How Do Hospitals Respond to the Affordable Care Act Medicaid Expansions?

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Hospitals frequently provide health care to uninsured patients without receiving compensation. ACA Medicaid expansions reduced hospitals' uncompensated care burdens by providing the uninsured with a means of payment in the form of insurance. Anecdotal evidence from hospital administrators suggests hospitals in expansion states respond to their improved financial positions by increasing capacity, purchasing equipment, and hiring more workers. I investigate such claims using hospital financial report data from CMS. Using a differences-in-differences regression framework, I find no evidence that hospitals in expansion states increased bed capacity, capital expenditures, or FTEs relative to hospitals in non-expansion states.

The Affordable Care Act (ACA) is the largest health care overhaul since the creation of Medicare and Medicaid in 1965. A primary goal of the ACA is to reduce the national uninsured rate by providing affordable health insurance to low-income adults. In order to achieve this goal, the ACA provides federal funding for states to expand Medicaid eligibility to adults with incomes below 138 percent of the federal poverty level (FPL).[1] The ACA originally required states to expand Medicaid, but the Supreme Court ruled in *National Federation of Independent Business v. Sebelius* that Medicaid expansions are optional for states. Since the start of the ACA expansions in 2014, 37 states have chosen to expand Medicaid through the ACA.

The optional nature of the state Medicaid expansions provides a natural experiment for researchers to examine the effects of public health insurance expansions. Using expansion states as a treatment group and non-expansion states as a control, researchers have analyzed a variety of outcomes, including individual financial health, access to care, and uninsured rates.[2]

While much of the existing literature and media attention has focused on the benefits of Medicaid expansions for insurance *recipients*, Medicaid expansions also significantly benefit health care *providers*. Indeed, the Federation of American

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[1] The federal government pays 100 percent of the costs to cover newly eligible enrollees through 2016, and this share gradually decreases to 90 percent of costs by 2020.

[2] Antonisse et al (2018) provides a brief literature review of the ACA Medicaid expansions. I discuss the literature at greater length in the next section.

Hospitals (FAH), a group representing the interests of investor-owned hospitals, strongly supports Medicaid expansion in all states.[3] As noted by Finkelstein, Mahoney and Notowidigdo (2018), hospitals support public insurance expansions largely because hospitals often act as implicit insurers to the uninsured. Due to ethical and legal obligations,[4] hospitals provide emergency care as well as non-emergency care to uninsured patients without denying service due to lack of ability to pay. In effect, the hospital bears a substantial portion of the financial costs of the uninsured, as they act as "insurers of last resort."[5] ACA Medicaid expansions have the potential to reduce hospitals' uncompensated care burdens by providing the uninsured with a means of payment in the form of insurance.

Several papers analyze whether hospital financial positions improve following state Medicaid expansions. Using hospital financial report data from CMS, Dranove, Garthwaite and Ody (2016) and Blavin (2016) find that hospitals in expansion states experience reduced uncompensated care costs after expanding Medicaid relative to non-expansion states. The decline in uncompensated care costs is large relative to hospitals' operating margins. As shown in the results section of this paper,[6] hospital uncompensated care costs as a percentage of operating expenses declined by 2.25 percentage points (standard error of 0.34 percentage points) in expansion states relative to non-expansion states, which is large relative to the average hospital operating margin of 2.4 percent.[7] [8] The large decline in uncompensated care costs relative to hospital operating margins suggests hospital financial positions improved substantially after Medicaid expansions. This finding is consistent with the results of Garthwaite, Gross and Notowidigdo (2018) and Finkelstein, Hendren and Luttmer (2018): a substantial portion of Medicaid expansion spending acts as a transfer to providers of uncompensated care.

After confirming the financial analysis carried out in the previous literature, I ask: how did hospitals respond to the financial windfall of reduced uncompensated care costs? Anecdotal evidence from hospital administrators suggests hospitals in expansion states respond to their improved financial positions by increasing capacity, purchasing equipment, and hiring more workers:[9]

> One hospital executive referred to purchases of new radiology equipment in his facility in an expansion state, while "we would not dream of that in our hospital [in a neighboring non-expansion state]." (Searing and Hoadley, 2016)

[3] https://www.fah.org/issues-advocacy/medicaid/medicaid-expansion
[4] These will be discussed in more detail in the literature review section.
[5] See Garthwaite, Gross and Notowidigdo (2018)
[6] Table A3 Column (2) gives the difference-in-difference estimate.
[7] My findings are similar to findings of large reductions in uncompensated care costs noted in Dranove, Garthwaite, and Ody (2016) and Blavin (2016).
[8] This operating margin is based on the average hospital margin for years 2012-13, the years before Medicaid expansion. Table A2 provides an overview of descriptive statistics for both expansion and non-expansion states.
[9] Similar claims from hospital administrators can be found in other policy reports (Wishner and Burton, 2017)

A large hospital system in an expansion state reported a shift from a 0.1 percent margin to a 4 percent margin on their billion dollars in operating costs in the year after expansion. "Having a margin allows thinking about taking care of long-term needs." (Searing and Hoadley, 2016)

While the hospital administrators suggest that hospitals respond to ACA Medicaid expansions by increasing investment, these claims need to be tested formally. There are reasons several reasons to believe hospitals might not change their behavior in response to Medicaid expansions. First, the expansions began in 2014, meaning that all analyses in this paper involve short-run decisions of hospitals.[10]. Major construction projects can often take several years, and hospital investments might be contained in the short-run due to policies such as Certificate of Need laws that require hospitals to get major improvements approved by a governmental authority. Also, policy uncertainty regarding the repeal of the ACA could make hospitals reluctant to make large investments.[11]. Overall, whether and how hospitals respond to the ACA Medicaid expansion remains an empirical question open to novel research.

The research question this paper attempts to answer is how do hospitals respond to ACA Medicaid expansions. Using data from CMS hospital financial reports and employing a differences-in-differences regression framework, I find no evidence that hospitals in expansion states increased bed capacity, capital expenditures, FTEs, or worker compensation in an economically meaningful way relative to hospitals in non-expansion states.[12] To the best of my knowledge, these findings offer the most comprehensive view of how hospitals change their investment and staffing decisions in response to ACA Medicaid expansions.[13] More generally, these findings contribute to an understanding of the supply-side responses to large public health insurance expansions for low-income adults.

There are several reasons why it is important to study hospitals' response to ACA Medicaid expansions. The ACA Medicaid expansions target a different group (low-income, relatively healthy adults below 65 years of age) than previous

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[10] I analyze hospital data from 2011-16

[11] For instance, after a federal judge in Texas struck down the ACA as unconstitutional in December 2018, large hospitals chains Community Health Systems and Tenet Healthcare saw their stock prices decline 14 percent and 7 percent respectively over the next few days. Source: https://www.modernhealthcare.com/article/20181217/NEWS/181219921/health-system-health-insurer-stocks-tumble-on-aca-ruling

[12] In future versions of this paper, I will update my findings with data from the AHA Annual Survey, which contains detailed data on hospital operations. The AHA data will allow me to examine specific investments, technological adoption, and staff composition changes at hospitals. I am currently waiting on approval for my AHA data request.

[13] Duggan, Gupta and Jackson (2019), to the best of my knowledge, is the only other paper to examine the effects of the ACA Medicaid expansions on hospital investment decisions. Studying hospitals in California, they find no increases in bed capacity or capital spending for hospitals most affected by ACA Medicaid expansions. My paper expands upon their findings by including hospitals' staffing decisions and examining almost every acute care hospital in the US. In future versions of this paper, with AHA survey data, I will be able to examine both investment and staffing decisions at a more granular level.

public health insurance expansions. Previous research examined the supply-side effects of Medicare expansions and Medicaid expansions for pregnant women. Finkelstein (2007) examines the general equilibrium and supply-side effects of the introduction of Medicare in 1965. Freedman, Lin and Simon (2015) test whether the expansion of Medicaid eligibility to pregnant women increased hospital technological investment.[14] However due to differences in reimbursement and underlying health conditions of the insured population, hospital responses to ACA Medicaid expansions could differ from hospital responses to previous public insurance expansions.

