

U.S. Health Reform—Monitoring and Impact

How Has the ACA Changed Finances for Different Types of Hospitals? Updated Insights from 2015 Cost Report Data

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By Fredric Blavin



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With support from the Robert Wood Johnson Foundation (RWJF), the Urban Institute is undertaking a comprehensive monitoring and tracking project to examine the implementation and effects of health reform. The project began in May 2011 and will take place over several years. The Urban Institute will document changes to the implementation of national health reform to help states, researchers and policymakers learn from the process as it unfolds. Reports that have been prepared as part of this ongoing project can be found at www.rwjf.org and www.healthpolicycenter.org.

INTRODUCTION

The American Health Care Act, which was considered by Congress but ultimately did not reach the House floor for a vote, would have repealed the state option to expand Medicaid under the ACA.¹⁻⁴ However, with the ACA remaining intact for now, some states still face the decision to expand Medicaid and receive the enhanced match rate for the ACA expansion population. As of March 27, 2017, 32 states including Washington, DC have elected to expand, whereas 19 states have not.

States' decisions to expand Medicaid could have important implications for hospitals. Expansion could decrease unreimbursed expenses attributable to uninsured patients, while increasing revenue from newly covered patients. This could decrease hospitals' uncompensated care burden, which can be a significant financial strain.^{5,6} However, whether Medicaid expansion has been associated with improved hospital finances is uncertain. Substituting Medicaid for uninsured patients may not necessarily improve profits, particularly for hospitals that receive generous support from state or local government for providing uncompensated care.

This study estimates the effects of the ACA on hospital finances in 2015 and how they differ between hospitals in states that expanded Medicaid and hospitals in states that did not expand Medicaid. This analysis has two main objectives. First, it expands upon a 2016 study that found that the 2014 ACA Medicaid expansion lowered hospitals' uncompensated care burden attributable to uninsured patients, increased Medicaid revenue, and was associated with improved profit margins through part of 2014.⁷ By adding a full year of ACA exposure data through fiscal year (FY) 2015, this analysis provides a firmer assessment of the Medicaid expansion for states that elected to expand in early 2014. Second, this analysis explores what types of hospitals benefited from the ACA Medicaid expansion. Overall, this study finds that the financial benefits of the Medicaid expansion on hospitals' profit margins were strongest for small hospitals, for-profit and non-federal-government-operated hospitals, and hospitals located in nonmetropolitan areas.

APPROACH

This study examines changes from FY 2011 through FY 2015 in uncompensated care costs, uncompensated care costs as a percentage of total hospital expenses, Medicaid revenue, Medicaid revenue as a percentage of total hospital revenue, operating margins, and excess margins. Operating margin is a key ratio that measures the profitability of hospitals based on the performance of primary activities related to patient care.⁸ Excess margin is a broader profitability indicator that includes all other sources of income, not just those from patient care. See Box for detailed definitions of hospital financial terms.

This analysis uses multivariate difference-in-differences models to compare changes in financial outcomes for hospitals in 19 states that expanded Medicaid eligibility in early 2014 (treatment group) relative to hospitals in states that did not expand Medicaid (comparison group). Because this study focuses on the effects of the 2014 Medicaid expansion, the sample excludes hospitals in Massachusetts and six states (California, Connecticut, District of Columbia, Minnesota, New Jersey, and Washington) that extended Medicaid eligibility to low-income adults before January 2014 through a separate provision of the ACA. The

sample also excludes hospitals in three states that expanded Medicaid in the second half of 2014 (New Hampshire) or the beginning of 2015 (Pennsylvania and Indiana) because fiscal-year financial data for most hospitals in these states capture only a fraction of calendar year 2015. Details on the data and methodological approach, along with sensitivity analyses, are in the Appendix.

Though other components of the ACA, such as subsidies for marketplace coverage, could influence hospital finances, this study focuses primarily on the Medicaid expansion. Even though the marketplaces account for much the coverage

gains under the ACA, early evidence shows that the Medicaid expansion alone has altered hospitals' payer mix. In 2014, the hospital share of Medicaid inpatients increased, with a mirror-image decline in the uninsured share, but the share of privately insured hospital inpatients remained relatively unchanged.⁹ Additionally, focusing on the Medicaid expansion allows us to evaluate the implications of the Supreme Court ruling that allowed each state to choose whether or not to expand, and this analysis provides guidance to states moving forward with this decision or under a potential new law.

RESULTS

Hospital Characteristics and Trends in Financial Outcomes

Table 1 shows the characteristics of hospitals in FY 2015 by Medicaid expansion status. Overall, hospitals in 19 expansion states were more likely to be nonprofit, larger, part of a health system, located in metropolitan areas, and providing burn services, compared with hospitals in 22 nonexpansion states. The mean county-level unemployment rate in FY 2015 was 0.3 percentage points higher among hospitals in expansion states (5.5 percent) than among hospitals in nonexpansion states (5.2 percent).

Figures 1 through 4 show unadjusted trends in uncompensated care costs, Medicaid revenues, and hospital margins across expansion and nonexpansion states. These figures highlight how hospitals in expansion and nonexpansion states saw similar trends in these outcomes before the Medicaid expansion (FY 2014). See Appendix Table 1 for findings associated with formal tests for similar pre-expansion trends.

From FY 2013 to FY 2015, mean annual uncompensated care costs declined by nearly \$4.0 million among hospitals in Medicaid expansion states, with comparable declines in FY 2014 and FY 2015. In contrast, mean annual uncompensated care costs among nonexpansion states increased by \$0.5 million in FY 2014 and subsequently declined by \$1.0 million in FY 2015 (Figure 1).

