Heterogeneous Effects of the ACA Medicaid Expansion on Hospital Financial Outcomes

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ABSTRACT

This study examines the effect of the Affordable Care Act's Medicaid expansion on hospital financial outcomes. A key innovation relative to prior studies is that we explicitly account for heterogeneity across states in the timing and extent of the expansion as well across hospital types. We find that Medicaid expansion led to a decrease in uncompensated care expenditures and an increase in average operating margins. The effects were larger in states where the

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Medicaid expansion led to a greater increase in program eligibility. Operating margins improved most for public hospitals and facilities located in rural areas. (JEL Codes: I11, I13, I18)

I. INTRODUCTION

The main coverage provisions of the Affordable Care Act (ACA) – health insurance marketplaces and state Medicaid expansions—went into effect in January 2014. According to data from the US Census Bureau, the number of Americans without health insurance fell by over 8 million between 2013 and 2014 (Smith and Medalia 2015). More recent data suggest that between 2010, when the ACA was signed into law, and early 2016, the number of uninsured fell by up to 20 million (Uberoi, Finegold and Gee 2016). Coverage has increased more, especially among low-income individuals, in the states that chose to implement the ACA's Medicaid expansions than in states that did not.

Consistent with a large research literature on the effects of health insurance coverage, early analyses suggest that coverage expansion reduced cost-related barriers to obtaining health care services, with the largest effects occurring in expansion states (Sommers et al. 2015; Wherry and Miller 2016). The ACA coverage expansions are also likely to have a significant effect on health care providers, particularly hospitals. Under the Federal Emergency Medical Treatment and Labor Act of 1985, hospitals are effectively required to treat all patients requiring emergency care, even if they are uninsured (Rosenbaum 2013). In addition, to justify their tax-exempt status, non-profit hospitals must provide "community benefits," of which charity care is an important category (Young et al. 2013; Nikpay and Ayanian 2015). As a result, US hospitals can be seen as "insurers of last resort," providing care to uninsured patients who are unable to pay for it.

Garthwaite, Gross and Notowidigo (2018) estimate that prior to the passage of the ACA, each uninsured person was associated with $900 of hospital uncompensated care costs annually.

The prospect that increasing insurance coverage would reduce the burden of hospital uncompensated care has figured importantly in debates over the ACA. In many states, hospitals were a leading voice in favor of the Medicaid expansions (Ollove 2013; Barnes 2014), and later, in opposition to proposals that would scale back coverage (AHA 2017). Early research comparing hospitals in states that did and did not expand Medicaid indicates that the expansion led to a reduction in uninsured patients and an increase in Medicaid patient volume (Nikpay et al. 2016, 2017; Hempstead and Cantor 2016). These changes in patient payer mix coincided with significant reductions in hospital expenditures on uncompensated care (Nikpay et al. 2015; Dranove et al. 2016; Blavin 2016; Camilleri 2018).

How these changes have affected the bottom line for hospitals remains an open question. There are at least three reasons why improvements in payer mix and reductions in uncompensated care might overstate the windfall that hospitals receive from Medicaid expansion. First, holding constant the total volume of hospital care, some existing patients will shift from private insurance to Medicaid as a result of expansion ("crowding out"). Because private reimbursement rates are substantially higher than Medicaid rates (Selden et al. 2015), the substitution of public coverage for private insurance will generally have a negative effect on hospital revenues and margins. Second, total hospital volume may increase, and if the marginal patients are those for whom costs exceed Medicaid reimbursement rates – as hospitals often

argue about Medicaid patients – overall margins will decline. Third, if hospitals pass reductions in uncompensated care through to private payers in the form of lower prices (Frakt 2011), this would offset any improvement in hospital margins. For any of these reasons, or a combination of them, Medicaid expansion may have reduced uncompensated care without increasing hospital margins.

The only published study to date to examine the impact of Medicaid expansion on hospital margins finds only marginally significant improvements in operating margins in expansion states relative to non-expansion states (Blavin 2016). That study, like others focusing exclusively on changes in hospital uncompensated care (Dranove et al. 2016; Camilleri 2018), is based on a simple comparison of states that did and did not implement the Medicaid expansion in January 2014. Such an approach ignores important heterogeneity among expansion states in the extent to which the Medicaid expansion increased eligibility levels and therefore increased insurance coverage. Additional limitations of prior studies stem from the fact that the data they use extend only to 2014, the first year that the policy was in effect. Because hospitals report data on a fiscal year basis and fiscal years need not align with the calendar year, for most hospitals, fiscal year 2014 represented a "partial treatment" year. In addition, with data that ends in 2014, it is not possible to estimate the effect of the Medicaid expansion in the 7 states that delayed implementation of the policy until late 2014 or 2015.

In this paper, we provide additional evidence on the effect of the Medicaid expansion on hospital finances and in doing so extend the literature in several ways. First and most

importantly, we account explicitly for heterogeneity among expansion states, differentiating between those where the Medicaid expansion represented a major change in eligibility rules and states where the effect on coverage was limited because the income eligibility limit was already high. This distinction between "major" and "minor" expansion states, (which we describe in more detail below), is important because insurance coverage increased substantially more in the former than in the latter.

A second innovation relative to the existing literature is that we extend the period of the analysis by adding data from fiscal year 2015. By adding data from fiscal year 2015, our policy effects are estimated based on at least a full year of post-ACA experience for all hospitals. The additional year of data also allows us to estimate the impact of the policy on hospitals in "late expander" states. Previous studies either classified these states as being in the non-expansion control group or excluded them from the analysis altogether.

Previous studies have tested for differential effects of the ACA Medicaid expansion by hospital type. We do so as well, by testing for within-state heterogeneity with respect to three important hospital characteristics: "safety net" hospital status, ownership type, and rural/urban location. As a proxy for safety net status, we use information on whether hospitals are deemed Medicaid Disproportionate Share Hospitals (DSH) by the federal government. Because they treat more low-income patients who gained insurance coverage as a result of the ACA, we would expect the impact of the expansion to be greatest for DSH and public hospitals. Numerous media

accounts suggest that the ACA Medicaid expansion was especially beneficial, (and repeal would be especially harmful), for rural hospitals (Luthra 2016; Japsen 2017).

Consistent with prior studies, we find that on average the ACA Medicaid expansion led to an increase in Medicaid revenue and a decline in uncompensated care expenditures. Accounting for variation among expansion states, we find that these effects were larger in states where the ACA resulted in a greater change in Medicaid eligibility rules. We find that states that delayed implementation of the Medicaid expansion experienced changes in Medicaid revenue and uncompensated care expenditures that were broadly similar to those in states that expanded Medicaid eligibility by January 2014.

