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All Medicaid Expansions Are Not Created Equal: The Geography and Targeting of the Affordable Care Act

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ABSTRACT

The researchers use comprehensive patient-level discharge data to study the effect of Medicaid on the use of hospital services. Their analysis relies on cross-state variation in the Affordable Care Act's Medicaid expansion, along with within-state variation across ZIP Codes in exposure to the expansion. They find that the Medicaid expansion increased Medicaid visits and decreased uninsured visits. The net effect is positive for all visits, suggesting that those who gain coverage through Medicaid consume more hospital services than they would if they remained uninsured. The increase in emergency department visits is largely accounted for by "deferrable" medical conditions. Those who gained coverage under the Medicaid expansion appear to be those who had relatively high need for hospital services, suggesting that the expansion was well targeted. Lastly, the researchers find significant heterogeneity across Medicaid-expansion states in the effects of the expansion, with some states experiencing a large increase in total utilization and other states experiencing little change. Increases in hospital utilization were larger in Medicaid-expansion states that had more residents gaining coverage and lower pre-expansion levels of hospital uncompensated care costs.

The United States healthcare sector is often described as a market-based system driven by private firms. The government, nevertheless, plays an enormous role. As of 2018, over half of all U.S. healthcare expenditures came from the public sector—primarily through Medicare and Medicaid, but also through the subsidization of employer-sponsored health insurance via the tax code. Medicare has covered the elderly (65 and over) population in the U.S. since its creation in 1965, and growth in program enrollment has been driven primarily by shifting demographics. Medicaid, by contrast, has grown from a program that initially targeted the indigent and the disabled to a far more generous program that currently provides coverage to over 70 million Americans (Rudowitz, Antonisse, and Hinton 2018).

Expansion of Medicaid eligibility can be thought of as a reflection of society's evolving beliefs about social insurance. Historically, Medicaid enrollees needed to be both low-income and in a particular category in order to qualify for coverage. Coverage was extended to pregnant women and their children in the 1980s and then to relatively higher-income children in the 1990s through the State Children's Health Insurance Program. Throughout the 1990s and 2000s, states used federal waivers to expand Medicaid to additional categories of low-income individuals. These expansions mostly covered parents but, in only a few states, covered low-income childless adults (Long, Zuckerman, and Graves 2006). This focus on categorical eligibility was partly motivated by a belief that individuals in these specific groups were in particular need of assistance and that limiting the eligibility criteria to include only those groups could increase the target efficiency of Medicaid spending.

The largest and most-controversial expansion occurred with the implementation of the Affordable Care Act (ACA) in 2014. For those earning below 138 percent of the federal poverty line (approximately $16,600 for an individual in 2019), the ACA fundamentally changed the concept of Medicaid eligibility. It did so by stripping away categorical requirements, along with considerations over non-income assets, for the purposes of determining program eligibility for the under-age-65 population. Instead, the law transformed Medicaid into an entitlement with new eligibility criteria based on a current monthly modified adjusted gross income (MAGI) standard.[1]

[1] Categorical eligibility determinations are still used within non-expansion states and within the entire the Medicaid program to determine the share of state vs. federal financing. Moreover, asset tests can still be used for eligibility determinations of individuals over age 65.

Expansion of Medicaid eligibility to a greater fraction of the low-income population was driven by a variety of motivations. Certainly, policymakers were motivated by the desire to ensure some baseline level of access to healthcare. As such, the expansions reflected the preferences of the electorate over what this baseline level of access entails.[2] That said, policymakers were also motivated by questions regarding the efficiency of the healthcare sector. Specifically, policymakers and advocates for the ACA routinely noted that lack of access to formal insurance results in healthcare being provided in more-expensive settings than would otherwise be necessary (e.g., primary care services provided in emergency departments).

Finally, federal lawmakers have also shown a preference for establishing a baseline of access to healthcare across states. While Medicaid has always been a state-administered program, federal expansions have progressively raised the floor of who would be covered in all states. States have always had—and many have exercised—the right to exceed that floor and provide more-generous social insurance. In this way, federal Medicaid policy serves as a safety net that reflects the nation's preferences for a compromise, maintaining a minimum level of access but allowing for variation above that minimum across states.

The ACA represents the largest reform of the healthcare sector since the creation of the "Great Society" programs in the 1960s. But after nearly a decade since the ACA's adoption, approximately 10 percent of the non-elderly population remains formally uninsured. This persistence of uninsurance stems, in part, from a 2012 Supreme Court decision that allowed states to refrain from implementing the ACA's Medicaid expansion. In 2014, the expansion was fully implemented with 100-percent federal financing, and only 24 states elected to expand Medicaid. Over the next three years, an additional 7 states adopted expansions. Currently, 36 states have expanded their Medicaid programs under the (nearly full) federal financing and authority granted by the ACA. Research has shown that state expansion decisions have meaningful impact on access to formal insurance. As of 2018, the share of the population without insurance was 16.1 percent in non-expansion states compared to 7.5 percent in expansion states (Haley et al. 2018).

While the decision over whether to expand Medicaid is clearly an important one, a variety of other policy decisions have contributed to an ongoing lack of universal coverage in the

[2] In 2013, President Obama defended that ACA and cited both its social-insurance benefits and increased access to healthcare: "In the wealthiest nation on Earth, no one should go broke just because they get sick. In the United States, health care is not a privilege for the fortunate few, it is a right" (Wilson and Wiggins 2013).

U.S. These include features of the ACA as well as differences in implementation decisions both within and across states. Lack of universal coverage has led to a variety of calls to further expand the social safety net for healthcare. These policies range from expansions of the existing ACA framework to a single-payer system that covers the entire nation.

Evaluating the efficacy of an expanded social insurance system requires careful consideration of the impact of previous expansions. In this paper, we examine the effects of the ACA using a large dataset maintained by the Agency for Healthcare Research and Quality (AHRQ) that covers the near universe of hospitalizations in 20 states. In each of those states, shown in Figure 1, we have data from 2012 to 2015 covering all outpatient and inpatient emergency department (ED) visits as well as inpatient hospitalizations that initiated in the ED.[3] As we consider the ACA, three natural questions arise that can inform both the design of future expansion efforts as well as help understand broader economic effects of existing social insurance programs.

First, did the ACA's expansion of Medicaid lead to a more-efficient utilization of healthcare? In particular, did those who became newly insured through Medicaid decrease their use of the ED? To answer this question, we use several identification strategies to examine overall and state-level impacts of the Medicaid expansion on ED use. We find consistent evidence across those identification strategies that Medicaid coverage increased the use of hospital services. The estimates rule out large declines in the use of the ED as a result of Medicaid expansions.

Second, did the expansion and transformation of Medicaid meet the goal of providing access to healthcare for those who most needed it? This is often described as the "target efficiency" of social insurance: the degree to which those who gain coverage are those who most need the assistance. To examine the target efficiency of the ACA we examine the use of healthcare for the newly insured compared to those who remain ineligible for the expanded program. We find that those gaining access to Medicaid in expansion states had greater pre-expansion utilization of healthcare than those who remained uninsured. This suggests that the

[3] The data encompass about 95 percent of all discharges in each state. HCUP databases do not include Federal hospitals (e.g., Veterans Affairs, Department of Defense, and Indian Health Service hospitals), long-term hospitals, psychiatric hospitals, alcohol/chemical dependency treatment facilities, and hospital units within institutions such as prisons.

expansion of Medicaid based on income, rather than specific categories of need, successfully targeted the remaining uninsured with greater pre-expansion use of medical services. Looking at non-expansion states, we see an increase in private insurance driven by the creation of the ACA marketplaces. In this setting, we find that those who purchased private insurance were also those with the greatest use of medical services. This suggests that the subsidized marketplaces, even though they required contributions from enrollees, provided coverage to those with a greater demand for healthcare services.

Finally, we examine heterogeneity in the impact of the expansion across states. At a minimum, the decision of some states to not expand Medicaid created variation in the social safety net across states. We investigate other sources of heterogeneity in the effects of the ACA across states. This variation extends beyond simply the question of take-up (i.e. how much of the eligible population signed up for formal insurance) and also reflects differences in the increase in the use of hospitals services among the newly insured. This heterogeneity should generate some caution in generalizing results from previous state expansions to other settings. It also provides some explanation for the heterogeneity in the existing literature on the relationship between Medicaid coverage and hospitalizations. Across all the states in our sample, we find that the ACA Medicaid expansion resulted in an increase in the use of hospital services. In a number of states, however, the estimated effect is small and statistically indistinguishable from zero. We also examine heterogeneity in the target efficiency of the expansions, finding that the degree to which the expansions could target those with the greatest need for medical services varied meaningfully across states.

1. Medicaid Expansions and the Use of Hospital Services

Concerns about access to healthcare have resulted in regulations that make the sale of healthcare fundamentally different from other sectors of the economy. For instance, hospital EDs are required by law to stabilize anyone with an emergency condition regardless of their ability to pay.[4] This creates several economic frictions. First, hospitals are effectively required to serve as "insurers of last resort" for care not paid for directly by patients or explicitly financed

[4] The Emergency Medical Treatment and Active Labor Act (EMTALA) introduced this requirement in 1983.

via public or private insurance (Garthwaite, Gross, and Notowidigdo 2018).[5] Second, since only hospitals with EDs are covered by this mandate, some conditions may be treated in the relatively high-marginal-cost setting of the hospital ED when they could be more efficiently treated in other, lower-cost settings. Third, the uninsured are often unable to gain access to routine, preventive primary care and expensive pharmaceuticals. Thus, there is a concern that medical conditions that could have been managed early and at a lower cost instead develop into acute episodes that end up costing the entire system more than they otherwise would if there were more widespread insurance coverage.

Differences in the ability to access healthcare can be seen in the data. Table 1 describes the use of hospital services by insurance status before the ACA. In our data, only 2.2 percent of the hospital visits for the uninsured were inpatient stays that did not originate in the ED. This is far less than the share for Medicaid patients (10 percent) and the privately insured (14.1 percent). Relatedly, three-quarters of the inpatient visits for the uninsured began in the ED. The corresponding numbers for Medicaid recipients and the privately insured are much lower, approximately 52 and 41 percent, respectively. Overall, those with private insurance had the lowest use of hospital services, which likely reflects the fact that those with private coverage are relatively healthy.[6]

These estimates suggest that while the uninsured do have access to healthcare through the ED, there are legitimate concerns that they lack access to more-discretionary and expensive healthcare services. Those concerns are often called the "access motive" for health insurance. The access motive argues that consumers need health insurance for reasons that extend beyond the need to smooth consumption across different states of the world, that is, the traditional economic rationale for insurance. Rather, an additional primary benefit of health insurance is to maintain *access* to healthcare for liquidity constrained populations (Nyman 1998; Besanko, Dranove, and Garthwaite 2016).

The access motive was cited by many policymakers in support of the ACA. For example, Speaker of the House Nancy Pelosi argued that "the uninsured will get coverage, no longer left

[5] While hospitals do receive supplementary funding to account for these expenses, the degree to which these fully reinsure hospitals is unclear. For example, Garthwaite, Gross and Notowidigdo (2018) find that hospital bear the brunt of the costs of marginal uninsured patients through lower profits.
[6] Despite some erroneous commentary in the popular press, it is wrong to consider this higher use of medical services by Medicaid recipients as a causal effect of Medicaid decreasing people's health.

to the emergency room for medical care" (Blase 2016). On the opposite side of the aisle, Rick Snyder, the Republican Governor of Michigan argued: "uninsured citizens often turn to emergency rooms… leading to crowded emergency rooms, longer wait times and higher costs. By expanding Medicaid, those without insurance will have access to primary care, lowering costs and improving overall health" (Kliff 2014).

As is often the case, economic research on this topic is less clear than what one would infer from the statements of activists and policymakers. It is true that the uninsured often face barriers to care outside of the ED. That said, care at the ED for the uninsured can be quite costly to the uninsured themselves. While hospitals are required to stabilize emergency patients regardless of their ability to pay, they are allowed to (and often do) bill for these services. Existing evidence suggests that hospitals do not recover all—or even most—of the costs of providing this service, but they do enact meaningful financial and psychic costs on those from whom they attempt to collect (Mahoney 2015). Non-profit hospitals enjoy tax-exempt status because they provide "community benefit," including charity care to the uninsured. But even these non-profit hospitals have been shown to go to great lengths—including litigation and wage garnishment—to re-cover unpaid bills.[7]

As a result, health insurance decreases the cost of accessing the ED, and this could create a moral-hazard response that results in more ED visits. That moral-hazard effect could be exacerbated by both perceived and real transaction costs. These costs derive from the need to separately secure office-based appointments, lab tests, and other complementary services outside of the emergency setting. This requires identifying a set of providers that accept Medicaid as a form of payment and have availability for appointments—a process that can be time consuming. By comparison, nearly all hospital-based EDs accept Medicaid as payment, offer a wide spectrum of services under one roof, and have minimal differential cost-sharing requirements for Medicaid patients. In addition, it is unclear whether ED services are a complement or a substitute for primary care, or whether that relationship might vary itself by insurance status.

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[7] For example, a recent investigation by ProPublica found that Methodist Le Bonheur Healthcare in Memphis brought thousands of lawsuits for unpaid medical bills in recent years (Thomas 2019), and the New York Times published a similar investigation into the collection efforts of nonprofit hospitals back in 2004 (Cohn 2004). Such practices have led some politicians to discuss trying to "rein in" nonprofit hospitals that bring lawsuits and garnish wages (Armour 2019).

Numerous studies have found clear evidence that Medicaid coverage tends to increase healthcare consumption in general and ED visits in particular. The Oregon Health Insurance Experiment found that low-income, uninsured people who gain health insurance coverage through Medicaid are 40 percent more likely to visit an emergency department (Taubman et al. 2014). That finding matches the conclusions of work by Nikpay et al., (2017); Anderson et al., (2012); Anderson et al., (2013); Card et al., (2008); Dresden et al., (2017); DeLeire et al., (2017); Garthwaite et al. (2017); Smulowitz et al., (2014); and Heavrin et al., (2011).

These studies have shown that insurance coverage increases the likelihood of an ED visit. But the literature is not entirely uniform on this point. Antwi et al. (2015), Hernandez-Boussard et al. (2014), and Sommers et al. (2016) all conclude that expansions of Medicaid actually *decrease* the risk of an ED visit. In particular, Miller (2012) finds that the Massachusetts health care reform—which nearly eliminated the uninsured population in that state—decreased ED visits overall.

Some of the disagreement across these studies may be driven by general-equilibrium effects in the provision of medical services. For example, in a more heavily insured population, primary-care physicians or other outpatient facilities may change their business practices to accommodate the new payer mix in ways that change the use of ED facilities (Richards, Nikpay, and Graves 2016). This could explain why two of the studies of the market-wide change in Massachusetts produced estimates that were different from the general thrust of the literature.