As noted by Finkelstein, Hendren and Luttmer (2018), Medicaid expansions act as transfers from the federal government to providers of uncompensated care. The economic incidence of these transfers must be examined in order to determine the welfare and distributional effects of the ACA Medicaid expansions. Studying hospitals' response to ACA Medicaid expansions can help in determining this economic incidence. For example, if hospitals in expansion states do not change their provision of care, but instead pass-on their reduced costs to workers in the form of higher wages, then a substantial component of of ACA Medicaid costs ultimately goes to labor. [15] A more detailed discussion of how studying the effects of ACA Medicaid expansions on hospitals fills gaps in the literature is presented below.

I. Background and Literature Review

A. *Uncompensated Care, Crowd-out, and Hospital Finances*

Hospitals frequently provide health care to uninsured patients without receiving compensation.[16] Uncompensated care costs generally fall into two categories - bad debt and charity care expenses. Bad debt expenses arise when hospitals provide a service with the expectation of receiving payment, but are unable to collect payment in full. Charity care expenses occur when a hospital provides a service without expecting to receive full payment. While firms in other industries try to avoid providing services for which they receive no payment, there are legal, tax, and ethical reasons why hospitals provide uncompensated care. The Emergency Medical Treatment and Labor Act (EMTALA) is a federal law that requires hospitals to provide treatment to all individuals requiring emergency care regardless of payment ability.[17] While EMTALA requires provision of emergency care,

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[14] Freedman, Lin and Simon (2015) provides an overview of the supply-side responses to public insurance expansions.

[15] The distributional effects will depend on which workers receive pay increases. If physicians receive pay increases, then the Medicaid expansions partially act as a transfer to individuals in the top of the income-distribution. Conversely, if hospital technicians receive wage increases, then the transfer is to those in the low-to-mid range of the income-distribution.

[16] For a more thorough discussion of uncompensated care and why hospitals provide it, see Garthwaite, Gross and Notowidigdo (2018) and Finkelstein, Mahoney and Notowidigdo (2018).

[17] In addition to EMTALA, states laws often require hospitals to provide a level of care to individuals without regard to ability to pay.

hospitals often provide non-emergency care to uninsured individuals. 90 percent of hospitals reported never denying services to any uninsured individual on an IRS survey of non-profit hospitals[18]. Non-profit hospitals also provide uncompensated care in order to retain exemptions from federal, state, and local taxes. Non-profit hospitals are required to provide community benefits to retain their favored tax-status, and uncompensated care is viewed as a community benefit.

Even if hospitals provide uncompensated care to uninsured individuals, it is still possible that payments from uninsured individuals could exceed reimbursements from private or public health insurance programs.[19] Evidence from Mahoney (2015) and Nikpay et al. (2016) suggests that hospitals receive substantially less uninsured patients than Medicaid or private patients.[20] Nikpay et al. (2016) find that hospitals receive nine times more from Medicaid than uninsured patients and 1.5 times more from privately insured than Medicaid patients for patients in an inpatient setting with similar conditions. This finding is important because the impact of ACA Medicaid expansions on hospital finances will depend on the relative payments of each form of insurance. If Medicaid patients pay more than uninsured patients, then hospitals stand to gain when the uninsured enroll in Medicaid. However, since private insurance pays more than Medicaid, if ACA Medicaid expansions result in substantial crowd-out[21], then hospitals could lose financially.[22] However, crowd-out from ACA Medicaid expansions appears to be low, suggesting that Medicaid expansion improve hospital financial positions Antonisse et al. (2018); Frean, Gruber and Sommers (2017).[23]

B. Medicaid Expansions and Insurance Recipients

Much of the previous literature on the ACA Medicaid expansions focuses on benefits to insurance recipients.[24] Courtemanche et al. (2016) and Frean, Gruber and Sommers (2017) find that uninsured rates drop and Medicaid coverage rates increase in states that expanded Medicaid relative to those that did not. Importantly, the research suggests that Medicaid expansions did not substantially crowd-out private insurance. Miller and Wherry (2019) find that fewer individuals delayed needed medical care due to costs or were unable to afford needed care

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[18] Source: https://www.irs.gov/pub/irs-tege/eo$_i$nterim$_h$ospital$_r$eport$_0$72007.pdf

[19] This situation could arise, for instance, if private insurance is able to negotiate substantially better rates for services from hospitals than uninsured individuals, and the number of uninsured individuals who receive charity care or default on payments is low. Alternatively, Medicaid or Medicare fee-for-service rates could be set very low.

[20] Finkelstein, Mahoney and Notowidigdo (2018) provides an overview of the amount of implicit insurance received by the uninsured.

[21] Crowd-out occurs when individuals substitute their private insurance for public insurance

[22] Freedman, Lin, and Simon (2015) offers a more formal discussion of insurance expansions, crowd-out, and hospital finances.

[23] That Medicaid expansions improve hospital finances is consistent with hospital lobbying efforts in favor of expansions, and reflects the negative response of hospital financial shocks to unexpected news that the ACA might be repealed.

[24] Antonisse et al. (2018) provides a more comprehensive overview of the literature on ACA Medicaid expansions.

in expansion states relative to non-expansion states.

While, researchers find that Medicaid expansions lead to increased insurance coverage, access to care, and financial health, evidence for increased utilization remains mixed. Prior to the implementation of the ACA, several states expanded Medicaid for low-income, relatively health adult populations. Evidence from the Oregon Health Insurance Experiment suggests public insurance expansions increased emergency department use, but emergency department and hospital utilization appeared to decrease in Massachusetts after public insurance expansions. (Finkelstein et al. (2012); Kolstad and Kowalski (2012); Sommers and Simon (2017)) Studies on the effects of ACA Medicaid expansions on health care utilization also remain mixed. Nikpay et al. (2017) find that ACA Medicaid Expansions increased emergency department usage, Freedman et al. (2017) find that total hospital discharges did not change in expansion states relative to non-expansion states, and Duggan, Gupta and Jackson (2019) find substantially greater hospital and emergency room utilization in areas most affected by Medicaid expansions.

Large changes in hospitalizations in ACA Medicaid expansion states could prove problematic to the claim that Medicaid expansions improve hospitals' financial positions. If newly insured individuals use hospital services more frequently,[25] and Medicaid reimbursement rates are low relative to the costs of providing these services, then hospitals could suffer financial losses from these newly insured individuals. The increased losses from providing additional care could outweigh the gains from receiving reimbursement for previously uncompensated care. Hence, hospitals could actually lose money from the Medicaid expansions. Note, however, that this narrative is inconsistent with hospitals' lobbying efforts in favor of ACA Medicaid expansion.[26] Given the confusion regarding the effects of Medicaid expansions on hospital utilization, I test whether Medicaid expansions affect hospital total inpatient discharges and inpatient days. My results [27] suggest that Medicaid expansions did not lead to large changes in inpatient discharges or days.[28][29]

C. Medicaid Expansions and Providers

While the effects of public health insurance expansions on recipients have been studied heavily, the literature on supply-side responses to public health insurance

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[25] For example, due to moral hazard.

[26] Depending on regional reimbursement rates and health profiles of the underlying population, hospitals in specific areas might be opposed to Medicaid expansions.

[27] Estimates are derived using a difference-in-difference regression with expansion states as the treatment group. The estimating is discussed more fully in the empirical methodology section. Results of the regression can be seen in Table A13.

[28] The estimates are a .2 percent increase in inpatient discharges with a standard error of 1.4 percent, and a 1 percent decrease in inpatient days with a standard error of 1.1 percent.

[29] I do not examine measures of inpatient treatment intensity or outpatient measures due to data limitations. Also, note that I am testing total hospital inpatient discharges and days rather than a newly insured individual's utilization. My results should not be taken to mean that individuals receiving Medicaid do not use more inpatient care, but rather that there is not a significant increase in total hospital inpatient care associated with the Medicaid expansion.

expansions is limited.[30] Buchmueller, Miller and Vujicic (2016) and Huh (2016) examine the response of dentists to Medicaid expansions for low-income adults[31], and Garthwaite (2012) examines the response of physicians to SCHIP expansions. Finkelstein (2007) studies the introduction of Medicare in 1965, and her findings are consistent with a large supply-side response by hospitals. Freedman, Lin, and Simon (2015) examine whether the expansion of Medicaid eligibility to pregnant women affects hospitals' decisions to adopt neonatal intensive care units (NICUs). They find no evidence that Medicaid expansions increased hospital adoption of NICUs, and note that the rate of adoption may have been reduced due to low Medicaid reimbursement rates and high crowd-out of private insurance associated with the expansion. The results of Finkelstein (2007) and Freedman, Lin, and Simon (2015) highlight the potential heterogeneity of hospitals' responses to various forms of public insurance expansions. The ACA Medicaid expansions target a different demographic (low-income, relatively health adults) than those covered under previous public health insurance expansions. Given differences in reimbursement between Medicare and Medicaid, as well the differences in the underlying health (and health costs) of the elderly, pregnant women, and low-income adults, hospitals' responses to ACA Medicaid expansions might differ from hospitals' responses to previous public health insurance expansions. Hence, examining hospitals' response to ACA Medicaid expansions contributes to gaps in the literature of the supply-side effects of public health insurance expansions to low-income adults.