These changes in Medicaid revenue and uncompensated care translated to improvements in hospital operating margins. Grouping all expansion states together, our results are similar to previous research (Blavin 2016). Disaggregating the expansion states into "major" and "minor" expansion states, we find that the increase in operating margins was driven by a statistically significant increase in margins among major expansion states; in minor expansion states, margins did not change after expansion, either in absolute terms or relative to non-expansion states. Stratifying the analysis by different hospital characteristics, we find public hospitals and those in rural areas benefited more from the Medicaid expansion than private or non-rural hospitals. We find no difference in the effect of the expansion between hospitals that do and do not meet Federal standards for mandatory inclusion in the Medicaid DSH program.

II. BACKGROUND: THE ACA AND HETEROGENEITY AMONG STATES

The Affordable Care Act as it was originally enacted in 2010 would have required all states to expand their Medicaid programs to cover all individuals in families with incomes below 138 percent of the Federal Poverty Level (FPL) beginning January 1, 2014, with the option of expanding sooner. A Supreme Court decision in 2012, however, allowed states to opt out of Medicaid expansion altogether. As of the end of 2018, 31 states plus the District of Columbia had expanded Medicaid under the ACA, while 19 states had not. As shown in Table 1, there is heterogeneity among expansion states in the extent to which the Medicaid expansion changed eligibility rules and in the timing of implementation.

Table 1 about here

Medicaid eligibility for low-income adults varied considerably prior to 2014, with some states covering adults up to and in some cases above the poverty level while other states offered very limited pathways onto Medicaid for non-disabled adults. (Low-income children were already covered by public insurance in all states). As a result of the baseline variation in eligibility for adults, increasing the eligibility threshold to 138 percent FPL had a much bigger impact in some expansion states than others. For example, in states like Kentucky and West Virginia, the upper income eligibility limit for a single, childless, able-bodied adult increased from $0 to $16,105 on January 1, 2014. In New York, in contrast, Medicaid eligibility for childless, non-disabled adults was already set at 100 percent of FPL, so that the upper income

eligibility limit for a single person increased from $11,670 to $16,105 on January 1, 2014. Six other states in addition to New York (Arizona, the District of Columbia, Delaware, Hawaii, Massachusetts, and Vermont) also had income eligibility limits of at least 100 percent of the FPL for all adults prior to Medicaid expansion. We label these states "minor expansion" states because fewer people should have gained Medicaid eligibility through the ACA expansion in these states, though coverage may have increased because of the increase to the 138 percent FPL limit and/or a "welcome mat" effect among individuals who were already eligible. In the other 25 expansion states, pre-ACA income limits were lower, especially for childless, non-disabled adults, who typically had no access to Medicaid coverage. Because the number of people eligible for Medicaid increased more in these 25 states than in the seven "minor expansion" ones, we refer to them as "major expansion" states.

Table 2 presents data from the American Community Survey showing how insurance coverage evolved for non-elderly adults (ages 19 to 64) in the three groups of states between 2008 and 2015. Between 2008 and 2013, Medicaid coverage was trending upward in all three categories of states, increasing by roughly 3 percentage points in non-expansion and major expansion states and by nearly 5 percentage points in minor expansion states. In major expansion states, Medicaid coverage increased by an additional 6.5 percentage points between 2013 and 2015. In minor expansion states, there was an increase of 3.5 percentage points over that period, while in non-expansion states the share of non-elderly adults on Medicaid increased by less than one percentage point. Between 2013 and 2015, nongroup coverage increased in all three

categories, though here the increase was greatest in non-expansion states. This is because in those states individuals with incomes between 100 and 138 percent of poverty can purchase heavily subsidized marketplace plans, whereas in expansion states individuals in this income range are enrolled in Medicaid. The net effect of these changes in Medicaid and nongroup coverage was a significant decline in the percent uninsured in all three groups of states. The decline was greatest in major expansion states (8.5 percentage points); the percent uninsured fell slightly more in non-expansion states (6 percentage points) than in minor expansion states (5.1 percentage points).

Table 2 about here

In terms of the timing of implementation, expansion states can be grouped into three categories. Although in most states the Medicaid expansion went into effect on January 1, 2014, six states took advantage of a provision in the law allowing them to begin implementing the ACA expansion earlier; seven other states did not expand eligibility until mid-2014 or later. Previous studies excluded some or all of the early and/or late expansion states, presumably because of the difficulty in defining the "pre" and "post" periods (Dranove et al. 2016; Blavin 2017; Camilleri 2018). We keep early expansion states in the analysis in light of evidence that in these states the coverage gains before 2014 were quite limited (Sommers et al. 2014). Some early expansion states simply shifted enrollees out of state-funded programs onto Medicaid (for

example, New Jersey). In others, the early expansion increased the Medicaid eligibility limit, though not up to 138 percent of the FPL (for example, Connecticut). Importantly, all early expansion states experienced significant gains in insurance coverage between 2013 and 2014 (Smith and Medalia 2015). Because prior studies on hospital outcomes have very little post-ACA data, they are not able to estimate the effect of Medicaid expansion in states that expanded after the first quarter of 2014. We estimate policy effects for six states that implemented the expansion between April 2014 and January 2016. Louisiana expanded its Medicaid program in July 2016; because we have minimal post-expansion data for Louisiana hospitals, we include these facilities in the non-expansion control group.

II. DATA AND METHODS

Medicare Hospital Cost Reports

Our main source of data is Medicare cost reports that are completed annually by all Medicare-certified hospitals. Hospitals report data on a fiscal year basis. Our analysis is based on a five-year period from fiscal year 2011 to fiscal year 2015.[1] The full sample consists of 20,468 observations from 4,507 general acute care and critical access hospitals.

We analyze three outcomes: Medicaid revenue, uncompensated care expenditures and hospital operating margin.[2] Medicaid revenue equals total inpatient and outpatient payments received or expected for services delivered to Medicaid patients, as well as Medicaid DSH

[1] Changes in the cost reports make it difficult to include data prior to 2011 in the analysis.
[2] More details on the data and the construction of our key variables are presented in the online appendix.

payments. Uncompensated care expenditures are defined as the sum of charity care and bad debt. Because hospitals vary in their policies regarding charity care, there is not a clear distinction between charity care and bad debt. Therefore, we analyze the combined measure rather than either component individually. Because uncompensated care is measured in terms of charges, which vary across hospitals, we deflate this variable by each hospital's cost-to-charges ratio. Following the standard approach used in the literature, we convert all outcomes into 2015 dollars using the consumer price index. Then, to account for differences in hospital size, we measure each of these two outcomes in percentage terms, dividing Medicaid revenue by net patient revenue and uncompensated care expenditures by total expenditures. Hospital operating margin is defined as net income from service to patients divided by net patient revenue. This measure is routinely used by both researchers and policymakers to measure hospital performance (Bai and Anderson 2016; GAO 2006; MedPAC 2016). One advantage of analyzing the operating margin, as opposed to net revenue, is that it implicitly adjusts for hospital size.

