15.13	45.81 ± 14.41
Clinical outcomes		32.89 ± 18.85	43.91 ± 18.61
Composite VBP score			28.30 ± 24.91

Abbreviation: VBP, value-based purchasing.

adherence to clinical care guidelines. As illustrated in Figure 1, our study also includes hospital size, location, system affiliation, or teaching status variables as control variables that may also influence profitability or performance in the VBP domains.

Data and Methodology

Hospital and local service area attributes, operating performance, financial statements, and quality metrics were gathered for all 111 adult, acute-care hospitals in the state of Missouri. The data elements were compiled and matched from the Missouri Hospital Performance Project database, the American Hospital Association, the American Hospital Directory, and the

Table 4. 2013 to 2015 Missouri Hospital VBP Adjustment.

	2013	2014	2015
Medicare IPPS adjustment	0.0000 ± 0.0023	0.0001 ± 0.0028	0.0018 ± 0.0037
Average upward Medicare IPPS adjustment	0.0017 ± 0.0014	0.0020 ± 0.0016	0.0035 ± 0.0027
Average downward Medicare IPPS adjustment	-0.0018 ± 0.0014	-0.0024 ± 0.0019	-0.0024 ± 0.0018

Abbreviations: VBP, value-based purchasing; IPPS, inpatient prospective payment system.

Medicare Cost Reports (Form 2552-10). Of the 111 hospitals, 58% (n = 65) participated in the hospital VBP program and were included in this study. Nonparticipating adult, acute care (46), mental health, rehabilitation, pediatric, long term, specialty, veterans', military, and prisoner acute care facilities were excluded. The sample included teaching hospitals (23), hospitals in rural locations (22), and hospitals with system affiliations (39). The average number of beds per facility in the sample was 227, and no critical access facilities opted into the program (Table 2).

Variables

The final 2013 hospital VBP adjustments for all hospitals that opted to participate in Medicare's hospital VBP program were collected from the CMS Web site, Hospital Compare,¹¹ and WhyNotTheBest.org, a Commonwealth Foundation website.¹³ The adjustment factors that were collected include the overall IPPS percentage adjustment and an overall performance index relative to the national participants. The national performance index in the clinical process adherence and the patient experience domains were also collected. CMS assigns scores of 0 to 100 using a statutorily mandated algorithm, and a score of 50 is the national average. The average domain scores and the VBP IPPS adjustments of the sample can be seen in Tables 3 and 4. In 2013, the average adjustment for Missouri hospitals was centered at 0.00. The firms that experienced an upward IPPS adjustment benefited from a small average increase of 0.17%. The firms that experienced a negative adjustment suffered an average decrease in a similar magnitude (-0.18%). The outcome and efficiency measures were not introduced until 2014 and 2015, respectively; however, the domain scores are reported for context.

The IPPS adjustment is calculated based on the metric achievement in a performance year, improvement over a baseline year, and consistency of performance between the periods (Figure 1). The 2013 IPPS adjustments utilized a 2009 to 2010 baseline and a 2011 to 2012 performance period that crossed financial reporting periods. A weighted average (based on the proportion of the year in the baseline and performance periods) was calculated for a set of common financial health ratios in both periods (Table 5). The specific ratios that were calculated include return to assets (ROA), return to equity (ROE), operating margin, and the total asset turnover (TATO). In addition, improvements in ratio performance were calculated as the percentage improvement over the baseline performance. Baseline, performance period, and the percentage improvement financial

Table 5. Average Missouri Hospital Financial Performance.

	Baseline	Performance	2013
ROE	-5.82%	9.98%	8.41%
ROA	6.56%	7.37%	3.72%
Margin	3.65%	3.99%	3.01%
Total asset turnover	1.319	1.359	1.215

ratios were then separately regressed on the 2013 hospital VBP adjustments. The process was repeated and controlled for hospital size, teaching status, system affiliation, and urban/rural location; these variables are thought to influence hospital profitability or are cited as adjustment factors in hospital capital structure and efficiency research.¹⁴⁻¹⁸ A subsequent analysis investigated the patient experience and clinical adherence components of the VBP adjustment as the dependent variable in the multivariate analysis. Finally, the 2013 VBP adjustments to the IPPS base were regressed against the 2013 financial performances of the respective hospitals using both a bivariate and a multivariate analysis that controlled for hospital characteristics.