Another reason to study hospitals' responses to ACA Medicaid expansions is to better understand the economic incidence of public health insurance expansions. Understanding the economic incidence of public health insurance expansions is critical for determining the welfare and distributional effects of public health insurance[32], yet it has not been examined thoroughly.[33] Studying the effects of ACA Medicaid expansions on hospitals can help in understanding, at least partially, the economic incidence of public health insurance expansions.

Garthwaite, Gross and Notowidigdo (2018) analyze contractions of public health insurance eligibility to low-income individuals, and find that contractions lead to increased uncompensated care costs and lower hospital profit margins. This finding suggests that hospitals cannot pass along all uncompensated care costs to other parties.[34] While they do not examine insurance expansions, Dranove,

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[30] Freedman, Lin, and Simon (2015) offers an overview of the literature of supply-side responses to insurance expansions.

[31] Huh (2016) examines ACA Medicaid expansions specifically, and Buchmueller, Miller and Vujicic (2016) examine Medicaid expansions that target a similar demographic to those covered in the ACA expansions.

[32] Hospitals receive a financial boon from Medicaid expansions in the form of reduced uncompensated care. If they pass-on their gains to shareholders (if the hospital is for-profit) in the form of dividends or invest in new technologies that benefit patients, then the welfare and distributional implications will differ.

[33] It is empirically difficult to determine the economic incidence of insurance expansions due to the number of parties involved - insurers, workers, patients, suppliers, and so forth.

[34] One implication of this finding is that the hospitals are not able to fully shift costs to insurers in the

Garthwaite and Ody (2017) study how non-profit hospitals respond to negative financial shocks caused by the 2008 financial crisis and find mixed evidence of hospital cost-shifting[35] Several papers have analyzed how ACA Medicaid expansions affect hospitals. Dranove, Garthwaite, and Ody (2016) and Blavin (2016) find that Medicaid expansions reduced hospital uncompensated care.[36] Camilleri and Diebold (2019) find a weak relationship between reductions in uncompensated care costs (due to ACA Medicaid expansions) and increases in patient experiences scores. Lindrooth et al. (2018) find that Medicaid expansions lowered the likelihood of hospital closures. The only other paper to examine the effects of the ACA Medicaid expansions on hospital investment decisions is Duggan, Gupta and Jackson (2019). Studying hospitals in California, they find no increases in bed capacity or capital spending for hospitals most affected by ACA Medicaid expansions. My paper expands upon their findings by including hospitals' staffing decisions and examining almost every acute care hospital in the US. To the best of my knowledge, my paper offers the most comprehensive view of how hospitals change their investment and staffing decisions in response to ACA Medicaid expansions.[37]

II. Data

A. Hospital Financial Reports

The primary data source used in the analysis comes from hospital financial reports filed with The Centers for Medicare and Medicaid Services. Medicare-certified hospitals are required to submit annual reports containing information on finances, facility characteristics, and utilization to a Medicare Administrative Contractor. CMS maintains these reports in the Healthcare Provider Cost Reporting Information System (HCRIS). Since nearly all general acute care and critical access[38] hospitals accept Medicare, these reports cover almost every general acute care and critical access hospital in the US. I restrict the analysis to hospital report forms 2552-10, which CMS introduced in 2010, due to the fact that form 2552-10 contains more detailed data on uncompensated care.[39]

The version of 2552-10 reports I use in the analysis comes from the RAND Hospital Data. The RAND Corporation takes the public HCRIS 2552-10 reports and processes the data into hospital-level panel data. The RAND Hospital Data

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form of higher prices. Hence, privately-insured individuals do not bear the full incidence of public health insurance contractions.

[35] The authors take an expansive view of cost-shifting, including whether hospitals offer unprofitable lines of care. The authors also note that it is not clear whether hospitals would respond differently to financial shocks than insurance expansions.

[36] My analysis in Table A3 supports their findings.

[37] In future versions of this paper, I will update my findings with data from the AHA Annual Survey, which contains detailed data on hospital operations. The AHA data will allow me to examine specific investments, technological adoption, and staff composition changes at hospitals. I am currently waiting on approval for my AHA data request.

[38] Critical Access Hospital is a designation given to eligible rural hospitals by CMS.

[39] Uncompensated care data is included in Worksheet S-10 of hospital 2552-10 reports.

contains only a subset of the original form 2552-10 data, as the original dataset contains several hundred thousand variables. Importantly for the purposes of this paper, the RAND Hospital Data includes information on hospital location, number of beds and staffed beds, uncompensated care, operating margins, inpatient utilization, capital expenses, and number of FTEs and compensation per FTE.

While CMS partially reviews HCRIS reports, there are clear outliers and misreports in the filings. For instance, the AHA has called on CMS to establish stronger auditing guidelines for anomalous data reporting on uncompensated care.[40] The RAND Hospital Data attempts to correct for outliers by replacing values that lie far outside of a normal range of variation with interpolated values. The degree of variation deemed acceptable for a certain variable is based on the degree of observed variation for that variable within a given hospital over time. It should be noted that the RAND process for correcting anomalous data points does not pick up every outlier. For instance, several hospitals have operating margins below -20.[41] [42] HCRIS reports contain missing values for certain variables, but generally the amount of missing values for the major line items (such as FTEs, number of staffed beds, inpatient discharges, uncompensated care, etc.) included in my analysis is low.

Hospitals can select their own cost reporting periods when filing HCRIS reports. Hence, one hospital report might cover the time period from January 1st to December 31st, while another hospital report covers a the time period from October 1st to September 30th (fiscal year). The flexibility hospitals have in reporting periods can prove difficult for researchers when assigning a year to a progress report. For example, should a hospital report based on the period from July 1st 2014 to June 30th 2015 be considered hospital data from 2014 or 2015? The RAND Hospital Data provides calendar year report estimates that take a weighted average of two hospital reports based on the share of a report filed in certain year.[43][44] For my primary analysis, I use RAND's calendar year estimates. In the robustness section, I examine hospitals that only file reports from January 1st to December 31st, so that weighting by year does not enter into the analysis.

In order to arrive at the final sample used in the analysis, I exclude all reports that do not have a full-year of data. I also exclude hospitals from the Virgin Islands and Puerto Rico. Additionally, I exclude hospitals in Massachusetts,

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[40] https://revcycleintelligence.com/news/aha-uncompensated-care-costs-worksheet-inaccurate-inconsistent

[41] Main results are not driven by outliers, and the robustness checks, while not shown in this paper, are available upon request.

[42] Extreme values for hospital margins does not appear unique to the RAND Hospital Data or CMS form 2552-10 filings. Duggan, Gupta and Jackson (2019) find extreme hospital margins in California hospital administrative data. They winsorize the data for their analysis.

[43] For instance, If a hospital files reports from October 1st to September 30th in both 2014 and 2015, then the calendar year estimates for 2014 would assign a weight of .75 to the report from October 1st 2013 to September 2014 and a weight of .25 to the report from October 1st 2014 to September 2015.

[44] Note that using this method it is important not to include in the analysis data for which there is no end period. That is, in determining values for calendar year 2016, if a hospital has a report from October 1st 2015 to September 30th 2016, but no report from October 1st 2016 to September 30th 2017, then weighting could prove problematic. I exclude such examples from the analysis.

the District of Columbia, Delaware, Vermont, and New York, as these states expanded Medicaid eligibility to low-income individuals prior to 2014.[45] My final sample includes calendar year data from 2011-2016.[46] I exclude from the analysis all hospitals that did not have data in every year from 2011-2016 in order to reduce concerns of compositional changes in hospitals.[47] My final sample contains hospital-level data from 4048 hospitals for years 2011-2016, for a total of 24228 observations.