Empirical Strategy

Our baseline regression model is a panel difference-in-differences specification that compares changes in expansion states after the Medicaid expansion to the trend in non-expansion states:

$$Y_{ist} = X_{ist}\beta + \delta_1 Exposure_{ist} + h_i + \theta_t + \varepsilon_{ist} \qquad (1)$$

The variable *Exposure* represents the percentage of the fiscal year that a hospital was exposed to the ACA Medicaid expansion. It equals zero for all hospitals from non-expansion states and for expansion state hospitals in fiscal years that end before the Medicaid expansion went into effect. For expansion states after 2014, it equals the fraction of the year in which the Medicaid expansion was in effect in that state. For example, consider hospitals in Kentucky, a major expansion state with coverage going into effect in January 2014. A Kentucky hospital with a 2014 fiscal year ending in June 2014 would have a value of 0.50 for the variable *Exposure*, while a hospital with a fiscal year ending in September 2014 would have a value of 0.75. Defining the treatment variable in this way—rather than simply interacting dummy variables for expansion states and the post-2014 period—serves two purposes. First, it makes it possible to include states that expanded after January 2014. Second, it accounts for the fact that for most hospitals the fiscal year does not line up with the calendar year, which means that for most hospitals 2014 is a "partial treatment" year.[3] Note that for early expansion states, *Exposure* does not "turn on" until January 2014. The reason is that, as noted, in those states the expansion occurring before that date was partial and in some cases merely shifted enrollment among programs, rather than significantly increasing the number of people with insurance. At the same time, prior research indicates that in some states the early expansion did result in a decline in uncompensated care relative to the trend in neighboring states (Nikpay et al. 2015). Because such changes will affect

[3] Blavin (2016) takes a similar approach as do Leung and Mas (2016) in a different context. Dranove et al (2016) address this timing issue by limiting the analysis to hospitals with fiscal years that coincide with the calendar year. This requires dropping roughly two-thirds of all hospitals in the 46 states included in their analysis. Camilleri (2018) takes a similar approach, dropping hospitals with fiscal years ending in the first 8 months of the year. She drops more states from the analysis, for various reasons.

the pre-expansion mean, our approach will produce conservative estimates for early expansion states.

The model includes hospital (h_i) and fiscal year (θ_t) fixed effects and several time-varying hospital controls (X_{ist}): the number of licensed beds, dummies for ownership status (for-profit and public, where non-profit serves as the omitted category), and teaching status (measured by the number of full-time residents and interns). To account for competition within a hospital's market area, we include a county-level Herfindahl-Hirschman index (HHI) based on annual admissions.[4] The data on the number of residents and admissions comes from the annual survey of hospitals conducted by the American Hospital Association. The model also includes an indicator for hospital participation in the 340B drug program, which provides statutory discounts on prescription drugs and may represent a financial windfall for hospitals (Conti and Bach 2014). The number of hospitals participating in the 340B program increased by 30 percent between 2011 and 2015 (Kantarjian and Chapman 2015). To account for local economic shocks, we also control for the unemployment rate, the poverty rate, and median resident age, all measured at the county level.

As noted, we also estimate models that allow for heterogeneous effects related to state policies and hospital type. The state categories are those described in the previous section: we distinguish between major and minor expansion states and between states that began their

[4] HHIs can also be calculated using different geographic units—such as hospital service areas—and differ measures of hospital size—such as the number of inpatient days or licensed beds. Models using these alternative measures yield essentially identical results as the ones that we report.

expansion before January 2014, states expanding as of that date, and states expanding later. Regarding hospital type, we cut the data three ways. First, we are interested in how the ACA Medicaid expansion has affected safety-net hospitals, which we define as those that meet the standards to be deemed as Medicaid DSH hospitals (MACPAC 2016). To meet this standard, hospitals must either have a "low income utilization rate" of at least 25 percent or a Medicaid utilization rate at least one standard deviation above the mean in their state. We define DSH status as of 2012, using information from audited financial reports provided by the Medicaid and CHIP Payment and Access Commission. While close to 50 percent of all U.S. hospitals received Medicaid DSH payments in 2012, "deemed" facilities represent roughly 15 percent of all hospitals.[5] Second, we estimate separate models for non-profit, for-profit and public hospitals. Finally, we conduct the analyses separately for hospitals located in rural and non-rural areas. Rural hospitals are defined as those facilities that correspond to a rural core based statistical area (CBSA), as defined by the U.S. Office of Management and Budget.[6]

Summary Statistics and Pre-ACA Trends

Table 3 presents pre-expansion summary statistics for the full sample and for subsamples defined by expansion status, pooling data from 2010 through 2013. Consistent with baseline

[5] Note that this proxy for safety net status is different from that used by Camilleri (2018), who stratifies her analysis by whether a hospital receives any Medicare DSH payments. Because states have considerable flexibility in distributing these payments, many hospitals that participate in the program would not generally be viewed as safety net hospitals. Indeed, in her analysis, roughly 60 percent of hospitals are defined as DSH hospitals, compared to 13 percent in our data using the stricter definition of DSH status. Since we define DSH hospitals based on a single year, we do not control for DSH status in the full sample regressions because of collinearity with the hospital fixed effects.

[6] Because rurality is a fixed characteristic, in the full sample model its effect is captured by the hospital fixed effects.

differences in eligibility, mean Medicaid revenues were more than three times as large in minor expansion states as in non-expansion states; the pre-ACA mean in major expansion states was between these two extremes but closer to the non-expansion mean. Major expansion and non-expansion states are even more similar in terms of Medicaid revenue as a percentage of total revenues. The pre-2014 mean is 11.5 percent for major expansion states and 11.1 percent for non-expansion states. Prior to the ACA, hospitals in major expansion and non-expansion states were also quite similar in terms of uncompensated care expenditures. The mean was higher in minor expansion states, largely because of differences in hospital ownership. For-profit hospitals, which tend to provide less uncompensated care, are substantially more common in non-expansion states and are least common in minor expansion states. Prior to the ACA, the average hospital in each type of state reported negative operating margins. Here too, differences in the distribution of hospitals by ownership status make it difficult to interpret these unadjusted differences across state categories. On average, for-profit hospitals had positive margins in all three categories of states, while the mean public hospital had a negative margin in all three categories.

Table 3 about here

Our estimation strategy relies on the assumption that, in the absence of the ACA, hospital financial outcomes would have evolved similarly in expansion and non-expansion states. Thus, it

is important to establish that trends were similar prior to 2014. The ACS data presented in Table 2 (and graphically in Figure A1) suggests that trends in the percent of the population without insurance were parallel between 2008 and 2013. In addition, earlier research presents strong evidence of parallel trends in hospital payer mix (the percentage of patients with private insurance, Medicaid and no insurance) for expansion and non-expansion states between 2009 and the end of 2013 (Nikpay et al. 2016). To test for differential pre-trends in the outcomes studied here, we use pre-2014 data to estimate models that include a linear time trend interacted with indicators for expansion status.