By changing both the quantity and setting of healthcare consumed, expansions of Medicaid can have meaningful economy-wide impacts. To the extent that expansion leads to lower healthcare spending, this can free up economic resources for more-efficient uses in other parts of the economy. In addition, to the extent that more-efficient provision of healthcare can increase the underlying health of the population, it could also increase labor-force productivity for those affected. Both of these channels suggest meaningful macroeconomic impacts from changes to Medicaid.

Determining the broader economic impact of Medicaid is even more important given the current uneven geographic access to the ACA Medicaid expansion. As of mid-2019, 13 states have still not expanded their programs. In the next section, we describe the specifics of the ACA Medicaid expansion, which underlies our various identification strategies.

2. Background on the ACA Medicaid Expansion

Of primary importance to the questions in this paper, the ACA increased access to health insurance through both a large expansion of Medicaid for low-income populations as well as the creation of a series of state-based insurance marketplaces where individuals could purchase non-group insurance. Those purchasing insurance in these individual marketplaces could not be denied coverage for pre-existing medical conditions and their premiums could only vary by smoking status, across geographic rating areas determined by the state, and by age (with the ratio of premiums across age groups not to exceed 3-to-1). In order to combat adverse selection, individuals were mandated to purchase insurance or pay a penalty on their income taxes.[8]

Legal residents who earn less than 138 percent of the FPL are eligible for Medicaid. Those who earn between 100 and 400 percent of the FPL and who aren't otherwise Medicaid-eligible qualify for federal subsidies that limit marketplace plan premiums to a fixed percentage of the enrollee's income. Those earning between 138 and 250 percent of the FPL receive additional subsidies that limit their exposure to cost sharing (e.g., deductibles, co-payments and co-insurance). Those who earn more than 400 percent of the FPL, and those under 100 percent of the FPL, can still purchase insurance on the marketplace but they are required to pay the entire premium.

The ACA was exceptionally controversial and attracted large amounts of litigation. In the summer of 2012, the US Supreme Court upheld the constitutionality of the ACA's individual mandate. However, the Court also allowed states to opt out of the act's expansion of Medicaid to 138 percent of the FPL.

For those living in states that did not expand Medicaid, access to formal health insurance effectively depends on family income. Those who earn between 100 and 138 percent of the federal poverty level can purchase heavily subsidized insurance on the marketplace. These individuals also receive generous cost-sharing subsidies that made their coverage more similar to Medicaid—though Medicaid could be a preferred coverage vehicle given its even-lower cost-

[8] The individual mandate was effectively eliminated as part of a Congressional reform of the federal tax system in 2017.

sharing requirements, zero-dollar premiums (in some states), and a broader range of benefits than traditionally covered by private plans (e.g., transportation services).

Residents in non-expansion states that earn less than 100 percent of the federal poverty line (FPL) fall into a "coverage gap." These residents earn too much money to quality for their state's relatively parsimonious and categorically based Medicaid program and too little to qualify for subsidies on the ACA marketplaces. According to the Kaiser Family Foundation, this has resulted in approximately 2.5 million residents that lack access to health insurance based solely on their state of residence. Nearly half of these residents live in either Florida or Texas and over 90 percent live in the southern US. Given the state-based nature of decisions about the ACA, the potential economic benefits of the increased social insurance and the economic opportunities that it might provide can impact the economic growth of different geographies. In addition, the uneven implementation of Medicaid expansion under the ACA raises concerns over equity. To a greater degree than in the past, Americans' access to healthcare often depends on the state in which they reside.

The number of people in the coverage gap meant that the share of the uninsured population fell faster in expansion states compared to non-expansion states. For example, in the first quarter of 2018, the share uninsured in non-expansion states was 16.1 percent compared to 7.5 percent in expansion states (Haley et al. 2018). In addition to having a higher share uninsured, the composition of the insured market also differed based on a state's Medicaid expansion decision. In expansion states, those between 100 and 138 percent of poverty enrolled in Medicaid. However, in non-expansion states these individuals had access to heavily subsidized insurance through the marketplaces. Thus, one would expect the share with private insurance to be different across these states after the implementation of the ACA.

3. Data

The primary databases used in our empirical analysis are the State Emergency Department Database (SEDD) and the State Inpatient Database (SID). The databases are part of the Healthcare Cost and Utilization Project (HCUP) and are maintained by the Agency for Healthcare Research and Quality (AHRQ).

The SID and the SEDD are both made up of state-specific files. Each state-specific file covers a near-census of hospital and ED visits for a given calendar year. The databases are detailed and comprehensive; they are well-suited to studying state-level policy changes. Our analysis focuses on the following 20 states: Arizona, California, Connecticut, Florida, Georgia, Iowa, Indiana, Kansas, Maryland, Minnesota, Missouri, New Jersey, New York, Ohio, Rhode Island, South Carolina, South Dakota, Utah, Vermont, Wisconsin.[9] These states cover 51 percent of the U.S. population and 55 percent of the Medicaid population, and include both expansion and non-expansion states.[10]

The SID contains about 97 percent of all inpatient hospitalizations in participating states, while the SEDD contains more than 95 percent of ED encounters. Both databases contain a set of clinical information (e.g., length of stay, primary and secondary diagnoses) and nonclinical information (e.g., age, gender, race, total charges) on all patients, including individuals covered by Medicare, Medicaid, or private insurance, as well as those who are uninsured.[11] In this paper, we focus on the primary diagnosis code, since it allows us to categorize hospitalizations into "deferrable" or "non-deferrable" visits.

We follow Mulcachy et al. (2013) and Garthwaite et al. (2017) in identifying deferrable and non-deferrable visits. Deferrable visits are those for which a panel of physicians indicates that the patient likely has some discretion as to when to present to a professional. By contrast, non-deferrable visits are hospital visits for one of 12 conditions that have been identified by a panel of physicians as likely to require immediate medical treatment regardless of insurance coverage or financing. For instance, an intracerebral hemorrhage is classified as non-deferrable visit—patients with this condition would almost certainly present at an ED regardless of their insurance status.[12]

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[9] We selected this sample of states based on conversations with AHRQ staff. We excluded states that did not have consistent measurement and categorization of payer categories during this time period or did not have patient ZIP Code information that is necessary for our county- and ZIP-Code-level analysis.

[10] Data sources for these calculations are the US Census Bureau American Fact Finder (https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=PEP_2018_PEPANNRES&src=pt) and the Centers for Medicaid and Medicaid Services Enrollment data (https://data.medicaid.gov/Enrollment/2018-12-Updated-applications-eligibility-determina/gy72-q4z9/data).

[11] We categorize patients as uninsured if they are labeled as self-pay, no charge, or no expected payment source in the data.

[12] Non-deferrable conditions include: fracture, poison – toxic effects, dislocation, intracranial injury, appendicitis, foreign body, internal injury, ectopic pregnancy with rupture, crush injury, bowel obstruction, blood-vessel injury, and other non-discretionary conditions.

Most important for our purposes, we also observe each patient's insurance coverage (Medicare, Medicaid, Private) as well as whether the patient was uninsured. Lastly, we observe the patient's ZIP Code of residence, and we observe hospital identifiers in both databases, which we merge to hospital-level characteristics using survey data from the American Hospital Association (AHA).

We process the SID and SEDD state-specific files by first restricting the data to 2012–2015, and we then collapse the data into counts of visits by the following variables: patient ZIP Code, year, month, indicator functions for deferrable conditions, insurance status, and age group (under 18, 18–64, above age 65).[13] The collapsed data can then be used for difference-in-difference and event-study analyses, and most of our empirical models use either raw counts of visits or the natural logarithm of those counts.

Our secondary data comes from several other sources. We collect information on state-level uncompensated care costs (per uninsured individual) by merging AHA data on hospital-level uncompensated care costs with Current Population Survey (CPS) data that allows us to measure the size of the uninsured population in each state in 2013.[14] We calculate the share of the uninsured population eligible for the Medicaid expansion in each county using estimates from the Small Area Health Insurance Estimates (SAHIE) program. Finally, we combine these data with county-level enrollment totals for public and private sources of insurance from Decision Resources Group (DRG), a market research firm. We also draw on longitudinal data on health insurance coverage from waves 1 and 2 of the 2014 Survey of Income and Program Participation (SIPP). As explained below, we use these supplementary data sources to estimate county-based measures of the share of the pre-Medicaid-expansion uninsured population who transitioned to Medicaid coverage after the expansions.

[13] We use patient ZIP Code information to exclude out-of-state patients; these visits represent a small share of all visits. We also exclude the 4th quarter of 2015, because this is when HCUP switched from ICD-9 to ICD-10 for diagnostic code variables, and so we decided to exclude this quarter to maintain comparability across time. We have data covering the first quarter of 2012 through the third quarter of 2015 for all states except for Utah, where we drop all of 2015 because of missing data.

[14] Garthwaite, Gross, and Notowidigdo (2018) describe the AHA and CPS data in more detail.

4. The Effects of the ACA Medicaid Expansion on Hospitalizations and Emergency Department Visits

In order to estimate the effects of the ACA expansion, we exploit the decision by states as to whether or not to expand Medicaid. Figure 2 presents a simple time-series of hospital encounters across states that either expanded Medicaid or did not. The top panel of the figure presents trends by insurance status for all hospital discharges, and the bottom panel presents the same for scheduled inpatient visits.[15] Each panel consists of two separate figures: one for non-expansion states and one for states that did expand Medicaid in January of 2014. Then, in the same vein, Figure 3 presents those plots for inpatient emergency discharges and outpatient emergency discharges.

Across all types of hospital encounters, a basic pattern is unchanged. Medicaid-expansion states saw a decrease in uninsured visits and a corresponding increase in Medicaid visits. By contrast, we observe only a slight increase in Medicaid-covered visits in non-expansion states, possibly driven by the "welcome mat effect."[16] These patterns in the data are what we would expect given states' decisions over the Medicaid expansion.

Figure 4 combines the Medicaid and uninsured visits into one category. Looking at the treatment states, this figure provides evidence of an increase in the use of hospital services following the expansion.

Figure 5 describes the share of visits by insurance category – and the growing importance of Medicaid in expansion states. Together, Figures 4 and 5 present another intriguing and perhaps-less-expected pattern. We observe a moderate increase in private discharges in non-expansion states, and yet no such increase in Medicaid-expansion states. One explanation is that private visits differentially increased in non-expansion states as a result of the presence of individual marketplace subsidies for individuals 100–138 percent of the FPL in non-expansion states but not in expansion states (individuals in expansion states would have been enrolled in

[15] By "scheduled inpatient visits," we mean overnight stays in the hospital that do not involve the ED. By "emergent inpatient visits," we mean overnight stays in the hospital in which the patient is admitted through the ED.
[16] The "welcome mat effect" refers to the tendency for Medicaid enrollment to increase among previously eligible (but unenrolled) individuals as a consequence of broad outreach and enrollment efforts for the ACA's insurance exchanges. Even in states that did not expand Medicaid, the attention and advertising involved in the rollout of the ACA may have led those who were already eligible for Medicaid to sign up for pre-existing Medicaid programs.

Medicaid instead). A portion of the population targeted for Medicaid expansion (i.e., those under 138 percent of the FPL) thus received access to more-affordable marketplace coverage when no Medicaid option was made available. Below, we provide further evidence for this explanation with enrollment data.

This presents an interesting economic point and an econometric complication. Of economic interest, this suggests that low-income residents (100–138 percent of the FPL) in non-expansion states are more likely to be covered by private rather than public coverage. Future work should examine the impact of this difference on access to healthcare and on health outcomes, as differences in utilization mediated by type of coverage (e.g., Medicaid or heavily subsidized private insurance) could inform current policy debates over whether to further expand via public or private modes of coverage. Unfortunately, we were unable to quantify these impacts in our data because we lacked measures of individual income to identify patients in this narrow income range.

Econometrically, this dynamic complicates a simple difference-in-difference approach, because the non-expansion states still saw increases in coverage among an overlapping share of the low-income population (those 100–138 percent of the FPL). This complication extends to the wide and growing body of research on the ACA as well. In essence, the estimated effect of "Medicaid expansion" is the differential effect of Medicaid for those below 100 percent of the FPL plus the effect of differences in mode of coverage for those between 100 and 138 percent of the FPL. The effect of differences in mode of coverage on utilization are likely not insubstantial. In a recent study, among those 100–138 percent of the FPL, adults in expansion states had differentially lower out-of-pocket spending (-$344) and a lower probability of having a high-spending burden (-4.1 percentage points) as compared to those in non-expansion states (Blavin et al 2018). We further discuss this issue below, first by examining the effect of the expansion on private coverage and then by studying within-state variation in exposure to the expansion.

Regardless, these raw time-series figures suggest a natural starting point to study the effects of Medicaid expansion. We next explore standard difference-in-difference regressions that assess the degree to which Medicaid expansion affected the magnitude and coverage profile of hospital utilization. As discussed below, we account for this increase in private coverage in non-expansion states. We then examine a triple-difference specification that attempts to overcome the potential bias from the differential impact of the ACA on private insurance coverage in the non-expansion states.

4.1 Difference-in-Difference Estimates

To isolate the effect of the Medicaid expansion, we calculate utilization for each ZIP Code, year, and month. We estimate the following regression model:

$$Y_{ist} = \beta \cdot Post_{st} + \alpha_i + \alpha_t + \alpha_s \cdot t + \varepsilon_{ist}.$$

Here, we study outcome Y_{ist} for ZIP Code *i* in state *s* and year-month *t*. The variable $Post_{st}$ indicates whether the state has expanded Medicaid, α_i are ZIP-Code-specific fixed effects, α_t are year-month-specific fixed effects. In addition, we include a state-specific linear time trend, $\alpha_s \cdot t$.

Such a regression approach relies on the standard parallel-trends assumption, which is that trends in hospital utilization would have evolved along parallel paths in expansion states relative to non-expansion states if not for the expansion itself. We evaluate the validity of this assumption by examining trends in raw data in the years leading up to the reform as well as the pre-expansion coefficients from event-study specifications.

Figures 6 through 8 present event-study estimates for a variety of outcomes. First, the top panel of Figure 6 presents event-study estimates for all hospital discharges and each type of insurance. Each point represents the difference in total discharges in Medicaid-expansion states versus non-expansion states with the associated confidence interval plotted by dashed lines. The figure suggests that, after 2014, there was a clear increase in Medicaid visits and a decrease in uninsured visits. Importantly, the 2014 change does not seem to be driven by a pre-existing trend. In that sense, the figure supports the parallel-trends assumption that underlies the regression estimates above.