B. *County-Level Data*

I also use data from the Census' Small Area Income and Poverty Estimates (SAIPE) and Small Area Health Insurance Estimates (SAIHE) programs in order to get annual county-level data on income, population, and health insurance. SAIPE data includes county-level estimates of population, median household income, and poverty levels. SAIHE data includes the county uninsured rate by demographic and income categories, and is used to determine "treatment intensity", or which counties (and hospitals in those counties) were more likely to be affected by ACA policies.[48]

III.   Empirical Methodology

The Supreme Court ruled in *National Federation of Independent Business v. Sebelius* that ACA Medicaid expansions are optional for states. The optional nature of the state Medicaid expansions provides a natural experiment for researchers to examine the effects of public health insurance expansions. Using a differences-in-differences regression framework, I analyze whether hospitals in expansion states increased bed capacity, capital expenditures, FTEs, or worker compensation relative to hospitals in non-expansion states.[49]

The differences-in-differences regression model I use to estimate how ACA Medicaid expansions affect hospitals is

$$(1) \qquad Y_{hst} = \beta \ \cdot \ \mathbf{1}(Medicaid\_Expansion_{st}) + \mu_h + \lambda_t + \epsilon_{hst}$$

where Y_{hst} is an outcome of interest for hospital h in state s in year t, β is the coefficient for the effect of expansion on hosital outcomes, and $\mathbf{1}(Medicaid\_Expansion_{st})$ is 1 if the state a hospital is in has expanded Medicaid in year t and 0 otherwise. So, for instance, a hospital in California (CA expanded in 2014) would have

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[45] Miller and Wherry (2017) also exclude these states from their differences-in-differences analysis.

[46] 2011 is the first year of data used as CMS began issuing form 2552-10 in 2010, and many hospitals took a year to switch over to form 2552-10 from previous forms.

[47] Lindrooth et al. (2018) find fewer hospital closures in expansion states relative to non-expansion states.

[48] Treatment intensity measures are discussed more fully in the robustness section.

[49] Several papers have employed quasi-experimental and differences-in-differences methods to analyze the effects of ACA Medicaid Expansions Miller and Wherry (2017); Carey, Miller and Wherry (2018); Antonisse et al. (2018).

$\mathbf{1}(Medicaid\_Expansion_{st}) = 0$ in years 2011-13, and have $\mathbf{1}(Medicaid\_Expansion_{st})$ = 1 in years 2014-16. A hospital in Texas (non-expansion state) would have $\mathbf{1}(Medicaid\_Expansion_{st}) = 0$ in all periods. μ_h are hospital fixed-effects and λ_t are year fixed-effects. Standard errors are clustered at the state-level. Hospital-level and county-level covariates are not included in Equation 1.[50] Also, state-linear time trends or similar measures are excluded from Equation 1, as the data has few pre-treatment periods (three years), and treatment effects could be dynamic. The hospital outcomes examined are log of uncompensated care, uncompensated care as a percentage of operating expenses, operating margins, total margins, inpatient days, inpatient discharges, log of staffed bed days, log of full-time equivalent workers (FTEs), log of compensation per FTE, and log of capital expenses.

There are several reasons to believe any treatment effects might be dynamic. Miller and Wherry (2019) find larger effects of Medicaid expansions on insurance coverage in years after 2014. If greater insurance coverage leads to larger declines in uncompensated care, the effects of ACA Medicaid expansions on hospitals might not be fully realized in the first year of treatment. In order to better examine whether the effects of ACA Medicaid Expansions grow or decline over time, I estimate the event-study regression

$$(2) \qquad Y_{hst} = \mu_h + \lambda_t + \sum_{k=T} \gamma_k \cdot (Medicaid\_Expansion_{sk}) + \epsilon_{hst}$$

where $Medicaid\_Expansion_{sk} = 1$ if state s expanded Medicaid k years ago, and T = -3,-2,-1,0,1,2. The first period after treatment is designated $k = 0$, and the last pre-treatment period (k = -1) is used as the baseline reference.

The states included in the treatment and control groups are listed in Table A1. While most states implement Medicaid expansions at the beginning of the year, several states expanded Medicaid eligibility in the middle of the year. In assigning the treatment value, I consider states that expanded in the first half of the year to have a treatment value of 1 for that year, and states that expanded in the last half of the year to have a treatment value of 0 for that year.[51][52]

Descriptive data for states in the treatment and control groups is given in Table A2.[53] Average operating margins are low (between 2-3 pp)[54] in both states that

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[50] Main results are similar when county-level covariates are included. Controlling for county population, income, and poverty levels has little effect on the treatment estimate. Results are not presented in the paper, but are available upon request.

[51] For instance, Michigan, which expanded on April 1, 2014 would have a treatment value of 1 for 2014, but New Hampshire, which expanded on August 15, 2014, would have a treatment value of 0 for 2014.

[52] The main results are robust to assigning partial treatment values to states that expanded in the middle of the year. For example, A state that expanded on July 1st would have a treatment value of .5 for that year and 1 every year thereafter.

[53] The baseline years used to calculate the summary statistics are 2012-13, the years immediately preceding the first Medicaid expansions in 2014.

[54] Hospital margins vary widely - the 10th percentile operating margin is -9.7 percent, and the 90th

did and did not expand Medicaid. The average ratio of uncompensated care expenses to operating expenses is larger in non-expansion states than expansion states (6.4 pp vs. 4.9 pp)[55], and the average share of uninsured individuals below 138 percent of the federal poverty level in the counties in which hospitals are located is larger in non-expansion states than control states (10.3 pp vs. 7.8 pp). Together, these suggest that hospitals in states that have not expanded Medicaid might benefit more than hospitals in expansion states from Medicaid expansions in terms of reduced uncompensated care costs. The treatment and control groups also differ in the ownership structure of hospitals. Hospitals in control states are more likely to be for-profit or government hospitals.

While there are differences between the treatment and control groups, the crucial assumption for whether results are causal is the common trends assumption. This assumption posits that changes in the outcome variable over time would have been the same in both treatment and control groups in the absence of the state Medicaid expansion. While this assumption cannot be directly tested, Equation 2 can be used to examine whether the treatment and control groups have different pre-trends. There are several reasons to believe why the common trends assumption might not hold. For instance, The ACA consists of more than just Medicaid expansions, and these additional components of the ACA could confound results. In 2014, the first year of Medicaid expansions, the federal government began providing subsidies for low-income individuals to purchase private health insurance. If hospital outcomes in expansion and control states were affected differently by ACA premium subsidies, then the common trends assumption would not hold. I attempt to control for premium subsidies in the robustness section. Another provision of the ACA that could have affected treatment and control states differently is the individual mandate.[56] Frean, Gruber and Sommers (2017) find little effect of the individual mandate on insurance coverage, and I do not attempt to control for the effects of the individual mandate in this analysis. The ACA also restructured Medicare payments to hospitals. If the change in Medicare payments affects the treatment and control groups differently, this could confound results. I do not attempt to control for Medicare payment reform in this paper. Another concern is that states in expansion states could make changes to programs that affect hospital finances, such as lowering Medicaid reimbursement rates, in response to ACA Medicaid expansions. If this is the case, then the interpretation of results could be affected. I discuss such policies in the robustness section.

IV. Results

This section is divided into two parts. In the first part of the section, I present the analysis of the effects of ACA Medicaid expansions on hospital financial out-

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percentile operating margin is 15.3 percent.

[55] The 10th percentile ratio of uncompensated costs to operating margins is 1.4 percent and the 90th percentile is 10.3 percent.

[56] While enforcement of the individual mandate has weakened in recent years, the penalties associated with the mandate were in force for the years included in this analysis.

comes. These findings do not constitute my contribution to the literature, as researchers have already examined these outcomes.[57] In the second part of this section, I present the results for how Hospitals change their investment and staffing decisions in response to ACA Medicaid expansions, and these findings are new to the literature.