Mean annual Medicaid revenue increased significantly in the post-ACA period among hospitals in expansion states and remained relatively flat among hospitals in nonexpansion states. Mean annual Medicaid revenue increased by \$4.6 million from FY 2013 to FY 2015 among hospitals in Medicaid expansion states (with comparable increases in FY 2014 and FY 2015), but increased by only \$0.6 million among hospitals in nonexpansion states (Figure 2).

After the 2014 Medicaid expansion, both operating margins and excess margins increased among hospitals in expansion states relative to hospitals in nonexpansion states. Mean annual operating margins in expansion states increased by 0.8 percentage points in FY 2014 and 1.9 percentage points in FY 2015, but operating margins in nonexpansion states declined by 0.6 percentage points in FY 2014 and increased by 0.8 percentage points in FY 2015 (Figure 3). The patterns and trends for mean annual excess margins among both groups of states were consistent with those observed for operating margins (Figure 4).

Impacts of Medicaid Expansion

In the fully adjusted difference-in-differences regression analyses, Medicaid expansion was associated with a significant \$3.2 million decline in mean uncompensated care costs and a significant 1.7 percentage point decline in mean uncompensated care costs as a percentage of total expenses per hospital (Table 2). The \$3.2 million decline in uncompensated care costs represents a 34.0 percent decrease relative to the FY 2011 through FY 2013 baseline mean of \$9.4 million among hospitals in expansion states.

The Medicaid expansion also significantly increased Medicaid revenue. Expansion was associated with a \$5.0 million annual increase in mean Medicaid revenue per hospital and a 2.9 percentage point increase in Medicaid revenue as a percentage of total revenue. Compared with the baseline mean of \$27.9 million among hospitals in expansion states, the \$3.2 million increase represents an 18.1 percent increase in Medicaid revenue.

The Medicaid expansion also significantly improved operating margins (2.5 percentage points) and excess margins (1.7 percentage points). These increases represent 67.3 percent

and 41.4 percent increases in operating and excess margins, respectively, relative to the baseline means in expansion states.

Impacts in 2015 versus 2014

In addition to sensitivity analysis results, Appendix Table 2 compares the estimated Medicaid expansion effects through FY 2014 with those from the original 2016 analysis.¹⁰ Overall, the findings from both analyses are very consistent. The estimated effects of the Medicaid expansion in FY 2015 (relative to FY 2011 through FY 2013) are larger in magnitude than the FY 2014 estimate, suggesting that the improvements in hospital finances in 2014 were not a one-time effect. The estimated effects through FY 2014 in the original JAMA analysis are larger than the FY 2014 effect in the updated analysis because the latter does not adjust for the share of the fiscal year during which the hospital was exposed to the expansion.

Variation in Impacts Across Hospitals

In both metro and nonmetro areas, the Medicaid expansion decreased mean uncompensated care costs and increased average Medicaid revenue, with larger dollar changes in metro hospitals (Table 3). As percentages of total costs and revenue, respectively, these changes were the same or slightly larger in nonmetro areas. In contrast, the estimated effects of the Medicaid expansion on profit margins were larger in nonmetro areas. In the nonmetro sample, the Medicaid expansion increased operating margins by 4.0 percentage points and excess margins by 2.3 percentage points. However, in the

metro sample, the Medicaid expansion was associated with a 0.9 percentage point increase in excess margins (p-value=0.09) and a statistically insignificant 1.0 percentage point increase in operating margins (p-value=0.14).

The Medicaid expansion decreased uncompensated care costs (in dollars and as a percentage of total costs) and increased Medicaid revenue (in dollars and as a percentage of total revenue) among hospitals of all ownership types (Table 4). However, the estimated effects of the Medicaid expansion on profit margins were larger for the for-profit and government (nonfederal) hospitals than for nonprofit hospitals.

Finally, the Medicaid expansion decreased uncompensated care costs and increased Medicaid revenue among hospitals of all sizes (Table 5). The magnitude of these changes was similar across small, medium, and large hospitals, when uncompensated care costs and Medicaid revenue were standardized as percentages of total costs and revenue, respectively. The Medicaid expansion significantly improved margins among small hospitals with fewer than 100 beds, but it did not have significant effects on margins among medium (100 to 299 beds) and large (300 or more beds) hospitals.

Figure 5 summarizes the estimated impacts of the Medicaid expansion on profit margins by hospital metro status, ownership type, and size.

DISCUSSION

This updated analysis finds that the ACA was associated with substantial changes in hospitals' payer mix, with larger effects for hospitals in states that expanded Medicaid. Through FY 2015, hospitals in expansion states experienced reductions in uncompensated care costs and increases in Medicaid revenue and financial margins, compared with hospitals in nonexpansion states.

This study also provides insight on the types of hospitals that gained the most under the Medicaid expansion. All types of hospitals in expansion states—regardless of metro status, ownership type, and size—experienced reductions in uncompensated care costs and increases in Medicaid revenue, compared with their counterparts in nonexpansion states. However, the Medicaid expansion's effects on margins were strongest for small hospitals, for-profit and non-federal-government-operated hospitals, and hospitals located in nonmetro areas.

For states still considering the Medicaid expansion, these findings suggest that expansion likely would improve hospitals' payer mix and overall financial outlook, particularly those in nonmetro areas. However, changes in financial outcomes for specific hospitals, beyond the characteristics analyzed in this study, likely will depend on a host of factors, such as existing state or regional coverage gains under the ACA, state Medicaid eligibility thresholds before the 2014 expansion, Medicaid reimbursement levels, and subsidies hospitals would receive for providing uncompensated care to people losing coverage. For example, now that the ACA remains, it is still expected to substantially reduce Medicaid Disproportionate Share payments to hospitals in FY 2018, which provide additional funding to help cover uncompensated care in qualifying hospitals that serve a large number of Medicaid and uninsured individuals. These reductions were developed to help offset some of the federal costs associated with Medicaid expansion, with the idea that they would be replaced with Medicaid

revenues from newly-eligible beneficiaries. However, hospitals in nonexpansion states will be subject to cuts in this funding source without the offsetting benefit of an influx of new

Medicaid patients.¹⁵ The financial gap between hospitals in expansion and nonexpansion states could further increase if current policy remains the same.