In order to examine whether the expansion increased utilization, we next consider combinations of visits for patients with various types of insurance. The bottom panel of Figure 6 presents similar event studies, but with Medicaid-plus-uninsured hospital discharges plotted alongside private visits. The estimates suggest a clear increase in Medicaid-plus-uninsured visits. Again, that change appears to be sudden and not explained by pre-2014 trends. However, it is also clear that there was a *decrease* in private hospital discharges. Given the aggregate trends described above (and depicted in Figure 4 and 5) this differential decline is likely driven by the *increase* in private coverage in non-expansion states as low-income individuals became eligible for heavily subsidized marketplace coverage.[17] In expansion states, individuals with that income qualify for Medicaid coverage and would likely prefer that to marketplace coverage because Medicaid provides superior financial protection. Therefore, these estimates likely reflect an actual treatment of the ACA on insurance access for low-income individuals in non-expansion states. This increase should provide caution for interpreting other studies that compare expansion and non-expansion states that do not account for differential use of the ACA marketplaces by individuals earning between 100 and 138 percent of poverty.

Next, Figure 7 presents event-study estimates separately for the three types of hospital discharges: scheduled inpatient, inpatient emergency, and outpatient emergency.[18] The three panels of Figure 7 suggest decreases in uninsured visits, increases in Medicaid visits, and smaller decreases in private visits. The figure suggests a smaller effect for inpatient discharges. That smaller effect for inpatient visits is unsurprising given that relatively few uninsured patients have scheduled inpatient visits, and those visits tend to be less discretionary. Recall that hospitals are only required to provide care regardless of the ability to pay for patients in the emergency room; they are not required to provide scheduled inpatient visits to the uninsured. Finally, Figure 8 then presents the same analysis, but focusing on the sum of Medicaid and uninsured visits. Like the bottom panel of Figure 6, Figure 8 suggests a net increase in Medicaid-plus-uninsured visits and a decrease in private visits, across all types of discharges.

In order to provide a sense of the magnitude of the effect, we also estimate the regression specification above. The top panel of Table 2 presents this approach for all types of hospital encounters, with the dependent variable the number of visits in levels. Each cell presents estimates from a separate regression, with the main $Post_{st}$ coefficient tabulated. The first column suggests that Medicaid expansion led to roughly 10,000 more Medicaid-covered hospitalizations

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17 Given that the decline in private appears to be driven by an *increase* in private admissions in the non-expansion states, we do not believe that it demonstrates a "crowding out" of private coverage by public coverage in the expansion states.

18 Emergency department visits come in two types. Outpatient ED visits are medical encounters that begin and end in the ED and the patient is never admitted to the hospital. Inpatient ED visits are medical encounters that begin in the ED and the patient is subsequently admitted to the hospital. Inpatient visits are hospitalizations that do not originate in the ED.

and roughly 7,000 fewer uninsured hospitalizations. Those point estimates, in combination, suggest that the increase in Medicaid visits was larger than the decrease in uninsured visits. The second panel presents estimates in which the logarithm of hospitalizations is the outcome of interest; Medicaid visits increase by roughly 14 percent and uninsured visits decrease by roughly 25 percent.[19]

To further study that comparison, the table also presents estimates for the sum of Medicaid and uninsured visits and for the sum of Medicaid, uninsured, and privately covered visits. The estimates suggest an increase in both of those groupings of visits, though the estimate for all visits is less precisely estimated and more sensitive to the specification. This pattern suggests that Medicaid coverage leads to an increase, rather than a decrease, in utilization.

To better understand the dynamics of the effect of expanding Medicaid on utilization, we separate hospital encounters by category. Columns 2 through 4 suggest a roughly similar pattern for scheduled inpatient visits, inpatient visits that originated in the ED, and ED visits, respectively. In all cases, we see a statistically significant decrease in uninsured visits, combined with an increase in Medicaid visits. All types of encounters seem to increase on net: the increase in Medicaid visits is larger than the decrease in uninsured visits. When we consider all visits (Medicaid, uninsured, plus private) the effect is still positive and relatively large but is not statistically significant in all specifications.

Finally, Table 2 offers insight into which *types* of hospital encounters became more common. Column 5 presents estimates with deferrable hospital visits as the outcome of interest, and column 6 presents estimates with non-deferrable hospital visits as the outcome of interest. Following Garthwaite et al. (2017) and others, we focus on deferrable and non-deferrable visits as a way to disentangle changes in coverage rates from changes in the propensity to visit the hospital.

The two columns suggest similar relative drops in uninsured visits for either category, with roughly similar relative increases in Medicaid-covered visits. However, the regressions suggest a clear increase in Medicaid-plus-uninsured visits for deferrable encounters and no such increase for non-deferrable encounters. That pattern of results is easy to rationalize. The types

[19] It is important to remember that these percentage changes are off of meaningfully difference bases and therefore the magnitudes should not be directly compared. This is why the net effect of the smaller percentage Medicaid change is still an increase in overall use for the Medicaid and uninsured population.

of visits that are most discretionary are deferrable visits. So it unsurprising that we see a net increase in those types of visits. Non-deferrable visits, by contrast, are visits that likely must occur regardless of insurance status.[20]

4.2 Triple-Difference Estimates

A concern with the difference-in-differences approach above is that there may be a variety of state-level factors that are correlated with the Medicaid-expansion decision which could bias the estimates. For example, differential exposure to subsidized coverage in the ACA marketplaces for those 100–138 percent of the FPL may make it hard to assess the effect of the Medicaid expansion on the overall use of hospital services. This may contribute to the relatively small and imprecise estimates of the effect of insurance on the overall use of hospital services.

To address these concerns and provide a more-reliable estimate of the effect of the ACA Medicaid expansion, we next explore within-state variation in the share of each ZIP Code that was made newly eligible for Medicaid as a result of the expansion. Given that the ACA was based on a single income standard (i.e., earning below 138 percent of the poverty line) there is a large amount of variation in the share of each ZIP Code that gained Medicaid eligibility. To measure that variation, we use a Zip-Code-level measure of new Medicaid eligibility adapted from the work of Dranove et al. (2016).[21]

Figure 9 shows the variation across states in this measure. The maps in Figure 9 show variation across expansion states in the overall share of each population made newly eligible, with larger increases in eligibility in California and Ohio and relatively smaller increases in Indiana and Iowa. The bottom panel of Figure 9 shows the counterfactual population share that would have been made newly eligible in non-expansion states; the panel shows that all of the non-expansion states would have had high treatment "intensity" compared to the expansion

[20] In addition, regulations require hospitals to treat all patients with an emergency condition regardless of ability to pay.

[21] This measure was generated using a combination of data from the Brookings Institution data on Zip Code income, the Current Population Survey, and Kaiser Family Foundation income limits for eligibility. The measure is intended to calculate the share of a Zip Code that would made newly eligible for Medicaid as a result of the ACA expansion based on income and the state's pre-existing income limits and the distribution of income in the Zip Code. More details can be found in footnotes 11-14 of Dranove et al. (2016)

states (i.e., much closer to the large increases in California and Ohio than the other expansion states in our sample).

Lastly, Figure 10 illustrates the within-state variation (across ZIP Codes) for two expansion states (the ZIP Code maps for the remaining expansion states are reported in the Appendix). The maps, for Minnesota and New Jersey, show that some ZIP Codes had relatively small changes in eligibility, while other ZIP Codes had increases in eligibility of more than 30–40 percent.

Using this within-state variation, we implement a triple-difference specification that allows the effect of the Medicaid expansion to vary by the share newly eligible in each ZIP Code. This approach allows us to control for other features of the market or the ACA (other than the Medicaid expansion) that differentially impacted ZIP Codes with a greater share of their residents made eligible. Additionally, we are able to include state-year-month fixed effects in all specifications, which can account for confounding state-level shocks that are correlated with expansion and non-expansion status. We estimate the following regression model:

$$Y_{ist} = \beta \cdot Post_{st} \cdot ShareEligible_i + \alpha_i + ShareEligible_i \cdot \alpha_t + \alpha_s \cdot \alpha_t + \varepsilon_{ist}.$$

As with the difference-in-difference model above, we study outcome Y_{ist} for ZIP Code *i* in state *s* and year *t*. The variable $Post_{st}$ indicates whether the state has expanded Medicaid, α_i are ZIP-Code-specific fixed effects. The $ShareEligible$ variable is the estimate of the share of the ZIP Code's population that was made newly eligible for the ACA in expansion states, and the share that would have been made eligible in non-expansion states. In the spirit of a triple-difference model, this variable is interacted with a full set of year-month-specific fixed effects, α_t, and the regression model also includes a full set of state-year-month-specific fixed effects.

Figure 11 presents event-study estimates from such a triple-difference specification.[22] Panel A presents estimates for each type of insurance. Prior to the expansion, the pattern of the

[22] The event study estimates are based on the same estimation equation except that the $Post_{st}$ variable is replaced with a full set of "event time" dummy variables for each month, excluding December 2013 (which is the normalized reference month in all of our event study figures).

estimated coefficients for all insurance types is broadly flat and generally statistically insignificant. After the expansion, there is an immediate change in utilization by insurance status, with Medicaid visits surging and uninsured visits declining. Unlike the negative estimates of the difference-in-differences specification above, we observe no meaningful changes in the number of privately covered visits.

Panel B of Figure 11 presents triple-difference event-study coefficients for the combined outcome of Medicaid, uninsured, and privately insured visits. Similar to the estimates by category, prior to the expansion, these estimates are broadly flat and near zero. After the expansion, the estimates suggest a gradual, positive and statistically significant post-expansion increase in hospital visits. That pattern is consistent with individuals gaining access to insurance and changing their use of medical services, rather than simply a mechanical reclassification of existing behavior, although more research is needed to understand the mechanism driving this gradual increase.

To explore the precise magnitude of the change depicted in these event-study figures, Table 3 presents triple-difference regression estimates. Considering the overall use of hospital services, the first column of Table 3 suggests that the Medicaid expansion caused an increase in the number of hospital visits. To interpret the magnitude of the coefficient, consider that the average ZIP Code in our sample had 24 percent of its residents made eligible for Medicaid. Based on the estimates in Table 3, this implies a change in utilization of approximately 1.9 percent.[23] Understanding the treatment on the treated involves considering the impact of the Medicaid expansion on the share of the population with coverage. If we consider the overall population (i.e. the Medicaid, uninsured, and private) the increase in the share of the population with coverage is approximately 3.75 percent.[24] This implies an increase in the use of hospital services of approximately 50 percent.

Given that most of the privately insured population was largely unaffected by the expansion, this treatment-on-the-treated estimate likely overestimates the change in the use of hospital services. If, instead, we consider the change in insurance status for the population most

[23] We reach a similar conclusion whether we rely on the "Medicaid plus uninsured" specification or the "Medicaid plus uninsured plus private" specification.
[24] This is based on authors' estimates in the SIPP of the expansion increasing the Medicaid population by 15 percent off of a base of 25 percent.

directly affected by the expansion (i.e. the Medicaid and uninsured population), the implied change in the use of hospital services is much smaller and likely a more-accurate estimate of the actual change in behavior. The expansion is associated with a 9.6-percentage-point increase in the share of the Medicaid and uninsured population with insurance coverage. This implies an increase in the use of hospitals services by each newly insured person of approximately 20 percent.

The last two columns of Table 3 estimate the change in utilization by the type of visit. These estimates show that the overall increase in hospital visits was almost entirely driven by outpatient ED visits for deferrable conditions. This pattern of estimates is intuitive. Medicaid expansion effectively lowers the price of an ED visit for the patient, and so we would expect for an increase in visits for those that are discretionary. Appendix Figure A5 presents the corresponding event studies for these outcomes. These again suggest that the increase in outpatient ED visits was gradual in the post-expansion months and not a sharp reclassification.

4.2.A. Variation in the Number of Residents Transitioning to Medicaid

The triple-difference estimates result from the combination of two mechanisms. First, there is a mechanical effect: visits that would have occurred without any policy change are now categorized as a Medicaid visit rather than an uninsured visit. Second, there is an increase in use by those who gained coverage. This second effect likely operates through several channels, including a reduction in the price of a hospital visit, a greater ability of insured patients to access non-emergency hospital services, and the potential that hospitals are a complement, rather than a substitute, for physician and outpatient services.

Given Medicaid's retroactive coverage, the mechanical transition of uninsured to Medicaid visits can happen without any action by the newly eligible. After all, if those individuals have a medical shock that requires the use of hospital services they (or the hospital) can sign up for Medicaid at that point. The behavioral effect, however, likely requires that an individual is actually aware of their new Medicaid coverage in order to change their consumption of medical services.

To examine this second point, we turn to an analysis that examines within-state changes in hospital encounters based on county-level estimates of the number of residents who shifted from uninsured status to Medicaid. This analysis is motivated by the hypothesis that the changes in healthcare utilization we observe were driven by those who actually obtained coverage rather than simply those who were made eligible. We therefore seek to measure the size of the transition population, and to exploit variation across counties in that number to estimate the direct effect of Medicaid on the use of healthcare services. Again, exploiting this source of variation allows us to estimate the effect both in the entire sample and in a sample consisting of only counties in Medicaid-expansion states.

The triple-difference analysis above examines the relationship between the outcome (hospital utilization) and the expansion "dose," the fraction of the population that could enroll in Medicaid. However, to facilitate interpretation in terms of utilization rates per person, we develop estimates of the "response," the number of uninsured individuals who actually took up the Medicaid coverage for which they were newly eligible. We derive these county-level measures from three data sources: (1) county-specific estimates of the number of insured and uninsured residents in 2013 from the Census Bureau; (2) county-level measures of Medicaid and private-coverage enrollment in 2013 from DRG; and (3) a model of insurance transitions fit to a large nationally representative longitudinal (January 2013 to December 2014) panel of monthly insurance coverage among 44,227 individuals in the SIPP.[25] Using those data, we construct a measure for each county of the number of uninsured residents who actually enrolled in Medicaid. This procedure follows the work of Graves et al. (2019) and Graves, McWilliams and Hatfield (2019).

Figure 12 summarizes the relationship between this measure and a measure of the change in healthcare utilization before and after the expansion from the HCUP data. Specifically, we limit the data to the 11 Medicaid-expansion states in the main sample. The figure plots the association between the change in total Medicaid and uninsured visits from 2013 to 2015 for each county and the number of uninsured-to-Medicaid transitions in that county during the same time period. The figure demonstrates a positive relationship.

Building on Figure 12, Table 4 reports analogous regression results, quantifying the magnitude of the association. Table 4 presents regressions in which the outcome of interest is

[25] We also utilize the Census Bureau's 2015 Small Area Health Insurance Estimates (SAHIE) in a validation exercise, as described below.

the difference in Medicaid-plus-uninsured visits between the 12 months after Medicaid expansion and the 12 months before. The first column presents a simple regression in which the only right-hand-side variable is the measure, described above, of the number of county residents who shifted from uninsured status to being Medicaid covered. The coefficient on that variable is 0.32, suggesting that each county resident who gained Medicaid was associated with approximately one-third of a visit.