Results

The results of the bivariate analysis suggest that there is little to no relation between financial performance and either the hospital VBP adjustments or their respective components. The operating margin in the baseline period is the only variable with a significant association with the IPPS adjustment, and this relation is at the $\alpha = .10$ level. The financial ratios provide no explanatory power and show no relation to the adjustments when the control variables are added to the analysis. Of the control variables that are included (urban/rural location, teaching affiliation, system affiliation, and hospital size), system affiliation in the baseline and performance periods show a significant association with the VBP adjustment at the $\alpha = .05$ level. The results are not sensitive to using VBP percentile scores instead of the VBP adjustments. The summary data can be seen in Table 6, and the results of the analyses are included in Appendix A.

The financial ratios also have no association with CMS's scoring of the clinical adherence or patient experience dimensions in either the bivariate or multivariate analysis. Of the control variables, only system affiliation is significant. System affiliation is slightly associated with patient experience ($\alpha = .10$ level) and strongly significant to clinical process adherence ($\alpha = .01$) in the baseline and performance years. The only exception to the lack of a financial relation is the TATO ratio. In the

Table 6. Summary of Significant Variables From Bivariate and Multivariate Regressions on VBP Adjustment.

	Baseline Year	Performance Year	Percentage Improvement	Baseline Year With Controls	Performance Year With Controls	Percentage Improvement with Controls
ROE	-	-	-	System ^a	System ^a	-
ROA	-	-	-	System ^a	System ^a	-
Margin	^b	-	-	System ^a	System ^a	System ^a
TATO	-	-	-	System ^a	System ^a	System ^a

Abbreviation: TATO, total asset turnover.

^a Significant at .05 level.

^b Significant at .10 level.

Table 7. Impact of VBP Adjustment on Profitability (With Control Variables).

Variable	ROE			ROA			Margin			TATO		
	F Statistic	0.58 (Pr > F = 0.7184)		F Statistic	0.71 (Pr > F = 0.6153)		F Statistic	0.40 (Pr > F = 0.8500)		F Statistic	3.35 (Pr > F = 0.0099)	
	Adjusted R ²	-0.0343		Adjusted R ²	-0.0228		Adjusted R ²	-0.0496		Adjusted R ²	0.1552	
	Parameter Estimate	t Value	Pr > t	Parameter Estimate	t Value	Pr > t	Parameter Estimate	t Value	Pr > t	Parameter Estimate	t Value	Pr > t
Intercept	-1.05757	-1.61	0.1136	0.04099	1.41	0.1651	0.02564	1.21	0.2323	1.12116	9.21	<.0001
VBP Adjustment	-29.56278	-1.01		81.25049	0.51	0.6112	-0.14741	-0.02	0.9834	-0.08858	-0.02	0.9863
Geography	0.62811	0.73	0.4681	-0.05892	-1.55	0.1273	-0.01702	-0.61	0.542	-0.43549	-2.74	0.0082
Teaching	-0.01145	-0.01	0.9895	-0.0234	-0.61	0.5428	-0.01143	-0.41	0.6828	0.03464	0.22	0.8289
System	0.40941	0.46	0.6495	0.05209	1.31	0.1946	0.00694	0.24	0.8112	0.57943	3.5	0.0009
Size	0.00061254	0.34	0.7323	0.00006909	0.88	0.385	0.00007939	1.38	0.1727	0.00002588	0.08	0.9377

Abbreviations: VBP, value-based purchasing; TATO, total asset turnover.

performance year, this ratio is significantly related to clinical process adherence in both the bivariate and the multivariate analyses. The TATO ratio is not related to patient experience. The details of the VBP component analysis are available on request.