Definitions of Hospital Financial Terms¹⁰

1. Uncompensated care costs are the sum of charity care costs and the costs of non-Medicare and nonreimbursable Medicare bad debt expense reported by each hospital.
2. Net Medicaid revenue includes inpatient and outpatient payments received from Medicaid-covered services, including disproportionate share payments, supplemental payments, payments for an expansion CHIP program, and payments from Medicaid managed care.
3. Operating margin is a ratio that measures the profitability of hospitals based on the performance of primary activities related to patient care. It is defined as:

$$[(\text{net patient revenue} - \text{total operating expenses}) \div \text{net patient revenue}]$$

- a. Net patient revenue includes inpatient and outpatient revenues less allowances and discounts on patient accounts.
 - b. Operating expenses are expenses incurred during the ordinary course of operating the hospital, including general service costs, inpatient routine service costs, ancillary service costs, outpatient service costs, other reimbursable costs, special purpose costs, and nonreimbursable costs.
4. Excess margin is a broader profitability indicator that includes all other sources of income (e.g., income from investments, donations, parking lot receipts, etc.), not just those from patient care. It is defined as:

$$[(\text{net patient revenue} - \text{total operating expenses} + \text{total other income}) \div (\text{net patient revenue} + \text{total other income})]$$

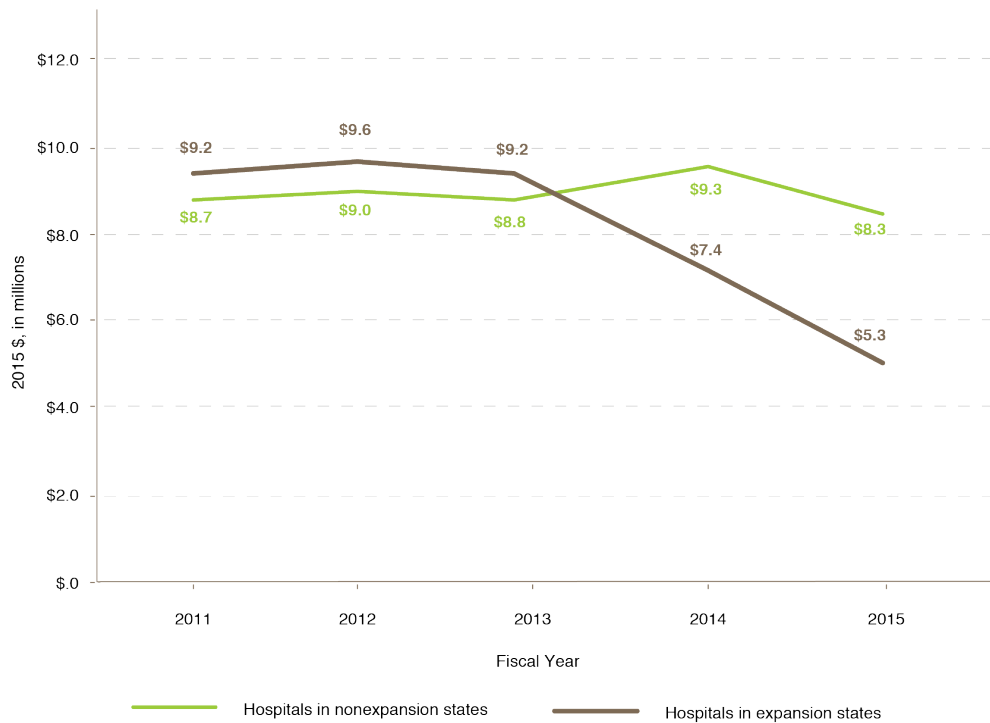
Table 1: Characteristics of Hospitals in Main Sample, Medicaid Expansion vs. Nonexpansion States, Fiscal Year 2015

	Expansion states	Nonexpansion states	P-Value
	Mean	Mean	
N of Hospitals	1,298	1,995	
Control Variables			
Organizational status			
Nonprofit	73.9%	48.7%	***
For-profit	9.2%	22.2%	***
Government	16.9%	29.1%	***
Hospital size			
<100 beds	48.9%	57.1%	***
100-299 beds	32.8%	28.2%	***
300+ beds	18.3%	14.6%	***
System status			
Not part of a system	36.4%	39.3%	*
Centralized health system	7.2%	5.9%	
Centralized physician/insurance system	6.5%	4.9%	**
Moderately centralized system	17.8%	13.5%	***
Decentralized system	24.2%	29.8%	***
Independent system	7.8%	5.2%	***
Part of system, unknown type/cluster	0.2%	1.4%	***
CBSA status			
Metro	55.6%	50.7%	***
Nonmetro	44.4%	49.3%	***
Hospital provision of alcohol/chemical dependency services			
Yes	8.1%	7.0%	
No	76.8%	77.0%	
Missing	15.1%	16.0%	
Hospital provision of burn services			
Yes	4.2%	3.1%	*
No	80.7%	81.0%	
Missing	15.1%	16.0%	
County unemployment rate	5.5%	5.2%	***

Source: FY 2015 AHA Annual Survey Database and CMS Healthcare Cost Report Information System.