The second-through-fourth columns of Table 4 probe the robustness of this finding. The regression in column 2 adds controls for state-specific fixed effects in order to isolate within-state variation in uninsured-to-Medicaid transitions, and the regression in column 3 adds a control for the number of visits consumed by the county's residents in the pre-expansion period. Column 4 includes a control for the size of the county's Medicaid enrollment before expansion. In all cases, the key coefficient on the proxy for the number of uninsured-to-Medicaid transitions remains roughly 0.3. Columns 5 through 8 present similar results from analogous specifications that exclude the largest counties. Since the regression is in first differences and in levels, including the largest counties substantially increases precision, but the inclusion of those counties does not entirely drive the results.

Appendix Table A1 reports results which address the fact that we likely measure each county's number of uninsured-to-Medicaid transitions with error. Given that potential measurement error, we instrument for the uninsured-to-Medicaid transitions with the change in the uninsured population before and after Medicaid expansion. The IV estimates in Appendix Table A1 are very similar in magnitude to the estimates in Table 4.[26] Finally, Appendix Table A2 replicates Table 4, but with the outcome of interest being the combined total of Medicaid, uninsured and private visits. Those estimates are quite similar to those in Tables 4 and Appendix Table A2, which suggests that changes in private visits are not biasing our conclusions about the net effect of the expansion on Medicaid-plus-uninsured visits.

This estimated increase is larger in magnitude to our preferred triple-difference estimate. This is understandable given that this is likely an overestimate of the true increase in use resulting from the expansion. While we are able to accurately measure the share of the population

[26] Additionally, Appendix Table A2 reports results using the DRG-based estimate rather than the SIPP-based population estimate. That table presents fairly similar results to those in Table 4 using this alternative estimate of population transitioning from being uninsured to being on Medicaid.

that actively transitions to Medicaid, any individuals that become newly eligible as a result of the expansion but do not sign up for coverage would not be accounted for in our transition measure. Visits by these individuals, however, would largely be categorized as a Medicaid visit in the hospital data because these individuals are retroactively eligible for coverage and Medicaid therefore paid for the visit. Thus, the measure of the increased use of hospital services based on the transition measure will overstate the true increase in use by those who take-up Medicaid coverage. That said, this upward bias is likely small and therefore the fact that this estimate is similar to the triple-difference estimate provides additional support for the fact that insurance expansions increase rather than decrease the use of hospital services.

5. How Target Efficient Was the ACA Medicaid Expansion?

One of the goals of publicly provided insurance is to provide assistance for those with the highest unmet need for healthcare coverage. The ACA attempted to meet this goal through both the expansion of Medicaid and the creation of heavily subsidized insurance marketplaces. This section examines how well-targeted these policies were towards those with the highest unmet need for health insurance.[27]

5.1 The Target Efficiency of Medicaid Expansions

Historically, Medicaid has been a program of categorical eligibility with benefits provided to low-income groups that were perceived to have high unmet need for healthcare. For example, Medicaid was available for low-income individuals who were disabled or pregnant – two groups with higher-than-average medical spending. The ACA expansion did not target particular groups but instead made coverage available to everyone earning below 138 percent of the FPL. That feature of the expansion led to a concern that the program would fail to provide coverage to those with the highest demand for healthcare. This would decrease the proverbial "bang for the buck" of the program.

To examine the target efficiency of the ACA Medicaid expansion, we focus on counties in the 13 expansion states listed above. In each of these counties, we calculate average utilization

[27] Note that this is not the same as unmet need for healthcare. We lack data on underlying health status and instead have data on the use of healthcare services.

by dividing total uninsured visits by an estimate of the uninsured population from 2012–2014. We then perform the same calculation for the Medicaid population, dividing utilization by enrollment in both periods. Finally, we do the same calculation for the privately insured.

Table 5 reports the results of these calculations. The first row shows an average of 0.354 visits (combining hospital visits and ED visits) per uninsured individual in the pre-ACA period. After the ACA, this average drops to 0.237 in 2014, a decline of 33.2 percent. These averages are based on simple unweighted means across the counties in the sample; the last two columns suggest a similar pattern when taking a weighted average across counties based on pre-ACA county population. This weighting causes little substantive change in the estimates. The decline in average utilization for the uninsured is consistent with the hypothesis that those who move from uninsured status to Medicaid have higher-than-average utilization in the pre-ACA period. As a result, removing them from the uninsured population leads to a reduction in the average utilization rate for the uninsured population in the post-ACA period. These estimates thus suggest that the ACA was broadly target efficient.

The second row of Table 5 also suggest that *pre-ACA* Medicaid expansions were not particularly target efficient compared to earlier categorical expansions. After the ACA expansion, the visits per Medicaid enrollee increases. This suggests that the newly insured also had a greater use of hospital services than those who were made eligible for Medicaid through prior expansions. In other words, Medicaid under categorical eligibility was not more target efficient, on average, than a system with eligibility based solely on income.

A concern with this analysis is that these changes in utilization rates might be driven by broader trends over time unrelated to the ACA. For that reason, Table 5 presents the same calculations for non-expansion states. Reassuringly, the bottom rows of Table 5 suggest relatively small changes in utilization rates for non-expansion states. This suggests that the changes in expansion states were not driven by pre-existing trends.

5.2 Target Efficiency of the ACA Marketplaces

The results above ought to be interpreted with one important institutional detail in mind. Unlike private insurance, Medicaid coverage is "retroactive," i.e. enrollees can receive coverage for medical expenses that occurred prior to their enrollment. Hospital billing departments often facilitate this enrollment in order to secure coverage for emergency services. There are then two types of new Medicaid enrollees: those who enrolled in Medicaid ahead of their hospitalization and those who enrolled afterwards. The former likely value Medicaid more than the latter, since they enrolled soon after becoming eligible. But we cannot separate those two types of Medicaid enrollees in the data. Therefore, it is difficult for us to estimate *enrollees'* valuation of Medicaid. The results, however, do speak to the Medicaid expansion's target efficiency. The expansion's target efficiency is based on *society's* preference for providing health insurance to those who most need healthcare. Estimating the need for healthcare across sub-populations does not involve enrollees' valuation of Medicaid, and so is an object we can pursue in the data.

An additional question is whether those who gained access to insurance as a result of the ACA were truly those who valued it most as opposed to simply those who consumed the most hospital services. An individual's valuation of Medicaid may not match their use of healthcare if they bore little cost for the use of hospital uncompensated care when they were uninsured. A number of recent papers have examined the willingness to pay for individuals who gain access to subsidized health insurance. For example, Finkelstein, Hendren, and Shepard (2019) and Finkelstein, Hendren, and Luttmer (2015) examine whether individuals value publicly provided insurance greater than the cost of the coverage.[28] These papers are consistent with the work of Garthwaite et al. (2018) and other studies which demonstrate that hospitals provide substantial uncompensated care, and this may crowd out demand for formal health insurance.

The creation of the ACA marketplaces in non-expansion states can shed further light on this issue. Standard economic theory suggests that the least healthy will value health insurance the most, holding constant risk preferences and other demand-side factors. This, in turn, suggests that the least-healthy uninsured ought to be those most eager to transition onto formal insurance when they become eligible for subsidized coverage. While everyone below the income

[28] Finkelstein et al. (2015) calibrate a stylized model of the demand for health insurance using results from the Oregon Health Insurance and conclude that the average willingness-to-pay for Medicaid is quite low (on the order of 20 percent of costs). Finkelstein et al. (2019) estimate demand for public health insurance using a Regression Discontinuity approach, where the out-of-pocket premium varies with household income. They show how to translate the RD estimate into a revealed preference measure of demand for public health insurance, and also conclude that demand is low on average. The existence of hospital uncompensated care, free health care clinics, and other charity care in the health care system is one possible explanation for the low estimated willingness-to-pay in both settings.

threshold becomes eligible for Medicaid without taking any action, those who were ineligible for expanded Medicaid needed to proactively sign up for coverage in the ACA marketplaces during an open-enrollment period.[29]

Given these facts about the enrollment process, we can use data from non-expansion states to examine whether those who signed up for the ACA marketplaces were healthier on average than those who remained uninsured. The bottom three rows of Table 5, described above, present the change in the use of hospital services in non-expansion states by insurance status. The utilization rate for uninsured residents of non-expansion states declined, while the utilization rate for the privately insured increased. This pattern suggests that those who purchased insurance used more medical services than those who previously lacked coverage. This suggests that many state residents were previously uninsured and had a high valuation of insurance but were kept from coverage by either a pre-existing condition or a lack of financial resources.[30]

It should be noted that a firm conclusion on whether the ACA's expansion of coverage via marketplaces is target efficient is much more difficult to pin down. Viewed one way, if the marketplaces attracted individuals with the highest health care needs then this pattern of results might lead us to believe that the expansion was target efficient. But this observation is also consistent with a standard adverse selection story. Viewed another way, then, the consequent rise in private insurance premiums to cover higher costs induced by adverse selection (and moral hazard) could price out higher-income (unsubsidized) people with high healthcare needs. Indeed, enrollment data since 2014 demonstrate that as marketplace premiums have increased, enrollment in the unsubsidized (greater than 400 percent of the FPL) income range has shrunk—the marketplaces are now effectively concentrated to those in the subsidized income range. As of February 2019, for example, 87 percent of marketplace enrollees received premium

[29] Even those who did not proactively sign up for Medicaid, could join the program retroactively. Hospitals can help those individuals enroll in Medicaid even after they receive treatment. Regarding the ACA's marketplaces, open-enrollment periods are required in order to avoid adverse selection. Absent a change in life circumstances (birth death, change in employer-provided coverage), individuals can only enroll in coverage during open-enrollment periods.

[30] The table also suggests a slight increase in utilization among Medicaid enrollees. Given that there was no change in Medicaid eligibility in these states, the increase in use for Medicaid enrollees could be the result of a change in the use of hospital services for those who signed up for Medicaid as a result of the welcome effect.

assistance (i.e., had income 100-400 percent of the FPL).[31] Whether or not the policy was target efficient is therefore an open question that is highly dependent society's preferences for redistribution *away* from higher-income people with healthcare needs and towards lower-income people with high healthcare needs.

6. How Did the Effects of the ACA Medicaid Expansion Vary Across States?

The estimates above suggest that Medicaid coverage increases hospital and ED visits and that the Medicaid expansion was generally well targeted, that is, those gaining coverage had greater demand for hospital services than those who remained uninsured. That said, an important feature of Medicaid is that the program is jointly funded by federal and state governments but is solely administered by the states. Prior to the ACA expansion, states made a number of different decisions about the operation and generosity of their Medicaid programs that could affect the impact of the expansion. In addition, Medicaid works in concert with a variety of other supply-side features of the healthcare market that vary across states.

The combination of these supply- and demand-side factors could result in heterogeneous effects of the expansion on the increased use of hospital services and the target efficiency of the policy. This section investigates state-level heterogeneity on both of these dimensions. We first document a wide amount of state-level heterogeneity in the magnitude of the effect of Medicaid expansion on utilization. We then investigate potential explanations for that heterogeneity by correlating state-specific estimates with characteristics of each state and expansion. Finally, we examine how the target efficiency of the program varied across both expansion and non-expansion states.

6.1 Heterogeneity in the Use of Hospital Services

We first estimate the effects of Medicaid expansion on hospital utilization for every state. This exercise is different from simply estimating the change in the *take-up* of Medicaid across states. Unlike private insurance, individuals are able to sign up for Medicaid at any point within

[31] See https://bit.ly/2ZiTmwx

the year and they have retroactive eligibility that allows them to apply Medicaid to medical events that happen prior to enrollment. Given that we use administrative—as opposed to survey—data, the uninsured in our data must be those who are likely ineligible for Medicaid and did not enroll for private insurance during open enrollment. Therefore, changes in overall utilization in the data reflect differences in the take-up decision across states to the extent that such enrollment in insurance impacts the decision to seek treatment at the hospital. Our results above suggest that enrollment in insurance does have a causal effect on utilization. Differences across states in the increase in utilization that is correlated with differences in state take-up would further support these estimates and demonstrate that gaining insurance increases the use of hospital services.

Given that Medicaid is administered at the state level, the program's operations differ somewhat across states. Even among the states that chose to expand Medicaid, a variety of operational decisions likely affected the success of these expansions at decreasing the share uninsured and increasing the take-up of Medicaid. While most research has focused on the binary state-level decision of whether or not to expand Medicaid to adults under the ACA, states faced many additional decisions once they decided to expand Medicaid. For example, states could choose whether or not to set up state-based marketplaces or whether to rely on the federal marketplace. Similarly, states decided whether their marketplaces had the authority to enroll eligible applicants in Medicaid or CHIP. The so-called "no wrong door" policy in the ACA required all marketplaces to assess whether applicants are eligible for Medicaid or CHIP, but only required state-based marketplaces to actually go through and enroll publicly eligible applicants (Skinner 2011). In other words, if states decided to rely on the federal exchange rather than set up their own state-level exchange, they could defer that enrollment authority to state Medicaid agencies.

As a result, the ultimate effect of Medicaid expansion on the take-up of Medicaid could have been shaped by these other state-level decisions. To the extent that enrollment has a causal impact on the utilization of healthcare services, these decisions would then affect utilization. All Medicaid expansions, in other words, are not created equal.

Hudson and Moriya (2018) suggest that a key factor in determining Medicaid take-up is not whether the state's marketplace was a state-based exchange or a "federally facilitated" exchange, but rather whether the exchange had the authority to enroll individuals who had been determined to be eligible for Medicaid. The key factor is marketplace enrollment authority, because otherwise Medicaid-eligible applicants would have to leave the marketplace and seek out state Medicaid agencies themselves, a process that invariably involved fewer state residents gaining Medicaid coverage.

Of course, variation in the effect of the Medicaid expansion on utilization likely reflects far more than differences in take-up. For example, variation could also be driven by the underlying demand for healthcare by low-income individuals and the access to care for the uninsured prior to the expansion. Some states arranged generous financing for uncompensated care which may have affected whether the uninsured could have regularly visited hospitals and EDs prior to the Medicaid expansion. By contrast, if the uncompensated-care financing pool was less generous or nonexistent, then hospitals may have discouraged visits from the uninsured in ways that did not violate the Emergency Medical Treatment and Labor Act. For instance, hospitals may have aggressively billed self-pay patients, partially to discourage visits from the uninsured. The availability of uncompensated care may influence the decision to sign up for Medicaid (Finkelstein, Mahoney, and Notowidigdo 2018). However, in our context even those who do not sign up for Medicaid would appear as a Medicaid visit in the data if they were eligible for the expansion.