Results from these regressions are reported in Appendix Table A1. Medicaid revenue was flat in dollar terms and as a share of total revenue. In both cases, the trends were similar for expansion and non-expansion states. Uncompensated care was trending up, with slightly larger increases for non-expansion states. The difference is not statistically significant for the dollar-denominated measure, though it is significant when uncompensated care is measured relative to total expenditures. The point estimate implies a difference of two-tenths of a percentage point per year. To the extent that this divergence would have continued after 2014, our estimates of the effect of the Medicaid expansion may be overstated. We see no difference in pre-trends for our key dependent variable, operating margins.

III. RESULTS

Table 4 presents estimates of the effect of the Medicaid expansion on Medicaid revenues, uncompensated care expenditures, and hospital operating margins. The expansion increased Medicaid revenue by an average of 2.3 percentage points, or a 20 percent effect relative to the pre-ACA mean for the full sample. As expected, we find a larger effect for major expansion states (column 2). The increase of 2.5 points represents a 21 percent increase for the average hospital in major expansion states. Still, the estimate of 1.3 percentage points for the minor expansion states is statistically significant, implying an 8 percent effect. This pattern is consistent with the fact that Medicaid enrollment increased in both groups of expansion states, but substantially more in major expansion states. In column 3 we see that hospitals in "late expander" states saw a significant increase in Medicaid revenue, though the effect was smaller than that for states implementing the expansion by January 2014.

Table 4 about here

The next three columns report results for uncompensated care as a percentage of total expenditures. Pooling all expansion states, the estimates imply a decline of 1.5 percentage points, or 28 percent relative to the baseline mean for the full sample. This is substantially larger than what we would expect if we extrapolated the differences in trends estimated in the pre-trend analysis. So, even if we were to adjust for the fact that expansion and non-expansion states were

diverging before 2014, the effect of the Medicaid expansion is clear. The results in column 5 indicate that uncompensated care fell significantly in minor expansion states relative to non-expansion states, despite similar declines in the percent of the population without insurance. This can be explained by differences in the source of new coverage. In non-expansion states, the gains in coverage came from private, nongroup insurance, which often has high deductibles and charges for physicians that are not included in a plan's network (Cooper and Scott Morton 2016). Allowing for heterogeneous treatment effects related to the timing of expansion, we see that uncompensated care declined significantly for all three groups. However, similar to the results for Medicaid revenue, the magnitude was smaller for late expanders.

The last three columns of Table 4 show how the increase in Medicaid revenue and decrease in uncompensated care affected hospitals' bottom line. Overall, Medicaid expansion was associated with a 1.2 percentage point increase in net operating margin. This result is driven by changes in major expansion states; margins did not improve significantly in minor expansion states relative to non-expansion states. Despite smaller changes in Medicaid revenue and uncompensated care, hospitals in late expander states experience similar margin improvements as hospitals in states that expanded earlier.

To test the robustness of these results to different specifications, Appendix Table A2 reports results for Medicaid revenue and uncompensated care with dependent variables specified in levels and logs rather than as percentages. When revenue and expenditures are measured in dollars, we find that the ACA expansion increased annual Medicaid revenues by $5.7 million per

hospital and caused uncompensated care expenditures to fall by an average of $3.2 million per hospital per year. The log models imply that the expansion led to a 30 percent increase in Medicaid revenue and a 36 percent decrease in uncompensated care expenditures. Our results are also robust to limiting the sample to a balanced panel of hospitals for which we have data for all years (results not reported).

Testing for Heterogeneity Within States

Table 5 reports results for samples stratified by different hospital characteristics. For the sake of brevity, we report only results for our baseline model, which estimates an average effect of expansion for all states regardless of how much eligibility limits changed or when the expansion occurred. The first two rows present results for Medicaid DSH and non-DSH hospitals. Prior to the ACA, the Medicaid share of revenue was roughly twice as large for DSH hospitals (21.6 percent vs. 10.2 percent). DSH hospitals also provided significantly more uncompensated care, though the difference was smaller (7.9 percent vs. 5.2 percent). For both outcomes, the impact of the Medicaid expansion was greater in magnitude for DSH hospitals. In contrast, the two types of hospitals experienced similar improvements in margins.

Table 5 about here

Stratifying by ownership status, we see that non-profit, for-profit and public hospitals experienced similar changes in Medicaid revenue and uncompensated care expenditures, but not

in operating margins. The ACA led to a large and statistically significant improvement in margins for public hospitals (4.4 percentage points). For for-profit hospitals, the effect was positive — an increase of 1.5 percentage points — though this estimate is not statistically significant at conventional levels ($p = 0.202$). For non-profit hospitals, the point estimate is negative, but with a t-statistic of less than 1. Similarly, while rural and non-rural hospitals experienced nearly identical changes in Medicaid revenue and uncompensated care, we find differences in the effect of the Medicaid expansion on hospital margins. Rural hospitals experienced a statistically significant improvement of 2.5 percentage points. For non-rural hospitals, margins increased by a statistically insignificant 0.7 percentage points.

IV. DISCUSSION

This paper adds to a growing literature examining the effect of the ACA Medicaid expansion on hospitals. Whereas prior studies estimated the immediate (first year) impact of the policy using samples that excluded hospitals from a number of states, the data we analyze includes up to two years of post-expansion data and includes hospitals from all states. Despite these differences, our results are quite similar to those previously reported. Our estimate of the impact of expansion on uncompensated care expenditures is comparable to estimates reported by three previous studies (Blavin 2016; Dranove et al. 2016; Camilleri 2018). Similarly, our finding that the expansion led to a 1.2 percentage point increase in net operating margin is nearly

identical to the effect estimated by Blavin (2016), but slightly smaller than the 2.5 percentage point effect he finds in a follow-up analysis using data through 2015 (Blavin 2017).[7]

The fact that these results are robust to examining changes over a longer period of time and to different sets of states strengthens the conclusion that the ACA Medicaid expansion improved the financial situation of the average hospital. A unique feature of our study is that we account for heterogeneity among states in terms of how and when the ACA increased Medicaid eligibility. Consistent with differences in how coverage changed in the population, we find significantly larger increases in Medicaid revenue and larger decreases in uncompensated care in states where there were larger changes in eligibility. This "dose-response" relationship further supports a causal interpretation of our results.