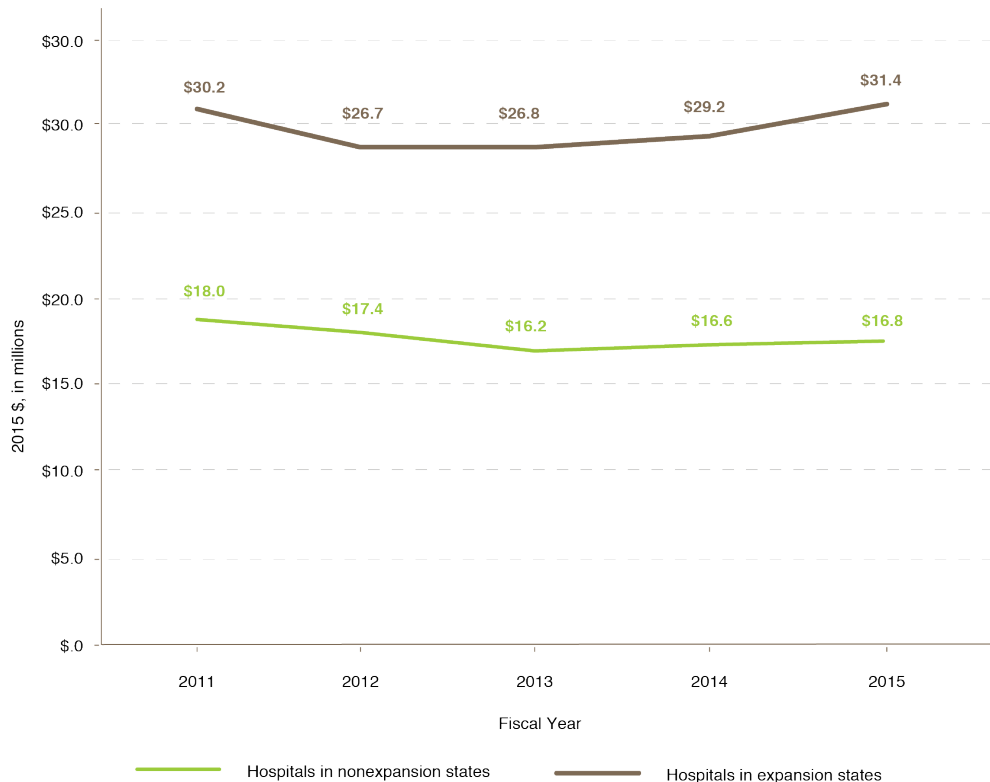
Note: Sample excludes hospitals in states that expanded Medicaid after July 2014 (NH, IN, PA), states that expanded Medicaid under ACA authority before 2014 (CA, CT, DC, MN, NJ, WA), and Massachusetts.

Figure 1: Trends in Mean Annual Uncompensated Care Costs for Hospitals in Medicaid Expansion and Nonexpansion States, FY 2011-2015



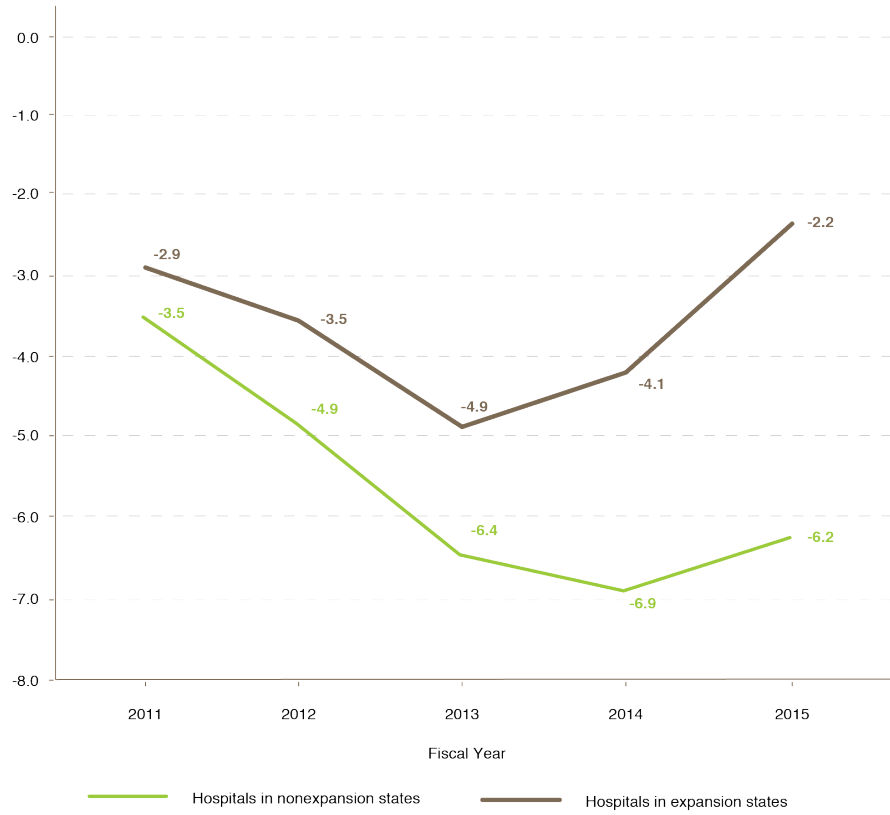
Source: FY 2011-FY 2015 CMS Healthcare Cost Report Information System.