There is a very limited relation between hospital profitability and the IPPS adjustment (when viewed from the baseline year, performance year, and percentage improvement perspectives). There also does not appear to be a relation between the IPPS adjustment and hospital financial performance. The IPPS adjustments do not correlate to increased or decreased profitability when examined with either a bivariate or multivariate analysis that includes control variables (Table 7).

Discussion

Overall, past financial performance does not appear to have an impact on the VBP adjustment. This finding suggests that CMS is avoiding penalizing poorly performing facilities; however, the adjustment is so small and tightly clustered around zero that it fails to provide an adequate incentive to hospitals. The costs of reporting are high, and improving performance in occasionally disparate metrics requires significant managerial/clinical attention and institutional resources. At the same time, hospitals face a 5% meaningful use penalty, a 1% hospital-acquired condition penalty, a 3% readmission penalty, and a reporting of

quality data that includes a 2% penalty for noncompliance. While the movement to a VBP framework that attempts to change the incentives that are currently in place is laudable, many challenges must be addressed.

- The IPPS adjustment to the base rate is small and not sufficiently significant to alter the profitability of a hospital. In Missouri, the 0.17% to 0.18% adjustment to Medicare inpatient revenues results in an average increase or decrease of less than US\$200K. Although US\$200K is a significant change in cash flow for hospitals that are attempting to preserve thin margins, the cost of monitoring and improving patient experiences, outcomes and clinical adherence are not inconsequential and may outweigh the potential benefits. Effective contracting departments in facilities and systems will likely negotiate rates with other payers that offset the potential CMS reductions, or the hospital will reduce expenses elsewhere in its cost structure.
- The VBP adjustments are expense neutral to CMS. For one hospital to receive more money, another hospital must receive less. One facility may make great improvements but still not keep pace with its competitors. Even with some of the persistence adjustments that were instituted by CMS, the result is a moving performance metric that may make long-term financial planning difficult.

- The addition of the MSPB as a metric may actually offset the performance gains and losses in other VBP domains. Decreases in MSPB will likely drive bond ratings¹² lower and result in higher borrowing costs for facilities. Higher borrowing costs can outweigh increases in the IPPS base rate. Preliminary MSPB evidence suggests an inverse relation to patient satisfaction; however, its relation to process adherence and outcomes must be investigated.¹⁹ It is also uncertain whether the efficiency measure will be a disincentive to accept highly complex Medicare cases.
- The number of metrics that compose the IPPS adjustment is already large and is scheduled to increase. To receive the full 1.5% to 2% increase, a facility must outperform their peers in more than 25 individual performance metrics. The additional domains and metrics that are to be instituted over the next several years spread the already-limited financial impact across even more CMS initiatives. For example, in 2013, adherence to clinical pathways accounted for 70% of the VBP adjustment. Giving appropriate discharge instructions to patients who had experienced heart failure was one of the 12 clinical adjustments that accounted for 70% of the VBP adjustment. As a result, appropriate discharge instructions accounted for 5.8% of the overall 0.17% adjustment that was experienced by Missouri hospitals. In 2014, outcome measures were added to the VBP adjustment, and the clinical adherence weight decreased to 45% of the overall adjustment. If the US\$200K adjustment is an accurate representation of the average financial impact, moving from 0% discharge instruction compliance to 100% compliance for patients with heart attack was worth a maximum of US\$7500 in 2014. It is unlikely that a facility provides no discharge instructions, and 100% compliance may be difficult to attain; therefore, the real impact may be even less than proposed.
- Finally, as VBP metrics are added to the IPPS adjustment, it will be more difficult for hospitals to differentiate themselves from their peers. To optimize their revenue, they will need to achieve significantly better patient outcomes and satisfaction, clinical adherence, and efficiency relative to other hospitals that participate in the program. Although above-average achievement in multiple domains is achievable, being significantly above average in all domains

simultaneously is unlikely. The regression to the mean is demonstrated in Table 3, in which all the components of VBP adjustment move closer to the 50th percentile from 2013 to 2015.