To investigate these issues empirically, we augment the main difference-in-difference specification above by interacting the key difference-in-difference coefficient with a full set of indicator functions for each state that expanded Medicaid. This amounts to a fully non-parametric specification of state-level treatment-effect heterogeneity, continuing to use the non-expansion states as controls. The results of these augment difference-in-difference results are first presented in maps in Figures 13 through 15. Since the non-expansion states are used as controls, they are normalized to 0 in each map. The color gradient in each map shows the difference in each expansion state relative to average non-expansion states, with darker shades indicating larger changes. For example, Panel A of Figure 13 shows larger changes in Uninsured visits in Ohio and Iowa, and relatively smaller changes in New York (relative to non-expansion states). Panel B shows similar geographic pattern for changes in Medicaid visits, and Figure 14 reports the combined Medicaid and Uninsured visits. Figure 15 then breaks out Medicaid visits by type of encounter, and these maps show greater geographic variation for outpatient emergency visits relative to scheduled inpatient visits. This implies that the small average effect for scheduled inpatient visits reported in Tables 1 and 2 is broadly replicated across each state. By contrast, the significant increase in Medicaid visits and decrease in Uninsured visits (on average across expansion states) masks considerable heterogeneity across the expansion states in our sample.

Figure 13 presents the point estimates from these specifications. The red line plots the cross-state average estimate, an equal-weighted average across the 11 expansion states.[32] On average, Medicaid expansion is associated with an increase in the total number of visits of roughly 4 percent. Interestingly, the effects of Medicaid expansion vary considerably across the expansion states in our sample. In Minnesota and Arizona, the difference-in-difference coefficient is roughly 10 percent, while in New Jersey and Connecticut, the estimates are close to zero and are not statistically significant. In other words, some states that expanded Medicaid saw no meaningful change in visits. Additionally, we can reject the null hypothesis that all of the state-specific estimates are the same, which provides a first piece of evidence of meaningful state-level heterogeneity in the effects of the Medicaid expansion.

To investigate the source of that heterogeneity, consider whether or not states implemented their own exchanges. Among the states in Figure 16, Vermont, California, Maryland, New York, Rhode Island, and Minnesota created their own marketplaces. The remaining states relied on the federal marketplace or had a federal-state partnership. New Jersey is the only state that used the federal exchange, but allowed the federal marketplace to make a Medicaid-eligibility determination, as all the state-based exchanges would have done (Rosenbaum et al. 2019). Thus, the four states in Figure 8 with the lowest Medicaid-plus-uninsured utilization effects allowed exchanges to determine eligibility, as opposed to assessing potential eligibility and then referring to state Medicaid agencies.

To further explore state-level heterogeneity, we separately estimate an effect on Medicaid and an effect on uninsured ED visits for each state. Figure 17 plots the state-specific effects, with the effect on uninsured visits along the horizontal axis and the effect on Medicaid visits along the vertical axis. The figure suggests a natural correlation: states that experienced the largest decreases in uninsured visits after expansion saw the largest increases in Medicaid visits. The

[32] We exclude Vermont and Indiana (which are expansion states in our main analysis sample) because we do not have all of the explanatory variables in the analysis that follows that tries to explain the variation in treatment effect heterogeneity across expansion states.

two patterns are nearly mirror images of each other. To facilitate comparison, the figure includes a 45-degree line.

Lastly, we account for state-level heterogeneity by regressing the state-level estimates on four state-specific variables. The first is the measure of the number of individuals that likely transitioned from uninsured status to Medicaid as a result of the expansion. We aggregate these county-level estimates to construct a state-level estimate of the number of state residents transitioning from being uninsured to being on Medicaid.

The second variable is a measure of which states were more "treated" by the Medicaid expansion, based on the share of the adult population that was made newly eligible (i.e., the "dose" measure in the SIPP transition model, described above). For example, in New York only about 7 percent of the adult population was made eligible for Medicaid through the Medicaid expansion, while in Ohio and Rhode Island that share was closer to 33 percent. Given Medicaid's retroactive eligibility, if any of these newly eligible individuals sought hospital treatment after the expansion they would be classified as a Medicaid patient.

The third variable we explore is a state-level measure of the total hospital uncompensated care costs per uninsured adult. This measure is constructed following Garthwaite, Gross, and Notowidigdo (2018), who study the relationship between Medicaid eligibility and hospital uncompensated care costs. We interpret this variable as reflecting a combination of the pre-existing generosity of uncompensated care in the state (across hospitals) as well as the latent demand for health care among the uninsured. In other words, high spending on the uninsured by hospitals (as measured by uncompensated costs, which the hospitals are not directly compensated for providing) can arise because the uninsured are particularly sick in that state and also because the hospitals provide more uncompensated care than other states (perhaps because of the state's generous uncompensated care policies towards hospitals). For states where uncompensated care is constrained by the willingness of hospitals to treat uninsured people (i.e. where uncompensated care per capita was low), an insurance expansion could increase total utilization.

The final variable we construct is a binary indicator variable for whether the state's exchange allowed for Medicaid eligibility determination. We hypothesize, following Hudson and Moriya (2018), that exchanges that directly enrolled Medicaid-eligible applicants would lead to higher Medicaid enrollments and thus larger impacts on hospital visits.

Table 6 reports the estimates from this regression for the outcome of Medicaid plus uninsured visits, total visits combining hospital visits and ED encounters. The first four columns each present a specification including only one of the four state-specific variables, and the final column presents a specification that includes all of the variables. The only statistically significant predictors of variation across states are the share of the population that took up insurance and the amount of uncompensated care prior to the expansion.

The negative coefficient on uncompensated care suggests that in places where there was a lot of uncompensated care before the expansion there was a smaller increase in total hospital encounters as a result of the expansion. This suggests that a large amount of uncompensated care prior to expansion representing high utilization by the uninsured prior to the expansion. If the degree of implicit insurance via uncompensated care was relatively higher in high-uncompensated-care states, we might expect that the uninsured transitioning to Medicaid would not have increased utilization as much following expansion of explicit insurance through Medicaid.

We also find that in places where take-up was higher, there was a greater increase in total hospital encounters. This is consistent with the results above and further suggests that gaining insurance increases the use of hospital services.

6.2 Heterogeneity in the Target Efficiency of the ACA Expansion

A variety of factors may have led to variation in the target efficiency of the Medicaid expansion across states. Some states had built more-generous Medicaid programs before the ACA. States also varied in the share of their population that is low income, and in the underlying health status of their uninsured populations. All of these factors could lead to meaningful variation in the target efficiency of the expansion.

To examine that potential variation, we study the relationship between changes in utilization and features of each state's pre-expansion market. If we observe a decline in utilization by the uninsured, then that suggests that the expansion was largely target efficient, in that those who gained coverage had a greater need for healthcare prior to the expansion. Conversely, if we observe an increase in the utilization by Medicaid patients, then that suggests that the pre-expansion Medicaid system was not particularly target efficient.

Figure 18 examines the relationship between the decrease in the size of a state's uninsured population and the change in hospital visits for the uninsured, Medicaid, and privately insured populations. uninsured. Panel (A) shows that states which experienced a greater decline in the size of their uninsured populations saw larger decreases in utilization for the uninsured. This suggests that larger expansions appear to be more target efficient. That is, those gaining insurance had a greater demand for healthcare than those who remained uninsured.

Panel B of Figure 18 shows that states with the largest declines in their uninsured population were also those with the largest *increases* in the use of hospital services in the post-expansion Medicaid program. This suggests that state decisions about the generosity of the existing Medicaid program appears to have resulted in a set of uninsured residents that had a higher demand of hospital services than those who were able to qualify for social insurance. Whether or not this was optimal is a question of how much value state residents placed on access to care for various groups. It does, however, suggest that if the metric is providing formal insurance for individuals who would still otherwise consume a large amount of hospital services then some of these existing programs were not accomplishing that goal.

Finally, Panel C of Figure 18 depicts the change in the use of hospital services by the privately insured based on the change in the share uninsured. Non-expansion states are marked with red triangles and show a clear pattern where states with larger declines in the share uninsured had greater increases in the post-expansion use of hospital services by the privately insured. This suggests that the ACA marketplaces provided access to health insurance for enrollees with a greater demand for hospital services than the set of patients with prior insurance prior to the expansion.

Further evidence of target efficiency can be seen in Panel A of Figure 19, which shows that states which had the highest use of hospital services for the uninsured prior to the expansion also had the largest declines in the use of hospital services by the uninsured after the expansion. While some of this relationship may be mechanical, i.e. those states with also had the greatest potential for a decline in hospital visits, this figure suggests that overall the expansion provided coverage for uninsured residents with the greatest demand for hospital services. This can also be seen in Panel B of Figure 19 where states with the greatest amount of uncompensated care prior to the expansion also saw the largest declines in the use of hospital services by the remaining uninsured.

7. The Broader Economic Impacts of Variation in The Social Safety Net

Our results demonstrate that the ACA Medicaid expansion resulted in meaningful changes in the access to and utilization of healthcare services. In addition, we demonstrate that there is meaningful variation in the impact of this expansion across states. This results not just from the state decision to expand Medicaid but is also a function of both state decisions to support the ACA and the pre-existing market conditions for the uninsured.

Given the growing importance of the social safety net, this can have a variety of impacts that extend well beyond healthcare utilization but could lead to regional variation in a variety of economic outcomes. This includes, but is not limited to, changes in labor market structure, the market for entrepreneurs, and underlying productivity and income.

In order to understand how variation in the expansion could affect broader economic outcomes, we next summarize the relevant literature in various areas where a differential impact of Medicaid could help to shape and drive economic growth.

7.1. Effects of Medicaid on Health

An important contributor to economic growth and productivity is the underlying health of the population. An important question then is how does health insurance coverage affect health itself? Unfortunately, this question is not easily answered. Studies on health insurance and health need to overcome several empirical challenges in order to credibly capture the health-effects of insurance. First, they need to exploit plausibly exogenous variation in health insurance, given that the insured population differs from the uninsured population. Second, credible studies need to quantify health, an outcome that is arguably multi-dimensional and that evolves slowly over time. A small research literature has overcome those challenges – the paucity of studies is remarkable given the importance of the topic.[33]

First, several studies have evaluated the health effects of Medicare. Finkelstein and McKnight (2008) studied the introduction of Medicare in 1965, and found no effect of the

[33] We focus here on the effect of health insurance on the health of adults. A related literature has studied the health of children (e.g., Dafny and Gruber (2005)) and also the long-term impacts of providing children with health insurance (e.g., Wherry et al. (2017); Goodman-Bacon (2016).)

program on aggregate death rates. Card, Dobkin, and Maestas (2008) focused on emergent hospital visits by patients who just barely qualified for Medicare based on its age–65 threshold versus patients who were too young to qualify for Medicare. Within that particular sample, the authors found a large effect of Medicare coverage on short-term mortality.

Most of the other work on this topic has focused on Medicaid. The Oregon Health Insurance Experiment found that Medicaid coverage improved self-reported physical and mental health and increased the diagnosis of diabetes and the use of diabetes medication.[34] Other research has focused on Medicaid expansions before the ACA and expansions that were part of the ACA. Sommers et al. (2012) study state-by-state Medicaid expansions through a difference-in-difference framework and find a clear reduction in mortality rates after expansion. Additional research by Sommers et al. (2015) and Miller and Wherry (2017) demonstrates that the ACA's Medicaid expansions led to an improvement in self-reported health. Finally, a recent working has found that the Medicaid expansion led to a decrease in mortality for eligible Americans in expansion states compared to non-expansion stations (Miller et al., 2019).

All in all, these studies tend to find that health insurance coverage leads to improvements in health. That said, relatively few studies exist in this area, and several studies of the ACA expansion have found no effect (Mazurenko et. al 2018). Moreover, the majority of studies focus on the short-run impacts of health insurance, which may be very different from the long-run impacts. Health, after all, is a stock variable (Grossman 1972), which suggests treatment effects that change over time.

Nevertheless, the research suggests that health insurance coverage reduces mortality, improves self-reported health, and improves some short-run markers of good health. One analysis found that Medicaid costs between $327,000 to $867,000 for every life it saves (Sommers 2017). Those estimates of the program are based solely on the effect of Medicaid on mortality, ignoring its other benefits, and suggest that Medicaid is likely a cost-effective use of government funds. To the extent that our estimates demonstrate a meaningfully different impact of the ACA expansion across states, this would lead to different impacts of the expansions on health.

[34] The evidence from the Oregon Health Insurance Experiment on blood pressure and other physical outcomes did not find statistically significant health improvements, although there exists some debate regarding the study's statistical power for some of these outcomes (see, e.g., https://www.nejm.org/doi/full/10.1056/NEJMc1306867),

7.2. Labor Market Effects of Medicaid

Historically, most Americans have faced a remarkably tight link between health insurance coverage and employment. They could find affordable health insurance coverage by working for a large employer, but would lose that coverage if they stopped working, or moved to a smaller firm. As a result, expanded access to health insurance could potentially have a large effect on the labor market, allowing consumers to leave their jobs without fear of losing their health insurance coverage.

To date, several studies have demonstrated a significant relationship between insurance coverage and labor supply. Garthwaite et al. (2014) studied a large Medicaid disenrollment in Tennessee in 2005, during which approximately 170,000 Tennessee residents lost Medicaid coverage. The authors found large increases in labor supply as a result, and argued that those who lost Medicaid coverage entered the labor market in order to regain health insurance coverage. Similarly, Dague et al. (2017) studied Wisconsin residents who were allowed onto Medicaid and found that those allowed onto Medicaid became much less likely to seek employment. Kim (2016) found that Connecticut's early expansion of Medicaid under the ACA led to a reduction in the employment rate.

At the same time, other studies have not found such a clear link between Medicaid coverage and the labor market. Leung and Mas (2018) found that the 2014 expansion of Medicaid did not meaningfully affect employment. Similarly, participants in the Oregon Health Insurance Experiment who gained Medicaid did not become more or less likely to work (Baicker et al. 2014).

This literature is thus divided between studies that have found a significant effect of Medicaid coverage on labor supply and studies that have not. One important issue in evaluating this gap in the literature is the degree to which the studies in question isolate consumers who highly value health insurance. Basic economic theory suggests that the consumers who value health insurance the most will be those who enter the labor market to retain access to health insurance. For instance, those who are HIV positive, who are diabetic, or who suffer from other chronic conditions, find it extremely costly to be without health insurance. Such consumers are difficult to isolate in the national surveys that are often used to measure employment rates, and so may not have been captured by some of the previous research.

Beyond the extensive margin of labor supply, broader access to health insurance could plausibly increase entrepreneurship. Without the ACA, aspiring entrepreneurs may be "locked into" work for large employers. A reform that makes health insurance cheaper for small businesses and individuals might eliminate that barrier for aspiring entrepreneurs (Fairlie, Kapur, and Gates 2011).