Accounting for heterogeneity among states also highlights important subtleties in the way that changes in patient payer mix affect hospitals. Differences between non-expansion and minor expansion states are particularly interesting. As shown in Table 2, the percentage of adults without insurance fell slightly more in non-expansion states (6 percentage points vs. 5.1 percentage points), though the sources of those coverage changes were different. In non-expansion states, the coverage gains came mainly in the form of private insurance, whereas in minor expansion states they were driven more by increased Medicaid enrollment. Our finding that uncompensated care fell in minor expansion states relative to non-expansion states reflects

[7] The difference between our estimate and Blavin's (2017) may be related, at least in part, to differences in the states that are included in the estimation samples. We find a weak and statistically insignificant effect of expansion for "early expanders," which he excludes.

the fact that many private plans have high deductibles and "surprise" charges for out-of-network providers, which often leaves patients unable to pay the full cost of inpatient care. In contrast, Medicaid has minimal cost-sharing, particularly for hospital care. At the same time, Medicaid reimbursement is lower than rates paid by private insurers, often substantially so. Our results suggest that the uncompensated care generated by privately insured patients and the "shortfall" in Medicaid payments are roughly comparable in terms of their effect on hospital margins.

Accounting for heterogeneity among expansion states is useful for considering how our results might project to states that have not yet implemented the ACA Medicaid expansion. In terms of baseline insurance coverage and hospital characteristics, non-expansion states are quite similar to major expansion states. And it could be argued that political factors that prevented a subset of major expansion states from implementing the policy in January 2014 are similar to those that are still at play in certain non-expansion states. Whether one believes that all major expansion states or just the "late expanders" are comparable to non-expansion states, our results suggest that additional states deciding to expand would generate significant financial benefits for hospitals in those states.

Stratifying the analysis by different hospital characteristics, we see that after states implemented the expansion, increases in Medicaid revenue and decreases in uncompensated care were widespread. The changes were larger for DSH hospitals than non-DSH hospitals, which is consistent with differences in the patient populations served. Although we analyze a different measure of uncompensated care for a broader set of hospitals, the general pattern is similar to the

results reported by Camilleri (2018). Despite this difference, the Medicaid expansion led to similar improvements in margins for DSH and non-DSH hospitals.

While we find no significant differences in the effect of expansion on Medicaid revenue and uncompensated care related to hospital ownership, there are significant differences in the case of operating margins, where we find larger effects for public hospitals. The comparison of rural and non-rural hospitals exhibits a similar pattern. The Medicaid expansion had similar effects on Medicaid revenue and uncompensated care for rural and non-rural hospitals. This is in line with the fact that the two groups had similar baseline means for these two outcomes and with evidence that the Medicaid expansion led to similar increases in insurance coverage in rural and urban areas (Soni et al. 2017). Yet, our results suggest that these changes translated into improved operating margins only for rural hospitals.

There are several possible explanations for why the margin improvements were larger for public and rural hospitals. There may have been more crowd-out in urban and private hospitals, which meant that the benefit of reduced uncompensated care was offset by a decline in revenue from patients who transitioned from private insurance to Medicaid. Or, there may have been differences in the effect of the expansion on total volumes and the types of patients treated. Further research providing a more detailed analysis of such changes would be valuable.

V. CONCLUSIONS

Our analysis underscores the conclusion that the expansion of Medicaid under the Affordable Care Act has had profound financial implications for hospitals. A broad range of hospitals have experienced a significant increase in Medicaid revenue and a decline in uncompensated care. On average, these changes have translated to an improvement in operating margins, with the greatest improvements occurring for hospitals that tended to face the greatest financial challenges prior to the reform. These results lead us to expect that hospitals will continue to play a role in debates over Medicaid expansion, especially if advocates for rural and public hospitals are able to make themselves heard.

References

AHA. “Letter to U.S. House of Representatives from Richard J. Pollock.” American Hospital Association. 2017. Accessed on 8/25/2017. http://www.aha.org/advocacy-issues/letter/2017/170307-let-aha-house-ahca.pdf.

Bai, G., and G.F. Anderson. "A More Detailed Understanding of Factors Associated with Hospital Profitability." *Health Affairs*, 35(5), 2016, 889-897.

Barnes, J. “Virginia Hospitals are Lobbying for an Expansion of Medicaid.” *The Washington Post*, February 5, 2014.

Blavin, F. 2016. “Association Between the 2014 Medicaid Expansion and US Hospital Finances.” *JAMA*, 316(14), 2016, 1475-1483.

Blavin, F. “How Has the ACA Changed Finances for Different Types of Hospitals? Updated Insights from 2015 Cost Report Data.” The Urban Institute. 2017. Accessed on May 25, 2018. https://www.urban.org/research/publication/how-has-aca-changed-finances-different-types-hospitals-updated-insights-2015-cost-report-data/view/full_report

Camilleri, S. "The ACA Medicaid Expansion, Disproportionate Share Hospitals, and Uncompensated Care." *Health Services Research,* 53(3), 2018, 1562-1580.

Conti, M. and P. B. Bach. "The 340B Drug Discount Program: Hospitals Generate Profits by Expanding to Reach More Affluent Communities." *Health Affairs*, 33(10), 2014, 1786-1792.

Cooper, Z. and F. S. Morton. “Out-of-Network Emergency-Physician Bills - An Unwelcome Surprise.” *New England Journal of Medicine*, 375(20), 2017, 1915-1918.

Dranove, D., C. Garthwaite, and C. Ody. "Uncompensated Care Decreased at Hospitals in Medicaid Expansion States but Not at Hospitals in Nonexpansion States." *Health Affairs*, 35(8), 2016, 1471-1479.

Frakt, A. B. "How Much do Hospitals Cost Shift? A Review of the Evidence." *Milbank Quarterly*, 89(1), 2011, 90-130.

GAO.“Hospital Mortgage Insurance Program: Program and Risk Management Could be Enhanced.” Government Accountability Office. 2006.

Garthwaite, C., T. Gross, and M.J. Notowidigdo. “Hospitals as Insurers of Last Resort." *American Economic Journal: Applied Economics*, 10(1), 2018, 1-39.

Hempstead, K., and J. C. Cantor. "State Medicaid Expansion and Changes in Hospital Volume According to Payer." *New England Journal of Medicine*, 374(2), 2016, 196-198.

Kantarian, H. and R. Chapman. “Value of the 340B Drug Discount Program,” *JAMA Oncology*, 1(8):1029-1030.

Japsen, B. “Hospitals Where Trump Won Face Closure if GOP Repeals Medicaid Expansion.” *Forbes*, February 26, 2017.

Leung, P., and A. Mas. “Employment Effects of the ACA Medicaid Expansions.” National Bureau of Economic Research Working Paper No. 22540, 2016.