Value-based purchasing may ultimately improve the delivery of care; however, its direct financial implications seem inadequate to drive the needed change. However, the public reporting of VBP metrics may be sufficient to influence the long-term non-Medicare contracting environment. Specifically, if third-party or Medicaid insurance providers begin to utilize VBP metrics for more selective contracting or network inclusion, the VBP experiment may be successful.

Limitations and Future Directions

Our study has some limitations that provide motivation for future research. First, because our study focused on Missouri hospitals, our findings may not be generalizable to hospitals elsewhere in the United States. Second, given the relatively short time frame of our data set (the 2014 Medicare Cost Reports had yet to be finalized at the time of this analysis), our findings analyze the potential short-term relations between VBP and financial performance. Thus, our findings may not be indicative of long-term relations and the persistence in relations over time. The tight clustering of the IPPS adjustment around the mean and what appears to be regression to the mean may also prompt additional investigation.

Regarding generalizability, Missouri hospitals have a more tightly distributed VBP adjustment than the national average. If a state has a greater distribution of scores, investigations may find relations that could not be detected in our sample. The sample also excluded critical access hospitals (CAHs). Assuming CAHs can achieve the necessary volume that is required for metric reporting, their patient profiles, outcomes, efficiency, and clinical compliance may differ significantly from those of non-CAHs.

In our study, we address the short-term relations between VBP and financial performance. Due to the lack of data covering a longer time period, future studies must await the collection and distribution of data over subsequent years. Future research should then focus on assessing the long-term relationships between VBP and financial performance.

Appendix A

Table A1 . Bivariate Analysis (No Controls) With 2013 Adjustment as Dependent Variable.

Baseline Year										Performance Year													
Analysis of Variance										Analysis of Variance													
Source	df	Sum of Squares	Mean Square	F Value	Pr > F	Source	df	Sum of Squares	Mean Square	F Value	Pr > F	Source	df	Sum of Squares	Mean Square	F Value	Pr > F	Source	df	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.00000363	0.00000363	0.67	0.4158	Model	1	0.00000313	0.00000313	0.58	0.45	Model	1	0.00000212	0.00000212	0.39	0.5347	Error	63	0.00034101	0.00000541	0.00034252	0.00000544
Error	63	0.00034101	0.00000541			Error	63	0.00034151	0.00000542			Corrected	64	0.00034464				Corrected	64	0.00034464			
Corrected total	64	0.00034464				Corrected total	64	0.00034464				total	64	0.00034464				total	64	0.00034464			
Parameter Estimates										Parameter Estimates													
Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	1	-1.737E-05	0.00028915	-0.06	0.9523	Intercept	1	-5.595E-05	0.00029726	-0.19	0.8513	Intercept	1	-0.00002909	0.00029236	-0.1	0.9211	ROE	1	-0.00002909	0.00029236	-0.1	0.9211
ROE	1	-0.0002403	0.00029339	-0.82	0.4158	ROE	1	0.00052467	0.00069014	0.76	0.45	ROE	1	0.00000682	0.0001093	0.62	0.5347						
Analysis of Variance										Analysis of Variance													
Source	df	Sum of Squares	Mean Square	F Value	Pr > F	Source	df	Sum of Squares	Mean Square	F Value	Pr > F	Source	df	Sum of Squares	Mean Square	F Value	Pr > F	Source	df	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.00000374	0.00000374	0.69	0.4091	Model	1	8.75E-08	8.75E-08	0.02	0.8998	Model	1	0.0000182	0.0000182	0.33	0.5648	Error	63	0.0003409	0.00000541	0.00000544	
Error	63	0.0003409	0.00000541			Error	63	0.00034455	0.00000547			Error	63	0.00034282	0.00000544			Corrected	64	0.00034464			
Corrected total	64	0.00034464				Corrected Total	64	0.00034464				Total	64	0.00034464				total	64	0.00034464			
Parameter Estimates										Parameter Estimates													
Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	1	0.00012369	0.00032599	0.38	0.7057	Intercept	1	-1.887E-05	0.00031802	-0.06	0.9529	Intercept	1	-0.0000252	0.00029201	-0.09	0.9315	ROA	1	-0.0000252	0.00029201	-0.09	0.9315
ROA	1	-0.00215	0.00259	-0.83	0.4091	ROA	1	0.00028189	0.00223	0.13	0.8998	ROA	1	0.0000068	0.00001175	0.58	0.5648						
Analysis of Variance										Analysis of Variance													
Source	df	Sum of Squares	Mean Square	F Value	Pr > F	Source	df	Sum of Squares	Mean Square	F Value	Pr > F	Source	df	Sum of Squares	Mean Square	F Value	Pr > F	Source	df	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.0001434	0.0001434	2.73	0.1032	Model	1	8.67E-07	8.67E-07	0.16	0.6916	Model	1	0.0000192	0.0000192	0.35	0.5551	Error	63	0.0003303	0.00000524	0.00000544	
Error	63	0.0003303	0.00000524			Error	63	0.00034377	0.00000546			Error	63	0.00034272	0.00000544			Corrected	64	0.00034464			
Corrected total	64	0.00034464				Corrected total	64	0.00034464				total	64	0.00034464				total	64	0.00034464			