In addition, there is a case to be made that health insurance coverage may directly increase the productivity of its beneficiaries. To begin with, there is evidence that medical treatment can increase labor supply and productivity. Berndt et al. (1998) found that the treatment of clinical depression led to an increase in a self-reported composite measure of workplace performance. Garthwaite (2012) studied the removal of Vioxx from the market, a then-common drug used to treat arthritis. His results suggest that a large share of Americans left the labor market once their arthritis was no longer treated. More generally, Chen and Goldman (2018) performed a meta-analysis of randomized clinical trials that evaluated the effect of medical care on productivity. The authors found that, for many disease categories, randomized trials have uncovered large productivity effects, in some cases greater than 25 percent.

And so if medical care improves productivity, then health insurance, by increasing access to medical care, may also boost productivity. To our knowledge, there exists no direct evidence for such an effect. That is, no studies have demonstrated that individuals who are given health insurance experience increases in their labor market productivity, but such a hypothesis appears warranted based on previous research. Furthermore, to the extent that these broad labor supply effects vary with the magnitude of the expansion the variation that we identify could have meaningful economic impacts.

7.3. Longer-Run Effects of Health Insurance Coverage

The majority of the research above focuses on the short-run impact of health insurance coverage across a variety of outcomes. The typical study relies on a difference-in-difference regression or instrumental-variables strategy that isolates the effect of health insurance over, at most, several years. It is much more challenging to study effects that evolve over decades. And yet, in the context of health insurance, longer-run effects might be very different from what we observe over only a year or two. Health is a stock variable, and so cumulative access to healthcare over decades can lead to dramatic consequences later (Grossman 1972).

Several studies have compiled suggestive evidence on precisely such a dynamic. Brown et al. (2018), Miller and Wherry (2017), and Goodman-Bacon (2019) all study childhood Medicaid coverage and adult outcomes. The studies compare children who were born in particular states and particular years such that they enjoyed Medicaid coverage through their childhoods and compare them to similar children who were not covered by Medicaid. The authors then study health outcomes years later and find dramatic benefits of childhood Medicaid coverage. Adults who were covered by Medicaid as children earn more, are less likely to be disabled, and are more likely to be employed. Related work by Cohodes et al. (2015) suggest that childhood Medicaid coverage also leads to increases in educational attainment. Brown et al. (2018) estimate that the federal government recovers 57 percent of the cost of Medicaid coverage through increased tax revenue years later. Overall, we view these studies as suggestive of meaningful longer-run effects of Medicaid coverage, although more research is needed to uncover a fuller picture of the longer-run effects of Medicaid.

7.4. Economic Transfers Between States

Medicaid is administered by state governments but is jointly financed by federal and state governments. The amount of money from the federal government is dictated by each state's Federal Medical Assistance Percentage (FMAP). In 2012, the average FMAP was 57 percent: for every dollar of Medicaid spending, 57 percent came from the federal rather than the state government. This average masks a great deal of variation, because each state's FMAP is determined based on the state's average personal income. States that have lower average incomes receive more federal assistance. By statute, the FMAP cannot fall below a floor of 50 percent. In fiscal year 2020, this FMAP floor applied to Alaska, California, Colorado, Connecticut, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Virginia, Washington, and Wyoming. Many states have FMAPs well above this floor. For example, the following states had an FMAP above 70 percent: Arizona, Idaho, South Carolina, Arkansas, Kentucky, Alabama, New Mexico, West Virginia, and Mississippi.

Expansions of Medicaid have often involved enhanced FMAPs that provide more-generous federal support for the newly eligible population. For example, under the State Children's Health Insurance Program (SCHIP), states received an enhanced FMAP that ranged from 76.5 to 96 percent in fiscal year 2020. These enhanced FMAPs continued with the ACA Medicaid expansion, where the federal government pays a constant 90 percent of costs across all states regardless of the state's income.

This generous contribution combined with variation in both the expansion decision and the impact of the expansions has meaningfully shifted the distribution of transfers across states. Table 7 contains data from the Medicaid and CHIP Payment and Access Commission (MAC-PAC) on funding sources and enrollment for Medicaid programs by a state's expansion status. Unsurprisingly, these data show that the average expansion state had a much-larger increase in Medicaid enrollment than the average non-expansion state. That said, non-expansion states also saw a non-trivial increase in the size of their Medicaid population. This is a combination of economic conditions and the "welcome mat" effect described above where publicity about Medicaid and the ACA individual mandate increased enrollment. Importantly, some of the increase in expansion states are also likely the result of this welcome mat effect.

These new enrollees resulted in greater spending for both sets of states. However, for expansion states there was also a meaningful increase in the share of spending coming from the federal government. This was likely driven by the more-generous sharing of costs for the newly eligible cohort. In non-expansion states the share paid by the federal government was largely flat. Looking at spending per enrollee, the average expansion state saw its own spending per enrollee drop by 18 percent from 2012–2016. Non-expansion states saw a decline of only 2 percent over the same time period.

An economically meaningful fraction of Medicaid spending simply replaces uncompensated care that would have been provided by hospitals in that state (Garthwaite, Gross, Notowidigdo, 2018). In addition, the increased use of hospital services resulting from the ACA expansion represents an infusion of federal sources into state economies. To the extent this infusion exceeds the state's contribution to federal taxation, this shift in the distribution of federal spending could have economically meaningful effects on regional economic output. Future work should examine the potential fiscal and economic ramifications of this effect on regional economic development.

8. Conclusion

The United States social insurance system has meaningfully expanded over the past two decades and yet a non-trivial fraction of the United States population remains uninsured. The uninsured population is not evenly distributed across the country. Much of this variation results from state differences in decisions to adopt (mostly) federally-financed social insurance programs. As we consider expanding the social safety net further to address the remaining uninsured, it is important to have a full understanding of both the impact of the ACA and variation in its impact across the country.

This paper's results lead to three main conclusions. First, the paper provides evidence that the market-wide impact of the ACA has been to increase the use of hospital services. That increase primarily occurred through outpatient visits to the ED for conditions that might have been deferrable and treatable outside of the ED. Our preferred estimate suggests a 20-percent increase in the use of the hospital for the newly insured.

It is unclear whether or not that increase in ED visits is socially efficient. On the one hand, emergency departments are believed to be especially expensive venues to treat deferrable conditions. An increase in ED visits for such conditions thus indicates an inefficient use of resources, since those patients could have been treated in lower-cost settings. On the other hand, it is unclear whether the emergency rooms is truly a higher-cost setting. If the higher utilization is completely accounted for in slack capacity of the emergency room, the marginal costs could be quite low. However, the presence of a large number of potential uninsured patients could distort the fixed cost decision of the hospital for the optimal size of its emergency department which means that evaluating economic costs using only the marginal cost may not be appropriate. In addition, other studies on health insurance, cataloged above, suggest that insurance coverage decreases mortality rates. It is difficult to assess whether that decrease in mortality rates is driven by the increase in utilization, but such a mechanism is, at the very least, plausible. In that case, the increased spending on hospital services likely increases social welfare. More research is needed to assess both the true increased economic costs from this increased utilization and whether those costs are greater than the societal benefits.

Second, beyond the increase in utilization, this paper also demonstrates variation in the impact of the ACA across states. The results suggest that some of that variation can be explained by the size of the expansion and the pre-existing levels of hospital uncompensated care. There is room for more work unpacking the mechanism behind how a uniform federal policy can have such different effects across the country. Still, these estimates should raise broad concerns about the ability to generalize from a single setting to the entire nation. The variation that we estimate demonstrates that even small differences in the implementation of a uniform policy can cause meaningfully different outcomes. Beyond demonstrating important questions about external validity, this variation is something that policymakers may hope to harness as they attempt to develop a nationwide healthcare safety net. Given the important economic impact of health insurance, failing to understand and plan for this variation means could lead to meaningfully different regional economic impacts from federal policies. For this reason, we believe that far more research is needed to understand the mechanisms underlying our results. These mechanisms could be useful policy levers for elected officials as they attempt to develop a robust social safety net.[35]

Finally, we also study the "target efficiency" of the Medicaid expansion, the degree to which it gave coverage to those who most needed it. The estimates suggest that the existing safety net's policy of categorical eligibility was not more target efficient than the Medicaid expansion. As federal policymakers consider the optimal size and nature of the safety net it may be necessary to more clearly account for the degree to which existing market features can drive the efficiency of federal spending.

Taken together, this paper's estimates lead to several implications for policy. First, the results clearly suggest that the ACA's Medicaid expansions increased hospital utilization, including use of the ED. That finding should inform analysts seeking to predict the cost of future expansions. Moreover, if policymakers plan to expand coverage in areas with little excess supply of healthcare, then they should also consider complementary policies to expand the capacity of the local healthcare system. Second, policymakers should view evidence of state-specific heter-

[35] Another implication of this across-state heterogeneity is that it may affect the interpretation of future difference-in-difference studies of the ACA. Those future studies will be carried out over longer time periods, particularly as other states choose to expand Medicaid. Recent research emphasizes that difference-in-difference studies with variation in treatment timing need to be interpreted carefully when there is treatment-effect heterogeneity (Goodman-Bacon 2019), and so the results above imply that future researchers need to pay close attention to state-level heterogeneity when comparing results across studies that are estimated in different time periods or sets of expansion and non-expansion states.

ogeneity as perhaps suggesting that some federal laws should leave room for state-by-state customization. Healthcare is a fundamentally local product, and thus markets for healthcare act very differently across the country. Finally, this paper's estimates suggest that the ACA Medicaid expansion was well targeted. To the extent that policymakers are worried about targeting in a social insurance program that is available based only on income, our estimates should decrease these concerns.

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Table 1. Average Utilization Rate by Type of Visit and Insurance Status

	(1)	(2)	(2)
	Insurance Status		
	Uninsured	Medicaid	Private
Type of Visit:			
Inpatient hospital visit (not originating in ED)	0.009	0.046	0.026
Inpatient hospital visit (originating in ED)	0.026	0.049	0.018
Outpatient ED visit	0.357	0.364	0.138
Total visits (hospital + ED visits)	0.391	0.459	0.181
Share of total visits:			
Inpatient hospital visit (not originating in ED)	2.2%	10.0%	14.1%
Inpatient hospital visit (originating in ED)	6.6%	10.7%	9.9%
Outpatient ED visit	91.2%	79.4%	76.0%
Additional statistics:			
Ratio of outpatient ED visits / Inpatient visits (not originating in ED)	42.0	7.9	5.4
Ratio of Outpatient ED visits / Inpatient visits (originating in ED)	13.8	7.4	7.6
Share of inpatient visits originating in ED	75.3%	51.6%	41.3%

Each cell presents 2013 estimates (for all states in our sample) of average utilization by insurance status and type of visit. Each cell uses DRG population estimates to calculate utilization rate: the total number of visits divided by population with that insurance status. See text for details on the population estimates.

Table 2. Difference-in-Difference Estimates at the level of the ZIP Code

Dependent variable: Number or log of visits of the given type (column) and insurance status (row)

	(1)	(2)	(3)	(4)	(5)	(6)
	All visits	Scheduled inpatient visits	Emergent inpatient visits	Emergency outpatient visits	Deferrable visits	Non-deferrable visits
			A. Number of visits			
Medicaid	9.812	0.343	1.037	8.431	9.371	0.441
	(1.208)***	(0.084)***	(0.114)***	(1.088)***	(1.149)***	(0.071)***
Private	-1.221	-0.051	-0.141	-1.029	-1.090	-0.131
	(0.783)	(0.087)	(0.101)	(0.671)	(0.743)	(0.070)*
Uninsured	-6.932	-0.142	-0.692	-6.099	-6.451	-0.482
	(0.909)***	(0.035)***	(0.085)***	(0.827)***	(0.863)***	(0.060)***
Medicaid plus	2.879	0.202	0.345	2.333	2.920	-0.041
Uninsured	(1.081)***	(0.088)**	(0.104)***	(0.973)**	(1.048)***	(0.066)
Medicaid plus	1.659	0.150	0.204	1.304	1.830	-0.172
Uninsured plus Private	(1.389)	(0.136)	(0.149)	(1.267)	(1.337)	(0.119)
			B. Logarithm of visits			
Medicaid	0.132	0.042	0.115	0.141	0.131	0.126
	(0.017)***	(0.012)***	(0.014)***	(0.018)***	(0.017)***	(0.017)***
Private	-0.025	-0.002	-0.026	-0.029	-0.024	-0.029
	(0.009)***	(0.008)	(0.011)**	(0.010)***	(0.009)***	(0.016)*
Uninsured	-0.223	-0.107	-0.335	-0.209	-0.219	-0.209
	(0.024)***	(0.024)***	(0.027)***	(0.024)***	(0.024)***	(0.021)***
Medicaid plus	0.031	0.026	0.035	0.030	0.032	-0.001
Uninsured	(0.010)***	(0.011)**	(0.008)***	(0.011)***	(0.010)***	(0.014)
Medicaid plus	0.010	0.010	0.010	0.010	0.012	-0.016
Uninsured plus Private	(0.007)	(0.006)	(0.006)*	(0.008)	(0.007)*	(0.014)

Each cell presents the estimates of the key difference-in-difference coefficient for a separate regression. The sample consists of ZIP-Code-by-year-by-month counts of hospitalizations; there are 18,643 ZIP Codes and 45 months (January 2012–September 2015) for a total of N = 838,935 observations per payer and type of hospital visit. When logarithm of visits is the dependent variable, we add 1 to the number of visits. Standard errors in parentheses are clustered on state and year-month. ZIP-Code-specific fixed effects, year-month-specific fixed effects, and ZIP-Code-specific time trends not shown.