Figure 2: Trends in Mean Annual Medicaid Revenue for Hospitals in Medicaid Expansion and Nonexpansion States, FY 2011-2015



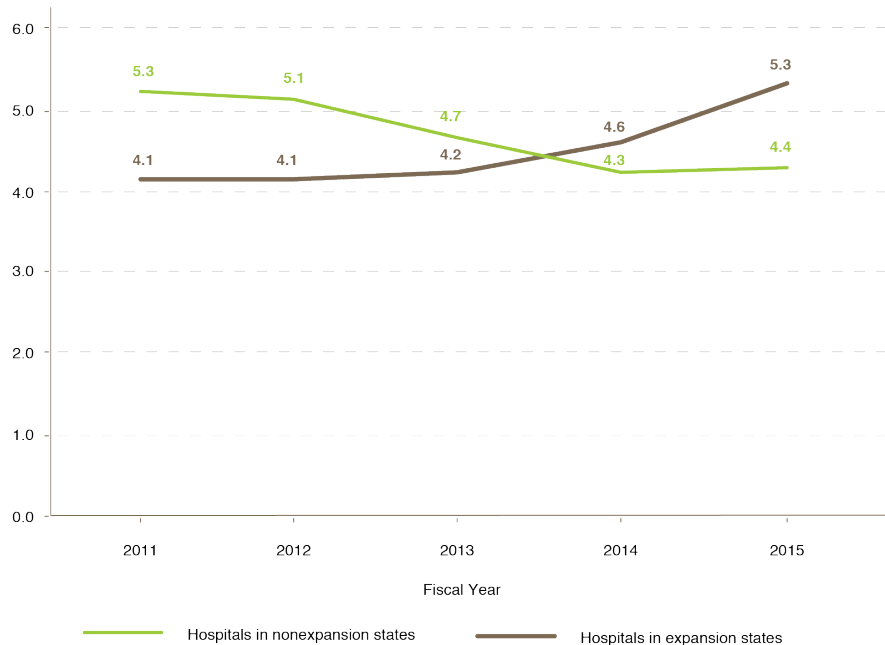
Source: FY 2011-FY 2015 CMS Healthcare Cost Report Information System.

Figure 3: Trends in Mean Annual Operating Margins for Hospitals in Medicaid Expansion and Nonexpansion States, FY 2011-2015



Source: FY 2011-FY 2015 CMS Healthcare Cost Report Information System.

Figure 4: Trends in Mean Annual Excess Margins for Hospitals in Medicaid Expansion and Nonexpansion States, FY 2011-2015



Source: FY 2011-FY 2015 CMS Healthcare Cost Report Information System.

Table 2: Difference-in-Differences Estimates: Changes in Mean Uncompensated Care, Medicaid Revenue, and Margins in 2015 vs. 2011-2013 Period

	Pre-FY 2014 Means		Main Model	
	Nonexpansion states	Expansion states	DD Coefficient: Expansion state in 2015	
UCC 2015 \$, in millions (N=16,394)	8.9	9.4	-3.2	***
UCC as % of total expenses (N=16,387)	6.2%	5.1%	-1.7%	***
Medicaid revenue 2015 \$, in millions (N=16,152)	17.2	27.9	5.0	***
Medicaid revenue as % of total revenue (N=16,152)	11.0%	11.9%	2.9%	***
Operating Margins (N=16,802)	-4.9	-3.8	2.5	***
Excess Margins (N=16,582)	5.0	4.1	1.7	***

Source: FY 2015 AHA Annual Survey Database and CMS Healthcare Cost Report Information System.

Notes:

- (1) Sample excludes hospitals in states that expanded Medicaid after July 2014 (NH, IN, PA), states that expanded Medicaid under ACA authority before 2014 (CA, CT, DC, MN, NJ, WA), and Massachusetts.
- (2) Regression-adjusted models control for hospital and year fixed effects, hospital ownership type, size, provision of substance abuse and burn services, urban/rural status, and unemployment rate of the hospital's county.
- (3) Sample varies slightly from year to year based on reporting. Uncompensated care and Medicaid revenue models are also estimated among observations with nonzero dollars.
- (4) Robust standard errors are clustered at the hospital level.
- (5) Estimates are inflated to 2015 dollars using the consumer price index for hospitals and related services.
- (6) *= $p < .1$, **= $p < .05$, ***= $p < .01$.

Table 3: Difference-in-Differences Estimates: Changes in Mean Uncompensated Care, Medicaid Revenue, and Margins in 2015 vs. 2011-2013 Period, By Metro Status

	Main Model		Metro		Nonmetro	
UCC 2015 \$, in millions	-3.2	***	-5.3	***	-8	***
UCC as % of total expenses	-1.7%	***	-1.7%	***	-1.7%	***
Medicaid revenue 2015 \$, in millions	5.0	***	7.7	***	2.0	***
Medicaid revenue as % of total revenue	2.9%	***	2.7%	***	3.1%	***
Operating Margins	2.5	***	1.0		4.0	***
Excess Margins	1.7	***	0.9	*	2.3	***

Source: FY 2015 AHA Annual Survey Database and CMS Health Care Cost Report Information System.

Notes:

- (1) Sample excludes hospitals in states that expanded Medicaid after July 2014 (NH, IN, PA), states that expanded Medicaid under ACA authority before 2014 (CA, CT, DC, MN, NJ, WA), and Massachusetts.
- (2) Regression-adjusted models control for hospital and year fixed effects, hospital ownership type, size, provision of substance abuse and burn services, urban/rural status, and unemployment rate of the hospital's county.
- (3) Sample varies slightly from year to year based on reporting. Uncompensated care and Medicaid revenue models are also estimated among observations with nonzero dollars.
- (4) Robust standard errors are clustered at the hospital level.
- (5) Estimates are inflated to 2015 dollars using the consumer price index for hospitals and related services.
- (6) Coefficients for post2014xMcAid not shown.
- (7) *= $p < .1$, **= $p < .05$, ***= $p < .01$.

Table 4: Difference-in-Differences Estimates: Changes in Mean Uncompensated Care, Medicaid Revenue, and Margins in 2015 vs. 2011-2013 Period, By Ownership

	Main Model		Nonprofit		For-profit		Government (Nonfederal)	
UCC 2015 \$, in millions	-3.2	***	-3.0	***	-2.1	***	-4.7	***
UCC as % of total expenses	-1.7%	***	-1.8%	***	-1.4%	***	-2.2%	***
Medicaid revenue 2015 \$, in millions	5.0	***	5.0	***	4.7	***	5.5	**
Medicaid revenue as % of total revenue	2.9%	***	2.7%	***	3.7%	***	3.4%	***
Operating Margins	2.5	***	0.8		3.2	**	6.9	***
Excess Margins	1.7	***	1.4	**	2.7	*	3.0	***

Source: FY 2015 AHA Annual Survey Database and CMS Healthcare Cost Report Information System.