(continued)

Table A I. (continued)

Parameter Estimates						Parameter Estimates					
Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	1	0.00022425	0.00031534	0.71	0.4796	Intercept	1	0.00005805	0.00032702	0.18	0.8597
Margin	1	-0.00635	0.00384	-1.65	0.1032	Margin	1	-0.00157	0.00394	-0.4	0.6916
Analysis of Variance						Analysis of Variance					
Source	df	Sum of Squares	Mean Square	F Value	Pr > F	Source	df	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.00000353	0.00000353	0.65	0.4222	Model	1	5.40E-08	5.40E-08	0.01	0.9211
Error	63	0.00034111	0.00000541			Error	63	0.00034459	0.00000547		
Corrected total	64	0.00034464				Corrected total	64	0.00034464			
Parameter Estimates						Parameter Estimates					
Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	1	-0.0003958	0.00056612	-0.7	0.487	Intercept	1	-6.741E-05	0.00071563	-0.09	0.9253
TATO	1	0.00031646	0.00039174	0.81	0.4222	TATO	1	0.00005217	0.00052487	0.1	0.9211

Abbreviation: TATO, total asset turnover.

Table A2. Multivariate Analysis (No Controls) With 2013 Adjustment as a Dependent Variable.

ROE	Baseline										% Improvement									
	Analysis of Variance					Analysis of Variance					Analysis of Variance					Analysis of Variance				
	Source	df	Sum of Squares	Mean Square	F Value	Pr > t	Source	df	Sum of Squares	Mean Square	F Value	Pr > t	Source	df	Sum of Squares	Mean Square	F Value	Pr > t		
Model	5	6.25E-05	1.25E-05	2.61	0.0336	Model	5	5.67E-05	1.13E-05	2.32	0.054	Model	5	6.2E-05	1.24E-05	2.59	0.0348			
Error	59	0.000282	4.78E-06			Error	59	0.000288	4.88E-06			Error	59	0.000283	4.79E-06					
Corrected total	64	0.000345				Corrected total	64	0.000345				Corrected total	64	0.000345						
Parameter Estimates																				
Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t			
Intercept	1	-0.00102	0.000522	-1.95	0.0554	Intercept	1	-0.00095	0.000525	-1.81	0.0749	Intercept	1	-0.0011	0.000537	-2.06	0.0441			