Luthra, S. “Even in Trump Country, Rural Hospitals Brace for Damage from Health Law’s Repeal.” *Kaiser Health News*, January 11, 2017. https://khn.org/news/even-in-trump-country-rural-hospitals-brace-for-damage-from-the-health-laws-repeal/

MACPAC. “Report to Congress on Medicaid Disproportionate Share Hospital Payments.” Medicaid and CHIP Payment and Access Commission. 2016. Accessed on March 1, 2017. https://www.macpac.gov/wp-content/uploads/2016/01/Report-to-Congress-on-Medicaid-DSH.pdf

MedPAC. “Report to the Congress: Sources of Financial Data on Medicare Providers.” Medicare Payment Advisory Commission. 2004. Accessed on July 1, 2016. http://67.59.137.244/documents/june04_990_DataNeeds.pdf

Nelb, R., J. Teisl, A. Dobson, J. E. DaVanzo, and L. Koenig. “For Disproportionate-Share Hospitals, Taxes And Fees Curtail Medicaid Payments.” *Health Affairs*, 35(12), 2016, 2277-2281.

Nikpay, S., and J. Ayanian. “Hospital Charity Care - Effects of New Community-Benefit Requirements.” *The New England journal of Medicine*, 373(18), 2015: 1687-1690.

Nikpay, S., T. Buchmueller, and H. Levy. "Early Medicaid Expansion in Connecticut Stemmed the Growth in Hospital Uncompensated Care." *Health Affairs*, 34(7), 2015, 1170-1179.

-------. "Affordable Care Act Medicaid Expansion Reduced Uninsured Hospital Stays In 2014." *Health Affairs*, 35(1), 2016, 106-110.

Nikpay, S., S. Freedman, T. Buchmueller, and H. Levy. “Impact of the ACA Medicaid Expansion on Emergency Department Visits: Evidence from State-Level Emergency Department Databases.” *Annals of Emergency Medicine*, 70(2), 2017, 215-225.

Ollove, M. "Hospitals Press States to Expand Medicaid." *Kaiser Health News*, April 17, 2013. https://khn.org/news/hospitals-lobby-for-medicaid-expansion-states/

Rosenbaum, S. “The Enduring Role of the Emergency Medical Treatment and Active Labor Act." *Health Affairs*, 32(12), 2013, 2075-2081.

Selden, T. M., Z. Karaca, P. Keenan, C. White, and R. Kronick. "The Growing Difference Between Public And Private Payment Rates For Inpatient Hospital Care." *Health Affairs*, 34(12), 2015, 2147-2150.

Smith, J., and C. Medalia. "Health Insurance Coverage in the United States: 2014." Washington, DC: US Department of Commerce, Economics and Statistics Administration, Bureau of the Census – Current Population Reports. 2015. Accessed on July 1, 2016. https://www.census.gov/content/dam/Census/library/publications/2015/demo/p60-253.pdf

Sommers, B. D., M. Z. Gunja, K. Finegold, and T. Musco. "Changes in Self-Reported Insurance Coverage, Access to Care, and Health Under the Affordable Care Act." *JAMA*, 314(4), 2015, 366-374.

Sommers, B. D., G. M. Kenney, and A. M. Epstein. "New Evidence on the Affordable Care Act: Coverage Impacts of Early Medicaid Expansions." *Health Affairs*, 33(1), 2014, 78-87.

Soni, A., M. Hendryx, and K. Simon. "Medicaid Expansion Under the Affordable Care Act and Insurance Coverage in Rural and Urban Areas." *Journal of Rural Health*, 33(2), 2017, 217-226.

Uberoi, N., K. Finegold, and E. Gee. "Health Insurance Coverage and the Affordable Care Act, 2010 – 2016." Unted States Department of Health and Human Services – ASPE Issue Brief. 2016. Accessed on July 1, 2016. https://aspe.hhs.gov/system/files/pdf/187551/ACA2010-2016.pdf

Wherry, L. R., and S. Miller. "Early Coverage, Access, Utilization, and Health Effects Associated With the Affordable Care Act Medicaid Expansions: A Quasi-Experimental Study." *Annals of Internal Medicine*, 164(12), 2016, 795-803.

Young, G. J., C. Chou, J. Alexander, S. D. Lee, and E. Raver. "Provision of Community Benefits by Tax-Exempt US Hospitals." *New England Journal of Medicine*, 368(16), 2013, 1519-1527.

TABLE 1

Non-Expansion	Medicaid Expansion		
		Minor Expansion	Major Expansion
Alabama	Expanded before January 2014[1]	Washington DC (211%)	Connecticut (73%)
Florida			California (0%)
Georgia			Minnesota (0%)
Idaho			New Jersey (0%)
Kansas			Washington (0%)
Maine			
Mississippi			
Missouri	Expanded in January 2014[1]	Arizona (110%)	All 0%:
Nebraska		Delaware (110%)	Arkansas
North Carolina		Hawaii (100%)	Colorado
Oklahoma		Massachusetts (150%)	Illinois
South Carolina			Iowa
South Dakota		New York (100%)	Kentucky
Tennessee		Vermont (160%)	Maryland
Texas			Nevada
Utah			New Mexico
Virginia			North Dakota
Wisconsin			Ohio
Wyoming			Oregon
			Rhode Island
			West Virginia
	Expanded after January 2014[2]		Michigan [4/14]
			New Hampshire [8/14]
			Pennsylvania [1/15]
			Indiana [2/15]
			Alaska [9/15]
			Montana [1/16]
			Louisiana [7/16][3]

[1] Eligibility level of other non-disabled adults prior to expansion is in parentheses; 0 if not specified.
[2] Expansion date in brackets; eligibility level for non-disabled adults is 0 in all cases.
[3] Because Louisiana expanded so late relative to the period covered by our data, it is treated as a non-expansion state in the analysis.

Source: Eligibility levels are from the Kaiser Family Foundation: http://www.kff.org/medicaid/state-indicator/medicaid-income-eligibility-limits-for-other-non-disabled-adults/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D; and, for Massachusetts, http://www.kff.org/health-costs/issue-brief/massachusetts-health-care-reform-six-years-later/.

Table 2

	Year	Non-expansion	Major Expansion	Minor Expansion
A. Medicaid	2008	0.062	0.078	0.122
	2009	0.082	0.097	0.148
	2010	0.085	0.103	0.161
	2011	0.087	0.107	0.169
	2012	0.091	0.109	0.169
	2013	0.091	0.113	0.171
	2014	0.095	0.142	0.190
	2015	0.098	0.171	0.206
	Change 2015-2013	0.007**	0.058**	0.035**
B. Nongroup	2008	0.108	0.111	0.113
	2009	0.099	0.102	0.101
	2010	0.095	0.097	0.097
	2011	0.093	0.097	0.095
	2012	0.095	0.095	0.094
	2013	0.094	0.093	0.088
	2014	0.113	0.106	0.097
	2015	0.129	0.114	0.104
	Change 2015-2013	0.035**	0.021**	0.016**
C. Uninsured	2008	0.236	0.192	0.153
	2009	0.243	0.200	0.154
	2010	0.254	0.208	0.156
	2011	0.250	0.204	0.152
	2012	0.247	0.200	0.150
	2013	0.243	0.196	0.147
	2014	0.210	0.149	0.117
	2015	0.183	0.111	0.097
	Change 2015-2013	-0.060**	-0.085**	-0.051**

Notes: Data are from the American Community Survey. The samples consist of adults between the ages of 19 and 64. ** $p<0.01$.