Notes:

- (1) Sample excludes hospitals in states that expanded Medicaid after July 2014 (NH, IN, PA), states that expanded Medicaid under ACA authority before 2014 (CA, CT, DC, MN, NJ, WA), and Massachusetts.
- (2) Regression-adjusted models control for hospital and year fixed effects, hospital ownership type, size, provision of substance abuse and burn services, urban/rural status, and unemployment rate of the hospital's county.
- (3) Sample varies slightly from year to year based on reporting. Uncompensated care and Medicaid revenue models are also estimated among observations with nonzero dollars.
- (4) Robust standard errors are clustered at the hospital level.
- (5) Estimates are inflated to 2015 dollars using the consumer price index for hospitals and related services.
- (6) Coefficients for post2014xMcAid not shown.
- (7) *= $p < .1$, **= $p < .05$, ***= $p < .01$.

Table 5: Difference-in-Differences Estimates: Changes in Mean Uncompensated Care, Medicaid Revenue, and Margins in 2015 vs. 2011-2013 Period, By Hospital Size

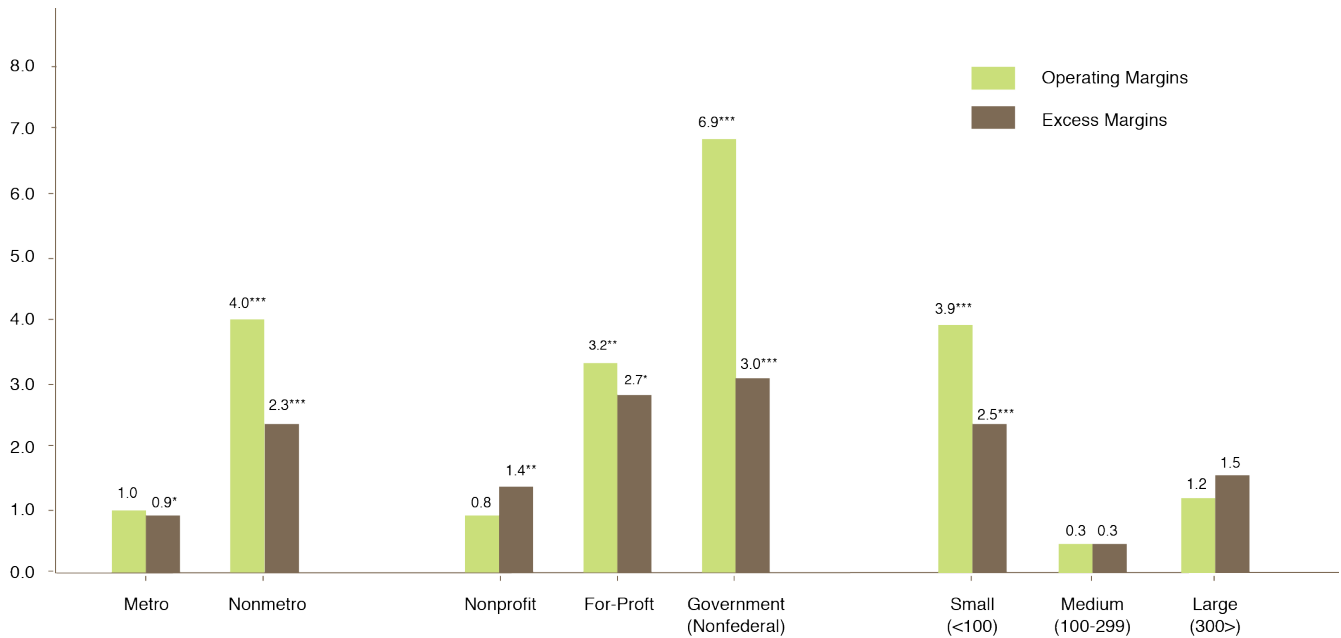
	Main Model		Small (<100)		Medium (100-299)		Large (300+)	
UCC 2015 \$, in millions	-3.2	***	-.7	***	-2.5	***	-11.0	***
UCC as % of total expenses	-1.7%	***	-1.7%	***	-1.7%	***	-1.7%	***
Medicaid revenue 2015 \$, in millions	5.0	***	1.4	***	4.0	***	17.4	***
Medicaid revenue as % of total revenue	2.9%	***	3.0%	***	2.9%	***	2.9%	***
Operating Margins	2.5	***	3.9	***	0.3		1.2	
Excess Margins	1.7	***	2.5	***	0.3		1.5	

Source: FY 2015 AHA Annual Survey Database and CMS Healthcare Cost Report Information System.

Notes:

- (1) Sample excludes hospitals in states that expanded Medicaid after July 2014 (NH, IN, PA), states that expanded Medicaid under ACA authority before 2014 (CA, CT, DC, MN, NJ, WA), and Massachusetts.
- (2) Regression-adjusted models control for hospital and year fixed effects, hospital ownership type, size, provision of substance abuse and burn services, urban/rural status, and unemployment rate of the hospital's county.
- (3) Sample varies slightly from year to year based on reporting. Uncompensated care and Medicaid revenue models are also estimated among observations with nonzero dollars.
- (4) Robust standard errors are clustered at the hospital level.
- (5) Estimates are inflated to 2015 dollars using the consumer price index for hospitals and related services.
- (6) Coefficients for post2014xMcAid not shown.
- (7) *= $p < .1$, **= $p < .05$, ***= $p < .01$.