ROE	1	-0.00032	0.000277	-1.14	0.2599	ROE	1	0.000203	0.000679	0.3	0.7662	ROE	1	1.15E-05	1.05E-05	1.1	0.2776			
Geography	1	0.000234	0.000698	0.33	0.7389	Geography	1	0.000155	0.000708	0.22	0.8279	Geography	1	0.000277	0.000703	0.39	0.695			
Teaching	1	-0.00101	0.000688	-1.47	0.1476	Teaching	1	-0.001	0.000698	-1.43	0.1587	Teaching	1	-0.00098	0.000688	-1.42	0.1596			
System	1	0.00212	0.000675	3.14	0.0026	System	1	0.00207	0.000684	3.03	0.0037	System	1	0.00213	0.000676	3.15	0.0025			
Size	1	-3.17E-07	1.44E-06	-0.22	0.8271	Size	1	-2.84E-07	1.46E-06	-0.19	0.8469	Size	1	-2.56E-07	1.45E-06	-0.18	0.86			
Parameter Estimates																				
Analysis of Variance																				
Source	df	Sum of Squares	Mean Square	F Value	Pr > t	Source	df	Sum of Squares	Mean Square	F Value	Pr > t	Source	df	Sum of Squares	Mean Square	F Value	Pr > t			
Model	5	5.94E-05	1.19E-05	2.46	0.0435	Model	5	5.68E-05	1.14E-05	2.33	0.0537	Model	5	6.2E-05	1.24E-05	2.59	0.035			
Error	59	0.000285	4.84E-06			Error	59	0.000288	4.88E-06			Error	59	0.000283	4.79E-06					
Corrected Total	64	0.000345				Corrected Total	64	0.000345				Corrected Total	64	0.000345						
Parameter Estimates																				
Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t			
Intercept	1	-0.00081	0.000552	-1.47	0.1465	Intercept	1	-0.0009	0.000552	-1.63	0.1076	Intercept	1	-0.00109	0.000535	-2.05	0.0451			
ROA	1	-0.002	0.0025	-0.8	0.4281	ROA	1	-0.00073	0.0023	-0.32	0.7511	ROA	1	1.23E-05	1.13E-05	1.09	0.2802			
Geography	1	6.49E-05	0.000715	0.09	0.9279	Geography	1	9.16E-05	0.000755	0.12	0.9039	Geography	1	0.000267	0.000702	0.38	0.7049			
Teaching	1	-0.00098	0.000691	-1.42	0.16	Teaching	1	-0.001	0.000699	-1.43	0.1577	Teaching	1	-0.00099	0.000688	-1.44	0.1543			
System	1	0.00212	0.000679	3.12	0.0028	System	1	0.00215	0.000711	3.03	0.0036	System	1	0.00214	0.000677	3.17	0.0024			
Size	1	-1.80E-07	1.46E-06	-0.12	0.9023	Size	1	-2.52E-07	1.47E-06	-0.17	0.8646	Size	1	-2.65E-07	1.45E-06	-0.18	0.8552			

(continued)

Table A2. (continued)