Trends in Insurance Coverage by State Expansion Status

TABLE 3

	All States (N = 10,670)		Non-Expansion (N = 4,986)		Minor Expansion (N = 881)		Major Expansion (N = 4,803)	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Expansion State	0.53	0.50	0.00	0.00	1.00	0.00	1.00	0.00
Medicaid Revenue ($M)	20.98	47.39	15.60	35.47	52.84	88.43	20.71	45.12
Medicaid Revenue/Net Patient Revenue	0.117	0.180	0.111	0.135	0.166	0.126	0.115	0.223
Uncompensated Care Costs ($M)	8.35	23.53	8.061	22.57	10.89	17.69	8.18	25.35
Uncompensated Care Costs/Total Expenses	0.055	0.046	0.065	0.0502	0.039	0.032	0.049	0.042
Operating Margin (%)	-0.033	0.156	-0.038	0.182	-0.072	0.145	-0.021	0.126
Non-Profit Ownership	0.593	0.4941	0.449	0.497	0.815	0.389	0.702	0.457
For-Profit Ownership	0.182	0.385	0.258	0.438	0.083	0.276	0.119	0.325
Public Ownership	0.225	0.418	0.293	0.455	0.102	0.303	0.178	0.382
Hospital Beds	150	181	139	184	228	230	148	164
Hospital Residents/Interns	22	102	11	71	77	203	23	99
County Unemployment Rate (%)	8.101	2.55	7.71	2.56	7.96	2.001	8.53	2.56
County Poverty Rate (%)	16.62	5.75	17.79	6.07	15.29	5.43	15.65	5.19
County Median Age (Years)	38.82	4.75	38.56	5.14	38.77	3.75	39.09	4.47
County HHI (Hospital Admissions)	6175.2	3484.6	6876.8	3294.1	3904.9	3065.9	5863.3	3526.5
340B Program Participation	0.38	0.49	0.36	0.48	0.44	0.49	0.39	0.49
Fiscal Year 2012	0.39	0.49	0.39	0.49	0.36	0.48	0.39	0.49
Fiscal Year 2013	0.23	0.42	0.23	0.42	0.27	0.45	0.21	0.41

Sources: Hospital Cost Report data from the Centers for Medicare and Medicaid Services (CMS), the American Hospital Association (AHA), the Health Resources and Services Administration (HRSA), the Bureau of Labor Statistics (BLS), and the Census Bureau (Census)

Pre-Expansion Summary Statistics: Average Hospital Characteristics by State Medicaid Expansion Status, 2010 - 2013

TABLE 4

	Medicaid Revenue (% of Net Patient Revenue)			Uncompensated Care (% of Total Expenditures)			Operating Margins		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
	0.0228**			-0.0152**			0.0121*		
A. Baseline model									
ACA Exposure									
	(0.0048)			(0.0024)			(0.0052)		
		0.0131**			-0.0091**			-0.0005	
B. By Extent of Expansion									
ACA Exposure x Minor Expansion									
		(0.0034)			(0.0029)			(0.0109)	
ACA Exposure x Major Expansion		0.0246**			-0.0163**			0.0145**	
		(0.0055)			(0.0027)			(0.0049)	
			0.0247**			-0.0129**			0.0037
C. By Timing of Expansion									
ACA Exposure (Early Expansion)									
			(0.0052)			(0.0036)			(0.0043)
ACA Exposure (Jan 2014 Expansion)			0.0237**			-0.0181**			0.0162*
			(0.0067)			(0.0031)			(0.0067)
ACA Exposure (Late Expansion)			0.0152*			-0.0068*			0.0106*
			(0.0058)			(0.0032)			(0.0047)

Sources: Hospital Cost Report data from the Centers for Medicare and Medicaid Services (CMS), the American Hospital Association (AHA), the Health Resources and Services Administration (HRSA), the Bureau of Labor Statistics (BLS), and the Census Bureau (Census)

Notes: N = 20,468. * = p < .05, ** = p< .01. All models include hospital and fiscal year fixed effects plus the following covariates: number of licensed beds, ownership type (3 categories), the number of full-time residents and interns (to proxy for teaching status), county level HHI (hospital admissions), an indicator for participation in the 340B program, county level unemployment rate, county level poverty rate, and county level resident median age.

The Effect of the Medicaid Expansion on Medicaid Revenues, Uncompensated Care and Operating Margins