A. *Hospital Financial Outcomes*

The results from the estimation of Equation 1 on hospital financial variables are given in Table A3. Table A3 gives the differences-in-differences (DID) estimate for the effects of ACA Medicaid expansions on the log of uncompensated care costs, the ratio of uncompensated care expenses to operating expenses, operating margins, and total margins in columns (1) - (4), respectively. The diff-in-diff estimate for the change in uncompensated care expenses is -0.382 log points (SE .061). This translates to an approximately 31.8 percent decline in uncompensated care costs in states that expanded Medicaid relative to those that did not.[58] The result is similar to previous researchers' estimates and is consistent with statements by hospitals that Medicaid expansions reduce their uncompensated care burdens (Dranove, Garthwaite, and Ody 2016; Blavin 2016). The measure of uncompensated care costs used in this analysis includes both bad debt and charity care expenses due to the fact that hospitals often blur the lines between these two expense categories when reporting (Garthwaite, Gross and Notowidigdo, 2018).[59] While not presented in the regression tables, the DID estimates for the change in charity care and bad debts costs are -41.7 percent and -23.1 percent, respectively.

The estimate for the change in hospital uncompensated care expenses over operating expenses is given in Column (2) of Table A3.[60] As would be expected given the findings of a 31.8 percent decline in uncompensated care costs, the ratio of uncompensated care to operating expenses declines in expansion states relative to non-expansion states. The DID estimate is a decline of 2.25 percentage points (SE .0034). This is relative to a mean of 5.6 percent in the ratio of uncompensated care costs to operating expenses. The DID estimates for the change in operating margins[61] is 1.15 percentage points (SE .0034), relative to a mean hospital operating margin of 2.4 percent. While the finding of increased operating margins in expansion states relative to non-expansion states is large relative to hospital operating margins, the increase in operating margins is lower than the decline in the ratio of uncompensated care costs to operating expenses. Given low operating margins, a decline in the ratio of uncompensated care costs to operating expenses should correspond to an almost one-to-one increase in operating

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[57] Dranove, Garthwaite, and Ody (2016) and Blavin (2016)

[58] The approximation is given by $e^{-\beta} - 1$.

[59] The uncompensated care measures used in this paper are in terms of costs rather charges, and come from Line 30 of Worksheet S-10 in HCRIS form 2552-10 reports.

[60] In calculating the ratio of uncompensated care to operating expenses for each hospital, the average of operating expenses for 2012-13 is used as the baseline.

[61] Shown in Column (3) of Table A3.

margins if no other factors change. If hospitals raise wages, states reduce Medicaid reimbursement, or some other factor affecting hospital margins changes, this one-to-one relationship would not hold. Hence, the results from Table A3 could be consistent with hospitals using (some of) the financial windfall from reduced uncompensated care costs to pay higher wages or increase capital spending. Alternatively, some other factor (such as reduced Medicaid reimbursement or patient volume) could explain the finding. In the next subsection, I examine whether hospitals used the potential financial windfall from reduced uncompensated care to increase investment, hiring, or worker pay.

The results from the estimation of Equation 2 on hospital financial variables are given in Figure A1. Figure A1 gives the event study estimate for the effects of ACA Medicaid expansions on the log of uncompensated care costs, the ratio of uncompensated care expenses to operating expenses, operating margins, and total margins in panels (A) - (D) respectively. The decline in uncompensated care costs is larger two years after expansion (denoted by 2 in the x-axis of panel A) than in the first year (denoted by 0) of the expansion. The DID estimate for the decline in uncompensated care costs in the second year after expansion is approximately 45.6 percent.[62] The DID estimate for the decline in uncompensated costs over operating expenses in the second year after expansion[63] is approximately 3.1 percent.[64] As shown in Panels (C) and (D) of Figure A1, estimates for the change in operating and total margins also increase over time. The event-study results from estimating Equation 2 reinforce the claim that Medicaid expansions reduced uncompensated care costs and improved hospital financial positions.[65] The findings of larger uncompensated care cost declines in later time periods suggests that the effects of Medicaid expansions on hospital finances is possibly larger than reflected in previous research that focused on the earliest years of expansion. While stronger financial positions could lead to increased hospital investment and hiring, if hospital financial positions are primarily improving in the latter years of the sample, and hospital investment and hiring takes time, then changes in hospital operating decisions might not occur until time periods outside of the sample.[66] In this case, DID estimates (using only data from 2011-16) of hospital operating decisions would not show a change in hospital investment or hiring. In the next subsection, I discuss DID estimates of the effects of Medicaid expansions on hospital operating decisions.

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[62] Or a change of -.609 log points.

[63] For a state that expanded Medicaid in 2014, I am referring to 2016 as the second-year after expansion.

[64] Estimates shown in Panel (B) of Figure A1.

[65] While the periods before the expansion in Panels (A) and (B) have coefficients significantly different from zero, the overall pattern of the event-study in Figure A1 suggests that pre-treatment trends are similar between expansion and non-expansion states. In the robustness section, I discuss post-treatment factors that could confound the results.

[66] Hospitals' financing constraints and expectations of uncompensated care cost declines could influence the timing of investments patterns.

B. *Hospital Investment and Staffing Outcomes*

The results from the estimation of Equation 1 on hospital operating investment and staffing decisions are given in Table A4. Table A4 gives the DID estimate for the effects of ACA Medicaid expansions on the log of staffed bed days available, the log of capital expenses, log of full-time equivalent workers (FTEs), and the log of salaries plus benefits per FTE in columns (1) - (4) respectively. The diff-in-diff estimate for the change in staffed bed days (given in Column (1) of Table A4) is -.4 percent, and the result is statistically insignificant at the five percent-level (standard error (SE) of .6 percent). Similarly, the DID estimate for the change in capital expenses is -1.35 percent, and the result is statistically insignificant (SE of 2.18 percent).[67] Columns (3) and (4) show that the estimated change in FTEs and compensation per FTE are -1.17 percent and -1.05 percent, respectively, and both are statistically insignificant (SEs of .9 percent and .7 percent, respectively). Overall, the estimates do not support the claim that improved hospital financial position as a result of the ACA Medicaid expansions led to an increase in hospital investment and hiring. In fact, the point estimates for all of the investment and hiring variables are negative. While no estimates are statistically significant, the findings suggest that hospitals did not have large increases in bed capacity, as measured by staffed bed days[68], capital expenses, hire more workers, or pay workers more. The event-study results given from the estimation of Equation 2 are shown in Panels (E) - (H) of Figure A2. The results are similar to those in Table A4, suggesting that hospitals did not have large increases in investments or hiring.[69]

There are several reasons why the results might not show that ACA Medicaid expansions increased hospital investment and hiring. First, the sample only includes data from years 2011-2016, and the ACA Medicaid expansions began in 2014.[70] Hospital investments take time and worker contracts could be sticky, so even if hospitals do change their behavior in response to Medicaid expansions, the changes might not show up in the results. Similarly, state certificate of need laws could prevent hospitals from making investments in capacity and equipment in the short-run. Additionally, there are limitations to using data from financial statements. For instance, hospitals frequently do not employ many of the physicians who operate at the hospital, so these physicians might not show up in the hospital financial reports. If physicians who work at hospitals in expansion states actually do receive increased pay as a result of ACA Medicaid expansions, this result might not show up in my estimates.[71] An alternative explanation for why

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[67] This result is displayed in Column (2) of Table A4.

[68] While not presented in the regression tables, DID estimates for the number of beds (as opposed to staffed beds) are also statistically insignificant.

[69] While the pre-treatment period effects are similar for Panels (E) - (G), there is a significant treatment effect two years before expansion for compensation per FTE (Panel (H)), but the magnitude of the effect is small.

[70] Some states had earlier Medicaid expansions, but those states are excluded from the analysis.

[71] Hospitals could also shift to using greater numbers of non-employed workers, which could happen, for

hospitals might not increase investment, hiring, or pay in response to Medicaid expansions is that the financial gains from reduced uncompensated care costs are offset by financial losses from other factors related to Medicaid expansions.[72] In this case, hospital financial positions might not actually improve after expanding Medicaid. I discuss reasons why the financial gains from expanding Medicaid likely outweigh any losses in the robustness section.

Hospitals might also elect to forego increased investment, hiring, or pay increases and "pass-on" the financial gains from reduced uncompensated care costs to other parties. For instance, hospitals might "reverse cost-shift" by reducing their negotiated rates with private insurers, who pass on the lower prices to the privately insured in the form of lower premiums.[73] Alternatively, for-profit hospitals might simply pass-on the financial gains from Medicaid expansions to shareholders in the form of increased dividends. Overall, determining the economic incidence of the ACA Medicaid expansion remains a question for future research.