Margin	Analysis of Variance						Analysis of Variance					
	Source	df	Sum of Squares	Mean Square	F Value	Pr > F	Source	df	Sum of Squares	Mean Square	F Value	Pr > F
Margin	Model	5	6.18E-05	1.24E-05	2.58	0.0354	Model	5	6.18E-05	1.24E-05	2.58	0.0354
	Error	59	0.000283	4.79E-06			Error	59	0.000283	4.79E-06		
	Corrected Total	64	0.000345				Corrected Total	64	0.000345			
	Parameter Estimates						Parameter Estimates					
	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t
	Intercept	1	-0.00078	0.000545	-1.43	0.1588	Intercept	1	-0.00086	0.000553	-1.56	0.1252
	Margin	1	-0.00419	0.00389	-1.08	0.286	Margin	1	-0.00213	0.00392	-0.54	0.5894
	Geography	1	4.62E-05	0.000708	0.07	0.9481	Geography	1	6.59E-05	0.000733	0.09	0.9287
	Teaching	1	-0.0009	0.000692	-1.29	0.2011	Teaching	1	-0.001	0.000695	-1.44	0.1545
	System	1	0.00199	0.000681	2.92	0.0049	System	1	0.00215	0.000688	3.12	0.0028
	Size	1	7.25E-08	1.49E-06	0.05	0.9614	Size	1	-1.66E-07	1.48E-06	-0.11	0.9111
	Parameter Estimates						Parameter Estimates					
	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t
	Intercept	1	-0.00109	0.000534	-2.04	0.0458	Intercept	1	-0.00109	0.000534	-2.04	0.0458
	Margin	1	6.56E-06	6.09E-06	1.08	0.286	Margin	1	6.56E-06	6.09E-06	1.08	0.286
	Geography	1	0.000255	0.000701	0.36	0.7171	Geography	1	0.000255	0.000701	0.36	0.7171
	Teaching	1	-0.00098	0.000688	-1.43	0.1587	Teaching	1	-0.00098	0.000688	-1.43	0.1587
	System	1	0.00214	0.000677	3.16	0.0025	System	1	0.00214	0.000677	3.16	0.0025
	Size	1	-2.62E-07	1.45E-06	-0.18	0.8567	Size	1	-2.62E-07	1.45E-06	-0.18	0.8567
	Parameter Estimates						Parameter Estimates					
	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t
	Intercept	1	-0.00099	0.000519	-1.91	0.0608	Intercept	1	-0.00099	0.000519	-1.91	0.0608
	TATO	1	0.000464	0.000377	1.23	0.2228	TATO	1	0.000464	0.000377	1.23	0.2228
	Geography	1	0.000263	0.000698	0.38	0.7078	Geography	1	0.000263	0.000698	0.38	0.7078
	Teaching	1	-0.00102	0.000687	-1.48	0.144	Teaching	1	-0.00102	0.000687	-1.48	0.144
	System	1	0.00201	0.000676	2.98	0.0042	System	1	0.00201	0.000676	2.98	0.0042
	Size	1	-2.34E-07	1.44E-06	-0.16	0.8714	Size	1	-2.34E-07	1.44E-06	-0.16	0.8714
	Parameter Estimates						Parameter Estimates					
	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t
	Intercept	1	-0.00019	0.000861	-0.22	0.8268	Intercept	1	-0.00019	0.000861	-0.22	0.8268
	TATO	1	-0.00062	0.000559	-1.12	0.2686	TATO	1	-0.00062	0.000559	-1.12	0.2686
	Geography	1	-9.6E-05	0.000739	-0.13	0.8976	Geography	1	-9.6E-05	0.000739	-0.13	0.8976
	Teaching	1	-0.001	0.000688	-1.46	0.1497	Teaching	1	-0.001	0.000688	-1.46	0.1497
	System	1	0.00246	0.000751	3.27	0.0018	System	1	0.00246	0.000751	3.27	0.0018
	Size	1	-4.04E-07	1.45E-06	-0.28	0.7808	Size	1	-4.04E-07	1.45E-06	-0.28	0.7808
	Parameter Estimates						Parameter Estimates					
	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t	Variable	df	Parameter Estimate	Standard Error	t Value	Pr > t
	Intercept	1	-0.00019	0.000861	-0.22	0.8268	Intercept	1	-0.00019	0.000861	-0.22	0.8268
	TATO	1	-0.00062	0.000559	-1.12	0.2686	TATO	1	-0.00062	0.000559	-1.12	0.2686
	Geography	1	-9.6E-05	0.000739	-0.13	0.8976	Geography	1	-9.6E-05	0.000739	-0.13	0.8976
	Teaching	1	-0.001	0.000688	-1.46	0.1497	Teaching	1	-0.001	0.000688	-1.46	0.1497
	System	1	0.00246	0.000751	3.27	0.0018	System	1	0.00246	0.000751	3.27	0.0018
	Size	1	-4.04E-07	1.45E-06	-0.28	0.7808	Size	1	-4.04E-07	1.45E-06	-0.28	0.7808

Abbreviation: TATO, total asset turnover.

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