TABLE 5

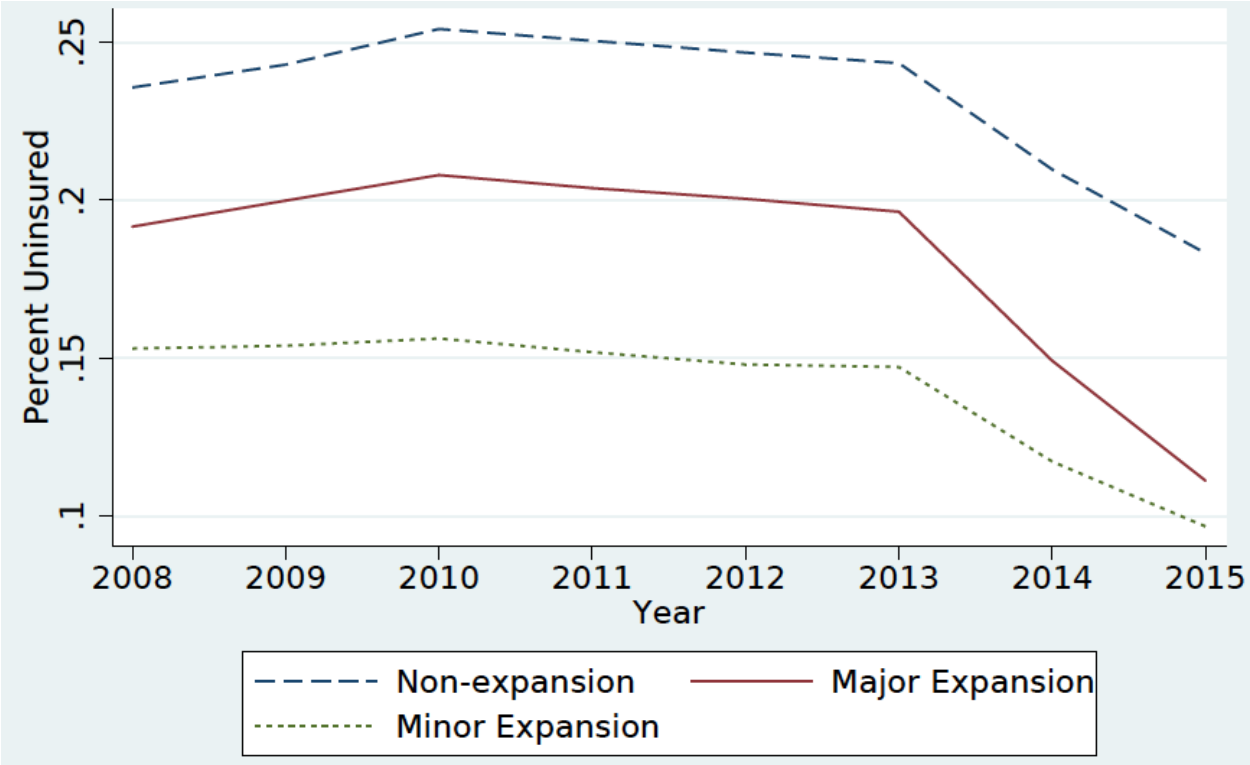
	Medicaid (% of Net Revenue)	Uncomp. Care (% of Expend.)	Operating Margins
	(1)	(2)	(3)
By DSH Status			
DSH (N = 2,685)	0.0349**	-0.0271**	0.0151
	(0.010)	(0.0044)	(0.0075)
Non-DSH (N = 17,350)	0.0204**	-0.0137**#	0.0118*
	(0.0050)	(0.0023)	(0.0057)
By Rural/Non-Rural			
Rural (N = 5,265)	0.0221**	-0.0168**	0.0251**
	(0.0079)	(0.0047)	(0.0083)
Non-Rural (N = 15,196)	0.0236**	-0.0142**	0.0073#
	(0.0061)	(0.0021)	(0.0049)
By Ownership Type			
Public (N = 4,458)	0.0226**	-0.0179**	0.0441**
	(0.0067)	(0.0039)	(0.0105)
Non-Profit (N = 11,794)	0.0220**	-0.0160**	-0.00227#
	(0.0068)	(0.0033)	(0.0058)
Proprietary (N = 3,424)	0.0304**	-0.0118**	0.0147#
	(0.0059)	(0.0031)	(0.0113)

Sources: Hospital Cost Report data from the Centers for Medicare and Medicaid Services (CMS), the American Hospital Association (AHA), the Health Resources and Services Administration (HRSA), the Bureau of Labor Statistics (BLS), and the Census Bureau (Census)

Notes: Asterisks denote whether the coefficient is significantly different from zero at the .01 (**) or .05 (*) level. # denotes that the coefficients for different subsamples are significant at the .05 level. In the bottom panel, estimates for Non-Profit and Proprietary hospitals are compared to those for Public hospitals. When stratifying by DSH status, we exclude hospitals located in Massachusetts and Maine because MACPAC was unable to identify "deemed" Medicaid DSH facilities in these states. When stratifying by ownership type, we exclude 176 hospitals that change ownership type over the sample period. All models include hospital and fiscal year fixed effects plus the following covariates: number of licensed beds, an indicator for participation in the 340B program, the number of full-time residents and interns (to proxy for teaching status), county level HHI (hospital admissions), county level unemployment rate, county level poverty rate, and county level resident median age.

Heterogeneous Effects of Medicaid Expansion by Hospital Type

FIGURE A1



Source: American Community Survey

Percent Uninsured by State Medicaid Expansion Status

TABLE A1

	Medicaid Revenue ($ Millions)		Medicaid Revenue (% of Net Revenue)		Uncompensated Care ($ Millions)		Uncompensated Care (% of Total Expenditures)		Operating Margins	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Trend	-0.107	-0.107	-0.0027	-0.0027	0.224	0.224	0.0028**	0.0028**	-0.0127**	-0.0127**
	(0.205)	(0.205)	(0.0017)	(0.0017)	(0.118)	(0.118)	(0.0008)	(0.0008)	(0.0021)	(0.0021)
Trend x Expansion	0.455		0.0029		-0.123		-0.00234*		0.00326	
	(0.349)		(0.0032)		(0.178)		(0.0010)		(0.0026)	
Trend x Minor Expansion		-0.130		0.0023		-0.255		-0.00222		0.0011
		(0.368)		(0.0031)		(0.641)		(0.00235)		(0.0052)
Trend x Major Expansion		0.581		0.0030		-0.094		-0.0024*		0.0037
		(0.376)		(0.0036)		(0.138)		(0.0010)		(0.0026)

Source: Hospital Cost Report data from the Centers for Medicare and Medicaid Services (CMS).

Notes: N = 10,670. * = p < .05, ** = p< .01.

Analysis of Trends in Outcomes Prior to 2014

TABLE A2

	Medicaid Revenue ($ Millions)			Log of Medicaid Revenue			Uncompensated Care ($ Millions)			Log of Uncompensated Care		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Baseline Model												
ACA Exposure	5.715**			0.266**			-3.194**			-0.439**		
	(0.915)			(0.0364)			(0.495)			(0.0538)		
By Extent of Expansion												
Exposure x Minor		6.784**			0.107**			-2.451**			-0.295**	
		(1.293)			(0.0335)			(0.517)			(0.0514)	
Exposure x Major		5.515**			0.296**			-3.333**			-0.466**	
		(1.016)			(0.0375)			(0.552)			(0.0584)	
By Timing of Expansion												
ACA Exposure (Early)			7.361**			0.254**			-4.223**			-0.461**
			(1.985)			(0.0511)			(1.208)			(0.109)
Exposure (Jan 2014)			5.392**			0.287**			-3.071**			-0.469**
			(1.068)			(0.0487)			(0.432)			(0.0623)
Exposure (Late)			3.878*			0.1902*			-1.686*			-0.260*
			(1.655)			(0.0757)			(0.759)			(0.101)

Sources: Hospital Cost Report data from the Centers for Medicare and Medicaid Services (CMS), the American Hospital Association (AHA), the Health Resources and Services Administration (HRSA), the Bureau of Labor Statistics (BLS), and the Census Bureau (Census)

Notes: N = 20,468. * = p < .05, ** = p< .01. All models include hospital and fiscal year fixed effects plus the following covariates: number of licensed beds, ownership type (3 categories), the number of full-time residents and interns (to proxy for teaching status), county level HHI (hospital admissions), an indicator for participation in the 340B program, county level unemployment rate, county level poverty rate, and county level resident median age.

Sensitivity Analysis: Alternative Dependent Variables

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