Figure 5: Difference-in-Differences Change in Excess and Operating Margins in 2015 By Hospital Characteristics



APPENDIX

Data

This analysis focuses on nonfederal general medical or surgical hospitals in FY 2011 through FY 2015. This analysis uses data from the American Hospital Association (AHA) Annual Survey merged with data from the Centers for Medicare & Medicaid Services Healthcare Cost Report Information System (HCRIS). The AHA data provide information on hospitals’ organizational characteristics. The HCRIS contains annual cost reports submitted by all Medicare-certified hospitals and provides information for constructing key financial measures.

Because this study focuses on the effects of the 2014 Medicaid expansion, the sample excludes hospitals in Massachusetts and six states (California, Connecticut, District of Columbia, Minnesota, New Jersey, and Washington) that extended Medicaid eligibility to low-income adults before January 2014 through a separate provision of the ACA. The sample also excludes hospitals in three states that expanded Medicaid in the second half of 2014 (New Hampshire) or the beginning of 2015 (Pennsylvania and Indiana) because fiscal-year financial data for most hospitals in

these states capture only a fraction of calendar year 2015. As a sensitivity analysis, the sample includes these states. Finally, the sample excludes hospitals with financial data that do not reflect 12 months of the fiscal year, observations with missing values for a given outcome, and observations with zero reported dollars in the uncompensated care and Medicaid revenue models.

Fiscal years are defined by the calendar year end date. For example, FY 2014 meant July 1, 2013, through June 30, 2014, for 33 percent of hospitals in the sample, and October 1, 2013, through September 30, 2014, for nearly 20 percent of hospitals. The pre-period is FY 2011 through FY 2013, and the post-period includes FY 2014 and FY 2015. FY 2015 captures a full calendar year of exposure to the Medicaid expansion for states that expanded in 2014, but FY 2014 only captures partial exposure to the expansion because most hospitals use fiscal years that do not perfectly align with the calendar year.

This analysis also classifies hospitals by metro and nonmetro status, hospital ownership type (nonprofit, for-profit, and non-federal government), and size (fewer than 100 beds, 100 to 299 beds, and 300 or more beds). Counties are classified by the US Office of Management and Budget according to their metropolitan status effective 2003. Metropolitan counties include large central cities, fringes of large cities (suburbs), medium-size cities, and small cities. Nonmetropolitan counties include micropolitan statistical areas and noncore areas, open countryside, rural towns (with populations below 2,500), and areas with populations of 2,500 to 49,999 that are not part of larger metropolitan area labor markets. Metropolitan status is commonly used to determine eligibility for various public programs and by researchers and others who analyze rural America.^{11,12}

Although the HCRIS is widely used by the government and many other entities to track critical components of hospital finances, it has known limitations with item nonresponse and data quality. To improve data quality, some erroneously reported values were coded as “missing.”¹³ The difference-in-differences analysis also reduces potential biases from accounting or reporting errors, assuming such errors did not emerge differentially between hospitals in expansion and nonexpansion states after 2013.

Methods

This analysis uses multivariate difference-in-differences models to compare changes in uncompensated care, Medicaid revenue, and profits among hospitals in 19 states that expanded Medicaid eligibility in early 2014 (treatment group) relative to hospitals in states that did not expand Medicaid (comparison group).

Because FY 2014 does not capture a full-calendar-year effect of the Medicaid expansion, the model includes two separate post-period dummies for FY 2014 and FY 2015 interacted with Medicaid expansion status. The primary independent variable of interest is FY 2015 interacted with Medicaid expansion status. This variable captures the effect of the ACA in 2015 among states that expanded in 2014, relative to the pre-period (FY 2011 through FY 2013). FY 2014 interacted with Medicaid expansion is the effect in FY 2014 relative to the pre-period, which captures less than a full calendar year of exposure to the Medicaid expansion for most hospitals.

Models include hospital fixed effects, a set of fiscal-year-specific dummy variables, and a random error term. Models also include a set of hospital-level controls that could vary

over time and could influence each financial outcome. These include hospital ownership type, size, system status, provision of substance abuse services, provision of burn services,¹⁴ and the unemployment rate of the hospital’s county. All estimates are unweighted to reflect changes in mean values associated with the average hospital in the sample. Robust standard errors are clustered at the hospital level to correct for possible heteroskedasticity and autocorrelation.

The same difference-in-differences technique was applied to the main sample split into groups defined by hospital characteristics. For example, the metro model compares changes in outcomes among hospitals in metro areas in expansion states with hospitals in metro areas in nonexpansion states, and the nonmetro model compares changes in outcomes among hospitals in nonmetro areas in expansion states with hospitals in nonmetro areas in nonexpansion states. A similar approach is used to split the sample based on hospital ownership type and size.

This study also incorporates various robustness and sensitivity models. First, to formally test for differences in trends between hospitals in expansion and nonexpansion states before 2014, the study includes models in which each fiscal-year dummy variable is interacted with the Medicaid expansion dummy; these models jointly test the null hypothesis that all pre-2014 interaction terms are equal to 0. Second, uncompensated care costs and Medicaid revenue are log-transformed because the distribution of the untransformed variables is heavily skewed. Third, the study estimates models including the late-2014 and 2015 Medicaid expanders (New Hampshire, Indiana, and Pennsylvania) in the treatment group. Instead of estimating separate interaction terms, the analysis also includes models defining “post” as a single binary variable set to 1 in FY 2014 or FY 2015. Finally, as a sensitivity analysis, the sample is limited to only the subset of hospitals that provided data for all four fiscal years.