V. Robustness

A. Premium Subsidies

In 2014, the first year of Medicaid expansions, the federal government began providing subsidies for low-income individuals to purchase private health insurance. If hospital outcomes in expansion and control states are affected differently by these premium subsidies, then the common trends assumption would not hold. Adults without access to affordable private insurance from an employer who are also not eligible for other public health insurance programs and have incomes between 138-400 percent of the household federal poverty level are eligible for premium subsidies.[74] I control for the effects of premium subsidies by using the percentage of individuals ages 18-65 with income between 138-400 of the federal poverty level and without health insurance in a county as a measure of "treatment intensity" for ACA premium subsidies. The county-level data comes from the Census' Small Area Health Insurance Estimates (SAIHE). I compare DID regression estimates with and without premium subsidy premium intensity in Tables A5 and A5.[75] The addition of controls for premium subsidies does not

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example, if hospitals acquire physicians' practices.

[72] For instance, Medicaid expansion states might reduce subsidies that they previously gave to hospitals for taking care of uninsured individuals.

[73] While evidence of cost-shifting is limited Frakt (2011), policymakers frequently use cost-shifting arguments when discussing the ACA. As noted by Finkelstein, Mahoney and Notowidigdo (2018), the statutory text of the ACA (42 USC 18091) reads, "...By significantly reducing the number of the uninsured, the requirement, together with the other provisions of this Act, will lower health insurance premiums."

[74] In some areas the income eligibility level is 100-400 percent of FPL. The Kaiser Family Foundation gives more details on premium subsidy eligibility. https://www.kff.org/health-reform/issue-brief/explaining-health-care-reform-questions-about-health/

[75] Estimates for FTEs and Cap ex are not included in the regression tables, but the results for these outcomes are also robust to the addition of controls for premium subsidies.

substantially change the coefficients for Medicaid expansions.[76]

B.   *Unreimbursed Care*

As shown in Table A3 and Figure A1, ACA Medicaid expansions led to substantial reductions in uncompensated care costs for hospitals. However, it is possible that hospitals in expansion states also experienced increased Medicaid-related payment shortfalls that partially or fully offset any financial gains from reduced uncompensated care costs. Young et al. (2019) find that Medicaid-related payment shortfalls partially offset reductions in uncompensated care costs for non-profit hospitals in 2014.

There are several ways in which policies and programs related to Medicaid expansion could offset hospital financial gains from uncompensated care reductions.[77] For example, Medicaid expansion states might reduce Medicaid fee-for-service reimbursement rates to hospitals if they believe hospitals can now survive reduced rates without hurting quality of care.[78] Similarly, states and localities often offer subsidy programs to hospitals that serve a large number of low-income or uninsured individuals to make sure these hospitals can continue operating. As hospitals' uncompensated care burdens decline, states might curtail the amount of subsidies to these hospitals. Federal law specifies Medicaid Disproportionate Share Hospital (DSH) payments to offset hospital financial losses from serving low-income and uninsured patients. If a hospitals' DSH payment is reduced in response to changes in patients' insurance status, the financial gains from reduced uncompensated care could be offset.[79] All of the reasons listed above give concern that hospitals might not actually benefit financially from ACA Medicaid expansions.[80]

It is difficult to control for the many Medicaid-related payment factors that could affect hospital financial status. I attempt to use a more comprehensive variable than uncompensated care costs in order to better ascertain the effects of Medicaid expansions on hospital finances. I estimate Equation 1 using hospital total unreimbursed and uncompensated care costs. The unreimbursed and uncompensated care costs measure comes from Line 31 of Worksheet S-10 in

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[76] An interesting avenue for further research is to study the relationship between premium subsidies and hospital investment.

[77] The Kaiser Family Foundation offers a more thorough discussion of these policies and programs. https://www.kff.org/report-section/understanding-medicaid-hospital-payments-and-the-impact-of-recent-policy-changes-appendix/view/print/

[78] Additionally, the composition and volume of Medicaid treatments given to patients could change in expansion states due to either moral hazard or different health characteristics of the newly insured, both of which could further offset (or increase) any hospital financial gains from reduced uncompensated care.

[79] The ACA originally scheduled large Medicaid DSH cuts to take effect in 2014, but these cuts were delayed past 2018. Source: https://www.kff.org/report-section/understanding-medicaid-hospital-payments-and-the-impact-of-recent-policy-changes-appendix/view/print/

[80] Even if states did not cut hospital funding in ways that offset the financial gain to hospitals of reduced uncompensated care, if hospitals expect such cuts in the future, they might curtail investment in the present.

HCRIS form 2552-10.[81] It includes uncompensated care costs plus total unreimbursed costs for Medicaid, SCHIP and state and local indigent care programs. In calculating unreimbursed costs, this measure partially takes into account Medicaid revenues and costs, DSH payments, and revenues and costs of state and local indigent care programs. The results from the estimation of Equation 1 on total unreimbursed care plus uncompensated care costs is given in Columns (3) and (4) of Table A8.[82] The DID estimates for the change in the ratio of unreimbursed plus uncompensated care costs to operating expenses is 1.59 percentage points (SE .0036). While this is lower than the change in the uncompensated care costs to operating expenses ratio, it is still substantial relative to hospital mean operating margins (2.4 pp). The results suggests that hospital financial positions did substantially improve in the wake of ACA Medicaid expansions.

C. Calendar Year

The RAND Hospital Data provides calendar year report estimates that take a weighted average of two hospital reports based on the share of a report filed in certain year. In the primary analysis, I use RAND's calendar year estimates. As a robustness check, I examine hospitals that only file reports from January 1st to December 31st, so that weighting by year is not a factor. Table A7 presents the regression estimates of Equation 1 using data from hospitals that only file reports from January 1st to December 31st. The results in Table A7 differ from the main results in that the estimate for operating margins is no longer significant and the estimate for FTEs shows a statistically significant 3.1 percent (SE 1.4 percent) decline in FTEs.

VI. Heterogeneity

One defining feature of the hospital sector is that most hospitals are non-profit entities. In the sample covered, 57 percent of hospitals are private non-profits, 24 percent are government hospitals,[83] and only 19 percent are for-profit hospitals. It is possible that non-profit, government, and for-profit hospitals have different objectives (Dranove, 1988; Dranove, Garthwaite and Ody, 2017) and serve different populations. I run separate regressions to estimate Equation 1 for each type of hospital ownership as well as for rural hospitals.[84] The results are presented in Tables A10, A11, A9, and A12. While no types of hospital show a statistically significant change in investment, rural and for-profit hospitals show a statistically

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[81] An overview of the pros and cons of different datasets containing Medicaid-payment related hospital financial data is given by the Kaiser Family Foundation. Source: https://www.kff.org/report-section/understanding-medicaid-hospital-payments-and-the-impact-of-recent-policy-changes-appendix/view/print/

[82] Columns (1) and (2) in Table A8 present the estimates from Equation 1 on uncompensated care costs only (without unreimbursed care costs). The results of Columns (1) and (2) in Table A8 are the same as those presented in Columns (1) and (2) of Table A3.

[83] State and local governments, as most federal hospitals are excluded from the analysis.

[84] Defined to be a hospital located in a county with less than 50,000 people.

significant decrease in compensation per worker of 1.7 (SE .82 percent) and 2.4 (1.1 percent) percent, respectively. Also, Non-profits show a statistically significant decrease in FTEs of 2 percent (SE .85 percent). Further research is needed to understand the heterogeneous responses of hospitals to Medicaid expansions.

VII. Conclusion

I find no evidence that, in the short-run, hospitals in ACA Medicaid expansion states increased bed capacity, capital expenditures, FTEs, or worker pay relative to hospitals in non-expansion states. In fact, I find statistically significant decreases in worker pay for rural and for-profit hospitals, as well as statistically significant decreases in full-time equivalents for non-profit hospitals in states that expanded Medicaid. I will continue to update my analysis with additional years of data as they become available.

My results are consistent with previous research (Freedman, Lin, and Simon 2015) that finds no evidence of hospitals adopting technology in response to Medicaid eligibility expansions to pregnant women. However, my results conflict with previous research (Finkelstein, 2007) that finds large supply-side responses to the introduction of Medicare. Further research is needed, however, to conclude that hospitals respond to ACA Medicaid expansions in the same manner as previous Medicaid expansions. It is possible that hospitals change the composition of technologies, services offered, and staff instead of increasing these items in the aggregate. While my current dataset does not allow me to test this claim, I will gain access to AHA survey data in the future, which will allow me to examine hospital operations at a detailed level.