Table 3. Triple-Difference Estimates at the level of the ZIP Code
Dependent variable: Number or log of visits of the given type (column) and insurance status (row)

	(1)	(2)	(3)	(4)	(3)	(4)
	All visits	Scheduled inpatient visits	Emergent inpatient visits	Emergency outpatient visits	Deferrable visits	Non-deferrable visits
			A. Number of visits			
Medicaid	0.539	0.003	0.039	0.500	0.516	0.023
	(0.029)***	(0.002)	(0.003)***	(0.027)***	(0.028)***	(0.001)***
Private	0.010	0.000	-0.006	0.016	0.008	0.002
	(0.012)	(0.001)	(0.001)***	(0.011)	(0.012)	(0.001)**
Uninsured	-0.449	-0.011	-0.052	-0.388	-0.428	-0.021
	(0.025)***	(0.002)***	(0.003)***	(0.022)***	(0.024)***	(0.001)***
Medicaid plus Uninsured	0.191	-0.005	-0.001	0.196	0.183	0.007
	(0.027)***	(0.002)**	(0.004)	(0.025)***	(0.026)***	(0.001)***
Medicaid plus Uninsured plus	0.167	-0.003	-0.007	0.175	0.159	0.008
Private	(0.031)***	(0.002)	(0.004)*	(0.028)***	(0.030)***	(0.001)***
			B. Logarithm of visits			
Medicaid	0.240	0.002	0.035	0.249	0.235	0.022
	(0.013)***	(0.002)	(0.003)***	(0.014)***	(0.013)***	(0.001)***
Private	0.004	0.000	-0.006	0.009	0.003	0.002
	(0.008)	(0.001)	(0.001)***	(0.008)	(0.008)	(0.001)**
Uninsured	-0.302	-0.011	-0.050	-0.268	-0.292	-0.020
	(0.015)***	(0.002)***	(0.003)***	(0.014)***	(0.015)***	(0.001)***
Medicaid plus Uninsured	0.080	-0.004	0.000	0.091	0.079	0.007
	(0.011)***	(0.002)**	(0.003)	(0.012)***	(0.011)***	(0.001)***
Medicaid plus Uninsured plus	0.079	-0.002	-0.004	0.087	0.078	0.007
Private	(0.011)***	(0.002)	(0.003)	(0.011)***	(0.011)***	(0.001)***

Each cell presents the estimates of the key triple-difference coefficient for a separate regression. The key right-hand-side variable is the interaction between a "post January 2014" indicator for states expanding Medicaid during the sample period, and "share eligible" for Medicaid as a result of the ACA. Share eligible is calculated for both expansion and non-expansion states. The sample consists of ZIP-Code-by-year-by-month counts of hospitalizations; see Table 1 for more details. The sample excludes all ZIP Codes in Vermont in all regressions. There are 18,643 ZIP Codes and 45 months (January 2012–September 2015) for a total of N = 838,935 observations per payer and type of hospital visit. When logarithm of visits is the dependent variable, we add 1 to the number of visits. Standard errors in parentheses are clustered on state and year-month. ZIP-Code-specific fixed effects, year-month-specific fixed effects, and ZIP-Code-specific time trends not shown. The average share of the population treated in expansion states is 0.24.

Table 4. Heterogeneity Across Counties in Number of Uninsured Who Transitioned to Medicaid
Dependent variable: Change in total number of Medicaid and uninsured visits, 2013–2015

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Full Sample				Exclude Largest Counties			
Number of Uninsured Who Transitioned to Medicaid	0.321	0.318	0.302	0.359	0.326	0.327	0.323	0.347
	(0.016)***	(0.016)***	(0.051)***	(0.061)***	(0.045)***	(0.048)***	(0.098)***	(0.103)***
Total Encounters in July 2012 - June 2013 period			0.007	0.034			0.001	0.017
			(0.021)	(0.027)			(0.025)	(0.039)
Initial Number of Uninsured Residents				-0.023				-0.012
				(0.017)				(0.024)
State Fixed Effects		✓	✓	✓		✓	✓	✓
N	553	553	553	553	551	551	551	551
R^2	0.816	0.835	0.835	0.840	0.537	0.589	0.589	0.592

Each column presents regression estimates where the dependent variable is the 2013-to-2015 change in the total number of Medicaid and uninsured visits (inpatient and ED visits combined). The sample consists of counties in the 11 ACA Medicaid-expansion states we study. The key right-hand-side variable is the number of uninsured individuals who transitioned to Medicaid. See text for details on construction of this variable. The columns report results from alternative specifications, and the last four columns exclude the two largest counties in the sample. Robust standard errors are reported in parentheses.

Table 5. Average Utilization Rate for Uninsured and Medicaid Populations, Before and After ACA Medicaid Expansion

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Average Utilization Rate Across Counties				Weighted Average Utilization Rate			
	2012	2013	2014	% change, 2012-14	2012	2013	2014	% change, 2012-14
Expansion states								
Uninsured Population	0.355	0.353	0.237	-33.2%	0.358	0.352	0.249	-30.4%
Medicaid Population	0.553	0.535	0.683	+23.5%	0.459	0.464	0.582	+26.8%
Private Population	0.199	0.191	0.199	+0.0%	0.190	0.183	0.188	-1.1%
Non-expanion states								
Uninsured Population	0.433	0.430	0.419	-3.2%	0.462	0.462	0.445	-3.7%
Medicaid Population	0.388	0.383	0.403	+3.9%	0.432	0.439	0.468	+8.3%
Private Population	0.191	0.189	0.206	+7.9%	0.178	0.179	0.200	+12.4%

Each cell presents estimates of average utilization (total hospital plus ED visits divided by total population). Columns (1) through (3) report average utilization by calculating averages in each county and then calculating (unweighted) averages across the counties in the expansion-state sample. Columns (5) through (7) present weighted averages, weighting by the pre-ACA population. The first two rows report estimates using SIPP population estimates, while the final two rows report estimates using DRG population estimates. See text for details on the population estimates.

Table 6. State-Level Heterogeneity in Effects of ACA Medicaid Expansion
Dependent variable is state-specific estimate of Medicaid expansion on total inpatient and ED visits, Medicaid plus uninsured

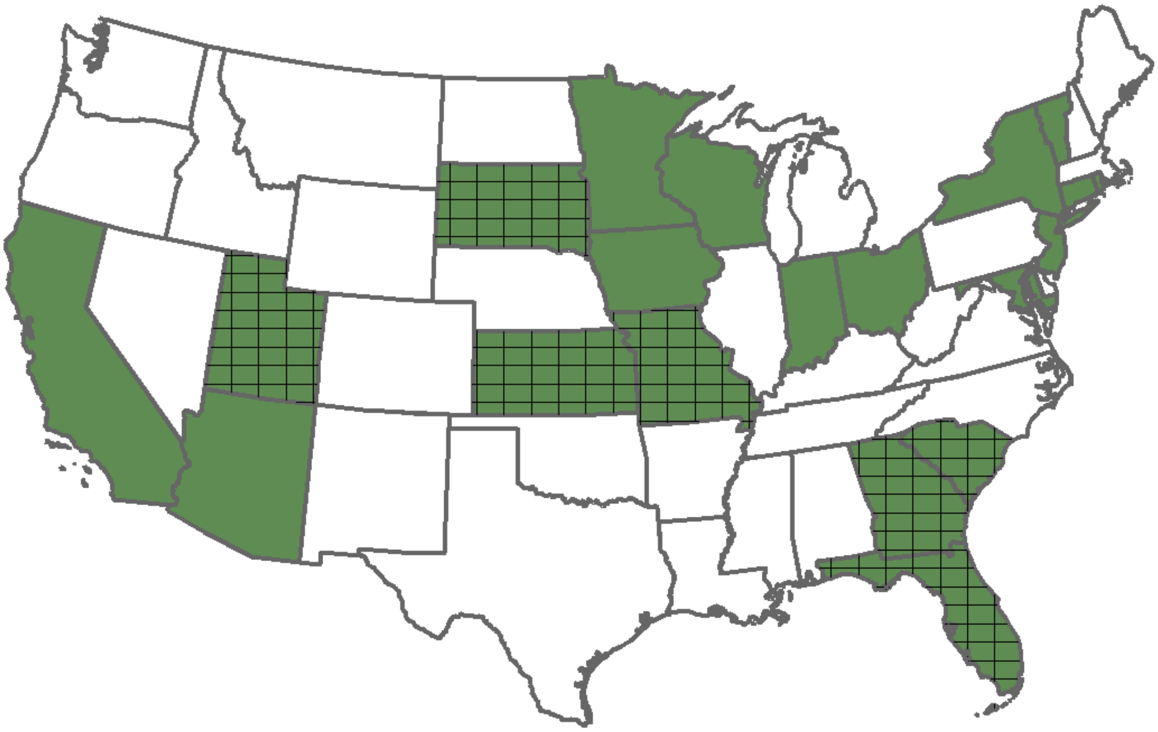
	(1)	(2)	(3)	(4)	(5)
Number of individuals changing from uninsured to Medicaid	4.99				3.88
	(1.43)				(1.33)
Share of adult population newly eligible for Medicaid		-8.69			-1.11
		(8.60)			(5.91)
State-wide hospital uncompensated care costs per uninsured individual, 2010			-2.52		-2.10
			(0.79)		(0.70)
Federal or state health insurance exchange eligibility determination indicator				-1.44	-0.97
				(1.56)	(1.09)
OLS regression weighted by inverse of the standard error of state-specific DD estimate	✓	✓	✓	✓	✓
N (States)	11	11	11	11	11
R^2	0.24	0.10	0.55	0.09	0.72

This table reports regressions of state-specific difference-in-difference estimates of Medicaid expansion on three variables to explore whether they predict the magnitude of the state-specific effect of expansion. The table reports weighted OLS regressions for efficency, where the weight is the inverse of the standard error of state-specific difference-in-difference estimate. The sample is the 11 Medicaid-expansion states in our sample; see text for details. Robust standard errors are reported in parentheses.

Table 7. Characteristics of the States' Medicaid Programs

	Expansion States	Non-Expansion States
Mean enrollment before expansion	1,164,453	1,175,039
Mean enrollment after expansion	1,667,961	1,443,135
% Change in enrollment	43%	23%
Mean federal funding before expansion (in thousands)	$5,613.59	$5,339.85
Mean federal funding after expansion (in thousands)	$8,288.20	$6,466.15
Mean state funding before expansion (in thousands)	$4,479.41	$3,196.46
Mean state funding after expansion (in thousands)	$4,776.03	$3,829.69
% Increase in total spending	29%	21%
Pre-Expansion federal share	56%	63%
Post-Expansion federal share	63%	63%
Average state spending per enrollee, 2012	$3,592.68	$2,720.30
Average state spending per enrollee, 2016	$2,962.78	$2,653.73
Decline in state spending per enrollee	-18%	-2%

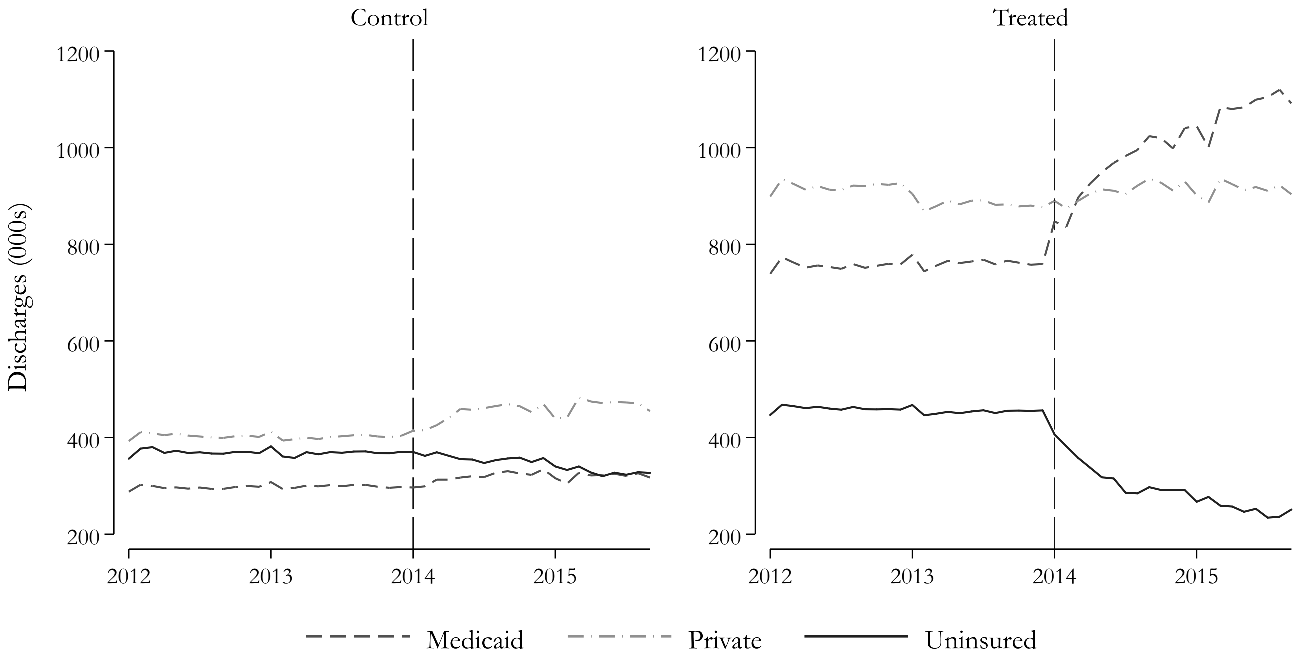
Figure 1. Map of states in analysis sample



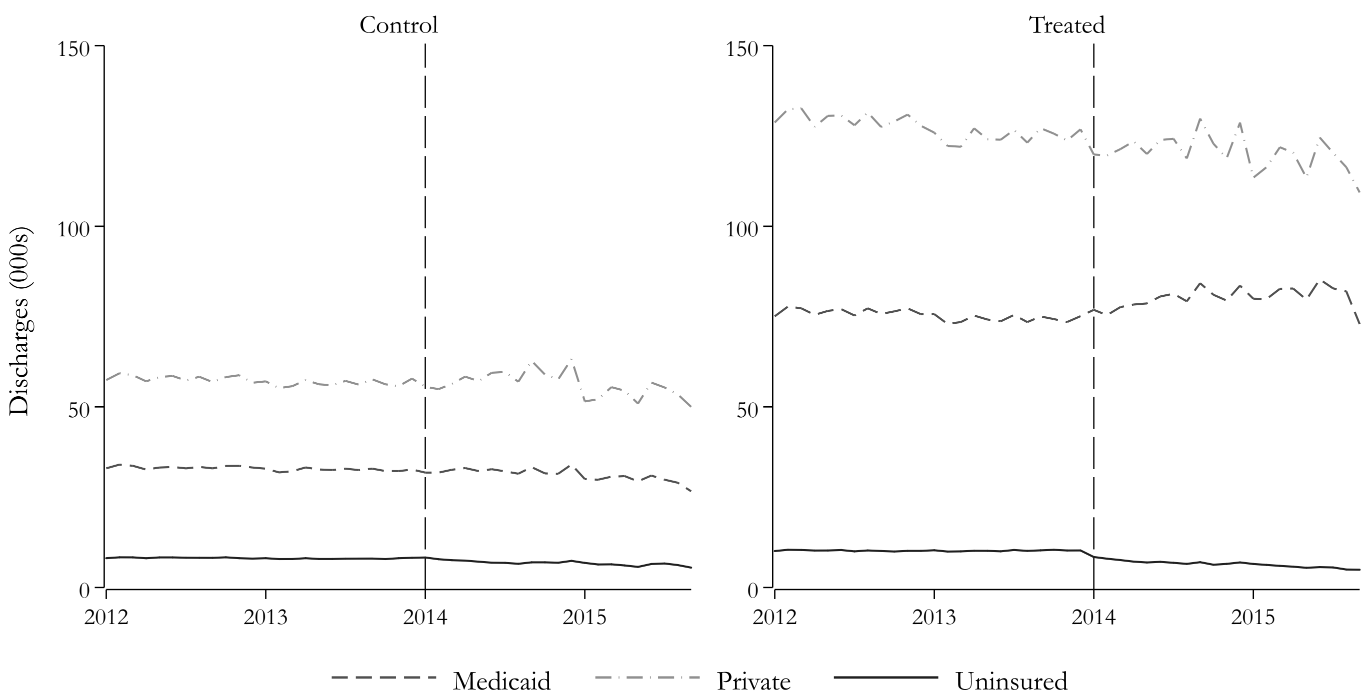
Notes: This map shows the sample of states in the main sample. The sample includes 20 states, with 13 expansion states and 7 non-expansion states. The non-expansion states are indicated with a grid pattern in this map and all of the maps that follow. See main text for more information on the sample construction based on the SED and SIDD databases.