Finally, this study compares estimates with those in the 2016 analysis.⁷ The original analysis differed in two major ways. First, in the earlier analysis, the key difference-in-differences variable was a term for the interaction between whether or not the hospital was in a Medicaid expansion state and the share of the fiscal year that the hospital was exposed to the 2014 Medicaid expansion. The model in this analysis does not use this “partial exposure” setup because all hospitals have at least a full calendar year of post-expansion exposure in the FY 2015 data. Second, the earlier analysis included New Hampshire, Indiana, and Pennsylvania in the comparison group because these

states were late expanders; these states are excluded from the sample in this analysis.

Sensitivity Analysis Results

The main sample excludes hospitals in three states that expanded Medicaid in the second half of 2014 (New Hampshire) or the beginning of 2015 (Pennsylvania and Indiana) because fiscal-year financial data for most hospitals in these states capture only a fraction of calendar year 2015. As expected, when the three Medicaid expanders were included in the sample as part of the treatment group, the overall effects associated with each outcome were smaller in magnitude but remained statistically significant. Similarly, when “post” is defined as a single binary variable set to 1 for FY 2014 or

FY 2015 observations in expansion states, the estimated coefficients are smaller in magnitude compared with the main model but remain statistically significant. This likely is because the FY 2014 post-period only captures a fraction of exposure to Medicaid expansion in calendar year 2014 (Appendix table 2).

When the sample is limited to only those hospitals that contributed data throughout the entire study period, findings were consistent with the main model. In most instances, the estimates were slightly larger in magnitude and more precise than the estimates in the main model. Log-transformed difference-in-differences estimates were also consistent with the main model, suggesting that the analyses were not biased by skewed data or potential outliers (data not shown; the 2016 analysis includes findings from these models).

Appendix table 1 : Test for Differences in Trends Among All Hospitals in Sample, FY 2011-FY 2013

	Expansion x FY 2012		Expansion x FY 2011		P-Value for joint test that pre-2014 interaction terms are 0
	Coeff.	P-value	Coeff.	P-value	
UCC 2015 \$, in millions	0.3	0.450	0.3	0.490	0.717
UCC as %	0.2%	0.210	0.2%	0.150	0.306
Medicaid revenue 2015 \$, in millions	-0.1	0.762	1.4	0.039	0.044
Medicaid revenue (%)	-0.4%	0.069	-0.6%	0.040	0.095
Operating Margins	-0.2	0.746	-0.8	0.281	0.516
Excess Margins	-0.4	0.375	-0.5	0.332	0.565

Source: FY 2015 AHA Annual Survey Database and CMS Healthcare Cost Report Information System.

Notes:

- (1) Sample excludes hospitals in states that expanded Medicaid after July 2014 (NH, IN, PA), states that expanded Medicaid under ACA authority before 2014 (CA, CT, DC, MN, NJ, WA), and Massachusetts.
- (2) Regression-adjusted models control for hospital and year fixed effects, hospital ownership type, size, provision of substance abuse and burn services, urban/rural status, and unemployment rate of the hospital's county.
- (3) Sample varies slightly from year to year based on reporting. Uncompensated care and Medicaid revenue models are also estimated among observations with nonzero dollars.
- (4) Robust standard errors are clustered at the hospital level.
- (5) Estimates are inflated to 2015 dollars using the consumer price index for hospitals and related services.

Appendix table 2: Difference-in-Differences Estimates: Changes in Mean Uncompensated Care, Medicaid Revenue, and Operating Margins Among All Hospitals in Sample

	Main Model			Alternate Specifications				JAMA estimates, FY2011-2014 (post2014xMcaid=% of FY14 exposed to Medicaid; 2015 expanders in comp. group)		
	Separate "post" indicators, excluding 2015 expanders			Include 2015 expanders		Combine 2014-2015 in single variable		Variable	Coeff.	P-value
	Variable	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value			
UCC 2015 \$, in millions	post2015xMcaid	-3.2	0.00	-2.6	0.00	-2.7	0.00	post2014xMcaid	-2.8	0.000
	post2014xMcaid	-2.3	0.00	-2.0	0.00					
UCC as % of total expenses	post2015xMcaid	-1.7%	0.00	-1.4%	0.00	-1.4%	0.00	post2014xMcaid	-1.5%	0.000
	post2014xMcaid	-1.2%	0.00	-1.0%	0.00					
Medicaid revenue 2015 \$, in millions	post2015xMcaid	5.0	0.00	4.2	0.00	3.5	0.00	post2014xMcaid	3.2	0.008
	post2014xMcaid	2.0	0.01	1.7	0.02					
Medicaid revenue as % of total revenue	post2015xMcaid	2.9%	0.00	2.4%	0.00	2.3%	0.00	post2014xMcaid	2.5%	0.000
	post2014xMcaid	1.8%	0.00	1.5%	0.00					
Operating Margins	post2015xMcaid	2.5	0.00	2.2	0.00	1.9	0.00	post2014xMcaid	1.12	0.06
	post2014xMcaid	1.3	0.00	1.1	0.01					
Excess Margins	post2015xMcaid	1.7	0.00	1.4	0.00	1.4	0.00	post2014xMcaid	1.05	0.04
	post2014xMcaid	1.0	0.01	0.8	0.02					

Source: FY 2015 AHA Annual Survey Database and CMS Healthcare Cost Report Information System.

Notes:

- (1) Sample excludes hospitals in states that expanded Medicaid after July 2014 (NH, IN, PA), states that expanded Medicaid under ACA authority before 2014 (CA, CT, DC, MN, NJ, WA), and Massachusetts.
- (2) Regression-adjusted models control for hospital and year fixed effects, hospital ownership type, size, provision of substance abuse and burn services, urban/rural status, and unemployment rate of the hospital's county.
- (3) Sample varies slightly from year to year based on reporting. Uncompensated care and Medicaid revenue models are also estimated among observations with nonzero dollars.
- (4) Robust standard errors are clustered at the hospital level.
- (5) Estimates are inflated to 2015 dollars using the consumer price index for hospitals and related services.

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