My findings of increased operating and total margins in expansion states relative to non-expansion states suggests that hospitals do not pass-through all of the financial gains from reduced uncompensated care burdens to other parties. This finding is consistent with previous research (Garthwaite, Gross and Notowidigdo, 2018) that finds Medicaid eligibility contractions lower hospital profit-margins. Determining the ultimate beneficiaries of the ACA Medicaid expansions, however, remains a question for further research.

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TABLES AND FIGURES

Figure A1. Event Study of Financial Outcomes
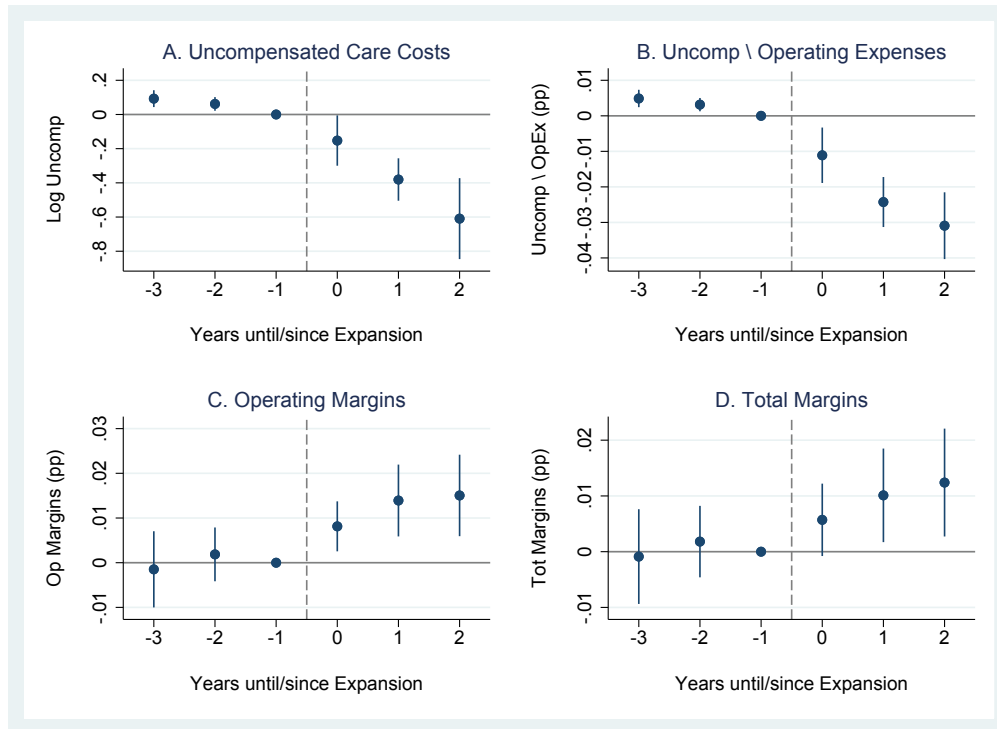
Note: Regression estimates of Equation 2. The omitted year (denoted -1 on the x-axis) is the year before the state in which a hospital is located expanded Medicaid. Standard errors are clustered at the state level. Uncompensated care expenses (Panel A and B) are given in terms of costs rather than charges, and include both bad debt and charity care. Note that the y-axis scales are different on each panel.

Figure A2. Event Study of Operational Outcomes

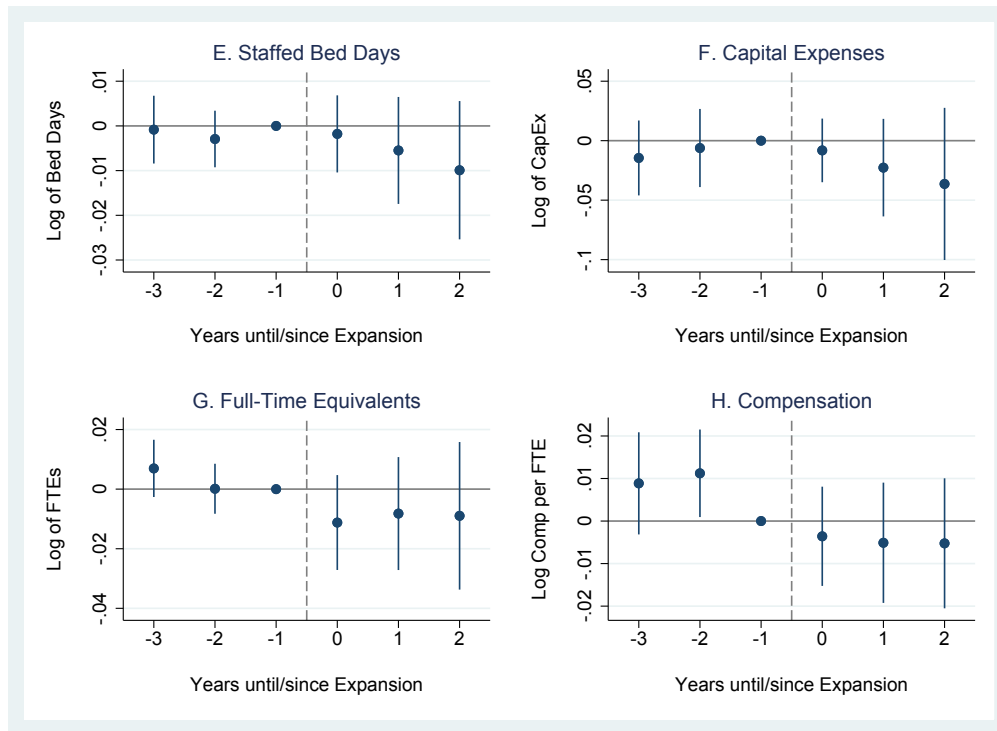*Note:* Regression estimates of Equation 2. The omitted year (denoted -1 on the x-axis) is the year before the state in which a hospital is located expanded Medicaid. Standard errors are clustered at the state level. Note that the y-axis scales are different on each panel.

Table A1— Which States Expanded Medicaid and When?

Panel A: Treatment Group

AR	January 1, 2014
AZ	January 1, 2014
CA	January 1, 2014
CO	January 1, 2014
CT	January 1, 2014
HI	January 1, 2014
IL	January 1, 2014
IA	January 1, 2014
KY	January 1, 2014
MD	January 1, 2014
MN	January 1, 2014
NJ	January 1, 2014
NM	January 1, 2014
NV	January 1, 2014
ND	January 1, 2014
OH	January 1, 2014
OR	January 1, 2014
RI	January 1, 2014
WA	January 1, 2014
WV	January 1, 2014
MI	April 1, 2014
NH	August 15, 2014
PA	January 1, 2015
IN	February 1, 2015
AK	September 1, 2015
MT	January 1, 2016
LA	July 1, 2016

Panel B: Control Group - Non-expansion States

AL	FL	GA
ID	KS	ME
MS	MO	NE
NC	OK	SC
SD	TN	TX
UT	VA	WI
WY		

Panel C: Excluded from the Analysis

DC	DE	MA
NY	VT	

Note: Source - Kaiser Family Foundation

Table A2— Descriptive Statistics

	Control	Treatment
Operating Margin	0.0252	0.0226
	(0.1364)	(0.1130)
Total Margin	0.0475	0.0452
	(0.1206)	(0.0980)
Uncomp Care Operating Expenses	0.0638	0.0485
	(0.0490)	(0.0415)
Beds	139.2497	149.2421
	(185.9427)	(166.2936)
Employees (FTEs)	781.7673	986.0631
	(1275.8091)	(1395.2188)
Compensation per FTE	68743.6971	78657.6136
	(14293.9004)	(20670.6804)
For-Profit Hospitals	0.2558	0.1272
	(0.4364)	(0.3332)
Government Hospitals	0.2899	0.1864
	(0.4538)	(0.3895)
Non-Profit Hospitals	0.4543	0.6864
	(0.4980)	(0.4640)
County Median Household Income	45787.0927	51122.0842
	(10780.0002)	(12570.8120)
County Population	338971.6476	846257.8337
	(703713.8253)	(1946300.0279)
Share Uninsured <138 FPL (Cty)	10.2796	7.8496
	(3.5679)	(3.0662)
Share Uninsured 138-400 FPL (Cty)	10.6771	8.9338
	(2.9396)	(2.6554)
Obs.	3,788	3,986

Note: The baseline years used to calculate the summary statistics are 2012-13, the years immediately preceding the first Medicaid expansions in 2014.

Table A3— The Effects of Medicaid Expansion on Hospital Finances

	(1) Log Uncomp	(2) Uncomp / Opex	(3) Operating Margins	(4) Total Margins
Treatment	-0.382***	-0.0225***	0.0115**	0.00845*
	(0.0609)	(0.00340)	(0.00335)	(0.00343)
Observations	23744	23729	23793	23815
Adjusted R^2	0.051	0.050	0.003	0.002

Note: Regression estimates of Equation 1. Treatment is the diff-in-diff estimate of expanding Medicaid on hospital outcomes. Standard errors are clustered at the state level. Uncompensated care expenses (Columns (1) and (2)) are given in terms of costs rather than charges, and include both bad debt and charity care.

Table A4— Hospital Investment and Staffing

	(1) Bed Days	(2) Capital Expenses	(3) FTEs	(4) Compensation
Treatment	-0.00381	-0.0135	-0.0117	-0.0105
	(0.00589)	(0.0218)	(0.00896)	(0.00693)
Observations	24266	21844	24210	24073
Adjusted R^2	0.006	0.014	0.004	0.140

Note: Regression estimates of Equation 1. Treatment is the diff-in-diff estimate of expanding Medicaid on hospital outcomes. Standard errors are clustered at the state level.

Table A5— Private Insurance Subsidies - Financial

	(1) Uncomp / OpEx	(2) Uncomp / OpEx	(3) Unreimb / OpEx	(4) Unreimb / OpEx
Medicaid Expansion	-0.0225***	-0.0213***	-0.0159***	-0.0139***
	(0.00340)	(0.00300)	(0.00357)	(0.00305)
Share Eligible Subsidies		0.000754		0.00119***
		(0.000497)		(0.000315)
Observations	23729	23723	23799	23793
Adjusted R^2	0.050	0.052	0.041	0.044

Note: Regression estimates of Equation 1. Medicaid Expansion is a binary variable for whether a state has expanded Medicaid or not, and Share Eligible Subsidies is a treatment intensity measure for the number of individuals between age 18 and 65 in a county who are eligible for premium subsidies. Standard errors are clustered at the state level. Uncompensated care expenses over operating expenses (Column (1)) are given in terms of costs rather than charges, and include both bad debt and charity care.

Table A6— Private Insurance Subsidies - Investment

	(1) Log Bed Days	(2) Log Bed Days	(3) Log Compensation	(4) Log Compensation
Medicaid Expansion	-0.00381 (0.00589)	0.000161 (0.00612)	-0.0105 (0.00693)	-0.00756 (0.00527)
Share Eligible Subsidies		0.00258* (0.00121)		0.00182 (0.00128)
Observations	24266	24260	24073	24067
Adjusted R^2	0.006	0.007	0.140	0.141

Note: Regression estimates of Equation 1. Medicaid Expansion is a binary variable for whether a state has expanded Medicaid or not, and Share Eligible Subsidies is a treatment intensity measure for the number of individuals between age 18 and 65 in a county who are eligible for premium subsidies. Standard errors are clustered at the state level.

Table A7— Calendar Year

	(1) Uncomp / Opex	(2) OP Margins	(3) Bed Days	(4) Capex	(5) FTEs	(6) Compensation
Treatment	-0.0234*** (0.00426)	0.00611 (0.00590)	-0.0156 (0.00819)	-0.00578 (0.0278)	-0.0306* (0.0142)	-0.0102 (0.00622)
Observations	8900	8924	9180	8158	9145	9118
Adjusted R^2	0.045	0.004	0.003	0.028	0.012	0.126

Note: Regression estimates of Equation 1. Treatment is the diff-in-diff estimate of expanding Medicaid on hospital outcomes. Standard errors are clustered at the state level. Uncompensated care expenses over operating expenses (Column (1)) are given in terms of costs rather than charges, and include both bad debt and charity care.

Table A8— Unreimbursed Care

	(1) Log Uncomp	(2) Uncomp / OpEx	(3) Log Unreimb	(4) Unreimb / OpEx
Treatment	-0.382*** (0.0609)	-0.0225*** (0.00340)	-0.194*** (0.0498)	-0.0159*** (0.00357)
Observations	23744	23729	23836	23799
Adjusted R^2	0.051	0.050	0.028	0.041

Note: Regression estimates of Equation 1. Treatment is the diff-in-diff estimate of expanding Medicaid on hospital outcomes. Standard errors are clustered at the state level. Uncompensated care expenses over operating expenses (Column (1)) are given in terms of costs rather than charges, and include both bad debt and charity care.

Table A9— For Profit

	(1) Uncomp / Opex	(2) OP Margins	(3) Bed Days	(4) Capex	(5) FTEs	(6) Compensation
Treatment	-0.0255***	0.0118	-0.0128	0.0269	-0.00620	-0.0238*
	(0.00439)	(0.00806)	(0.0129)	(0.0441)	(0.0221)	(0.0112)
Observations	4542	4597	4680	4434	4659	4654
Adjusted R^2	0.110	0.002	-0.000	0.023	0.012	0.079

Note: Regression estimates of Equation 1. Treatment is the diff-in-diff estimate of expanding Medicaid on hospital outcomes. Standard errors are clustered at the state level. Uncompensated care expenses over operating expenses (Column (1)) are given in terms of costs rather than charges, and include both bad debt and charity care.

Table A10— Non Profit

	(1) Uncomp / Opex	(2) OP Margins	(3) Bed Days	(4) Capex	(5) FTEs	(6) Compensation
Treatment	-0.0189***	0.00301	-0.00131	-0.0261	-0.0198*	-0.00721
	(0.00380)	(0.00328)	(0.00729)	(0.0298)	(0.00851)	(0.00667)
Observations	13602	13589	13829	12030	13814	13748
Adjusted R^2	0.042	0.001	0.014	0.005	0.004	0.154

Note: Regression estimates of Equation 1. Treatment is the diff-in-diff estimate of expanding Medicaid on hospital outcomes. Standard errors are clustered at the state level. Uncompensated care expenses over operating expenses (Column (1)) are given in terms of costs rather than charges, and include both bad debt and charity care.

Table A11— Government

	(1) Uncomp / Opex	(2) OP Margins	(3) Bed Days	(4) Capex	(5) FTEs	(6) Compensation
Treatment	-0.0258***	0.0327***	0.00490	0.0218	0.0251	-0.0113
	(0.00456)	(0.00702)	(0.00940)	(0.0362)	(0.0195)	(0.00997)
Observations	5585	5607	5757	5380	5737	5671
Adjusted R^2	0.056	0.018	0.004	0.057	0.009	0.201

Note: Regression estimates of Equation 1. Treatment is the diff-in-diff estimate of expanding Medicaid on hospital outcomes. Standard errors are clustered at the state level. Uncompensated care expenses over operating expenses (Column (1)) are given in terms of costs rather than charges, and include both bad debt and charity care.

Table A12— Rural

	(1) Uncomp / Opex	(2) OP Margins	(3) Bed Days	(4) Capex	(5) FTEs	(6) Compensation
Treatment	-0.0202***	0.0190***	-0.00284	-0.0432	0.00508	-0.0171*
	(0.00375)	(0.00503)	(0.00805)	(0.0291)	(0.0130)	(0.00823)
Observations	9364	9431	9536	9139	9524	9499
Adjusted R^2	0.059	0.011	0.011	0.032	0.001	0.201

Note: Regression estimates of Equation 1. Treatment is the diff-in-diff estimate of expanding Medicaid on hospital outcomes. Standard errors are clustered at the state level. Uncompensated care expenses over operating expenses (Column (1)) are given in terms of costs rather than charges, and include both bad debt and charity care. Hospitals are considered rural if the county in which they are located has a population of less than 50,000.

Table A13— Inpatients

	(1) Inpat Discharges	(2) Inpat Days
Treatment	-0.00966	0.00243
	(0.0109)	(0.0140)
Observations	24255	24249
Adjusted R^2	0.038	0.083

Note: Regression estimates of Equation 1. Treatment is the diff-in-diff estimate of expanding Medicaid on hospital outcomes. Standard errors are clustered at the state level.