Figure 2. Total discharges in sample states, by payer category and state treatment status

Panel A. Total discharges



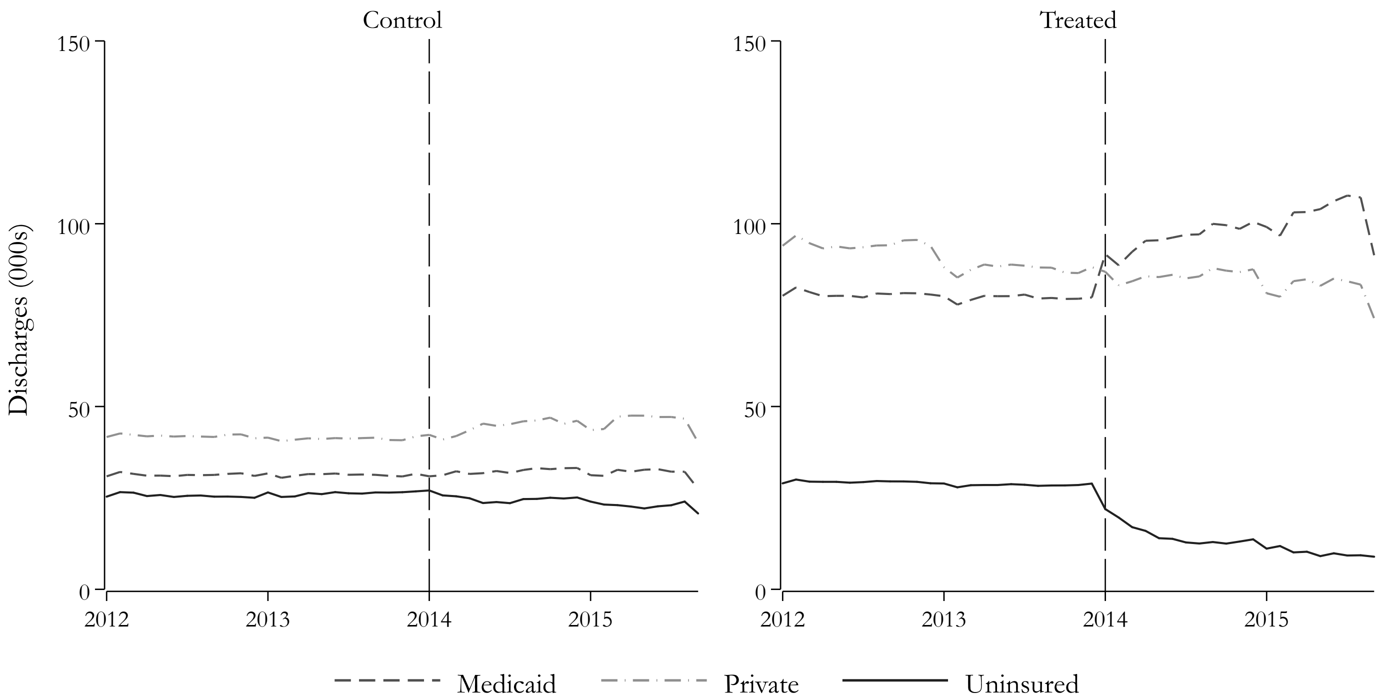
Panel B. Inpatient non-emergency discharges



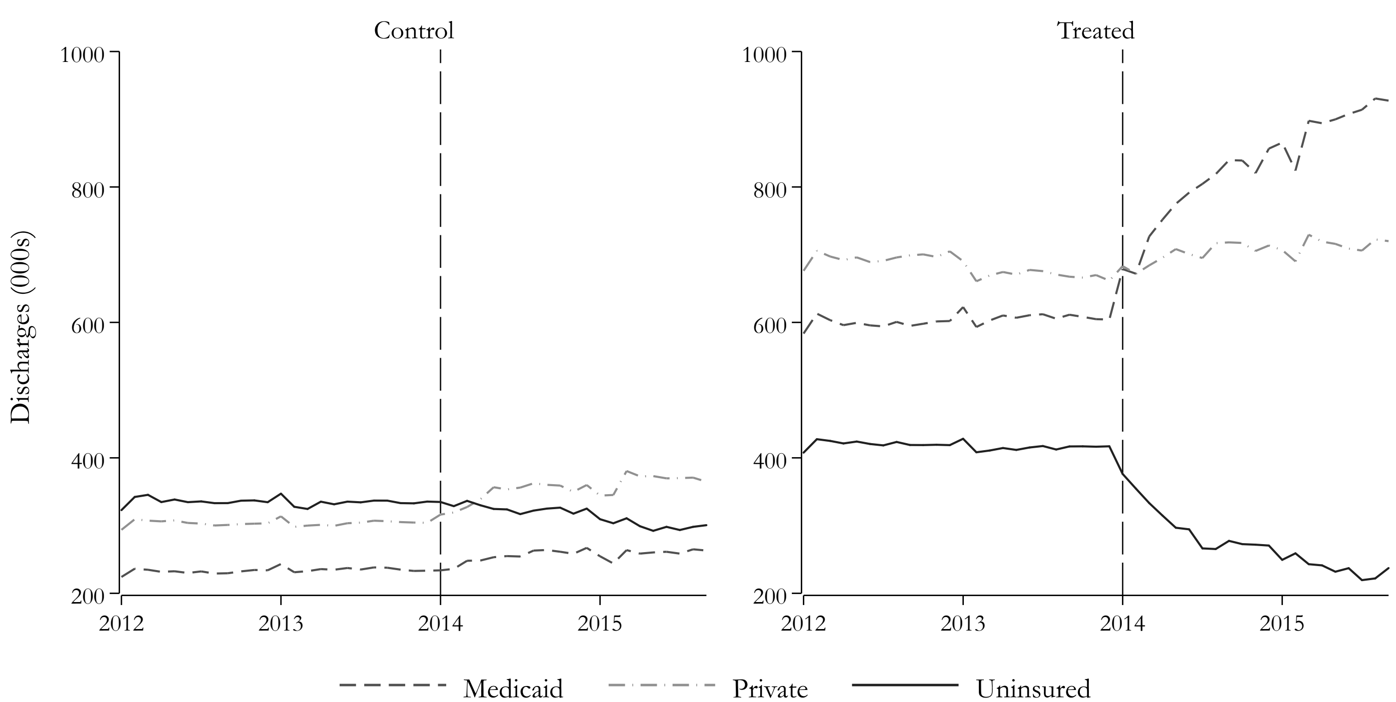
Notes: The figures above report the total discharges (hospital and ED combined) and inpatient non-emergency discharges for the expansion (treated) and non-expansion (control) states. The figures report the monthly totals aggregating across expansion and non-expansion states separately, with month fixed effects residualized out to remove seasonality, and the trends are reported separately for three insurance types: Medicaid, Private, and Uninsured. The data are monthly totals, and the time period spans January 2012 through September 2015.

Figure 3. Emergency department discharges in sample states, by payer category and state treatment status

Panel A. Inpatient emergency discharges

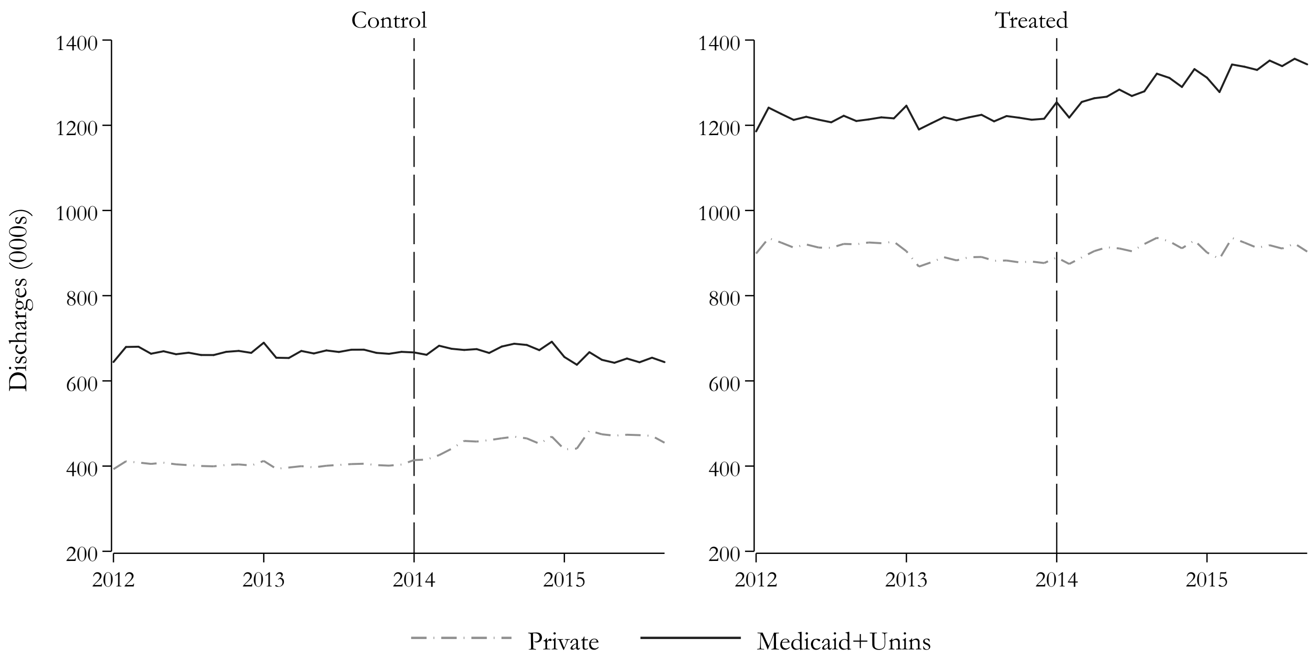


Panel B. Outpatient emergency discharges



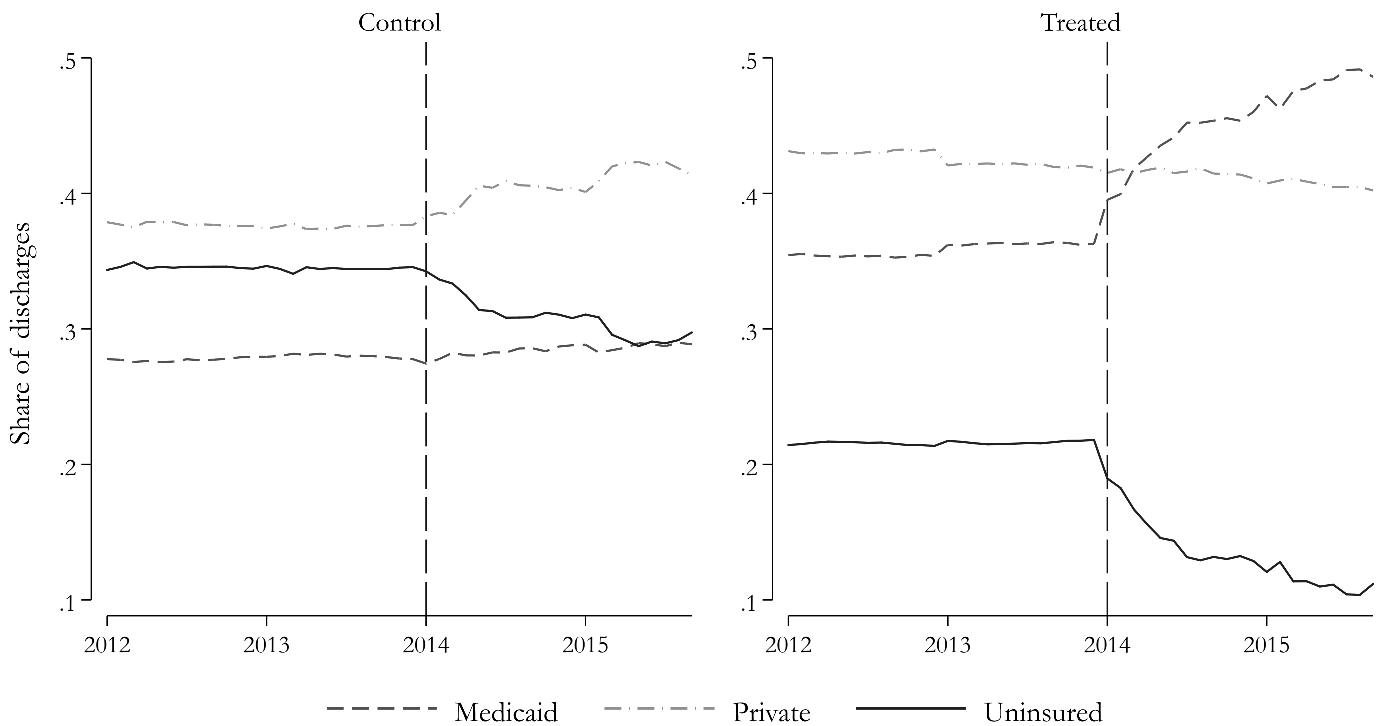
<u>Notes:</u> The figures above report the total inpatient and outpatient ED discharges for the expansion (treated) and non-expansion (control) states. The figures report the monthly totals aggregating across expansion and non-expansion states separately, with month fixed effects residualized out to remove seasonality, and the trends are reported separately for three insurance types: Medicaid, Private, and Uninsured. The data are monthly totals, and the time period spans January 2012 through September 2015.

Figure 4. Total discharges in sample states, combining Medicaid and Uninsured



Notes: The figures above report the total discharges (hospital and ED combined) and inpatient non-emergency discharges for the expansion (treated) and non-expansion (control) states. The figures report the monthly totals aggregating across expansion and non-expansion states separately, with month fixed effects residualized out to remove seasonality, and the trends are reported separately for two insurance types: Medicaid and Uninsured (combined) and Private. The data are monthly totals, and the time period spans January 2012 through September 2015.

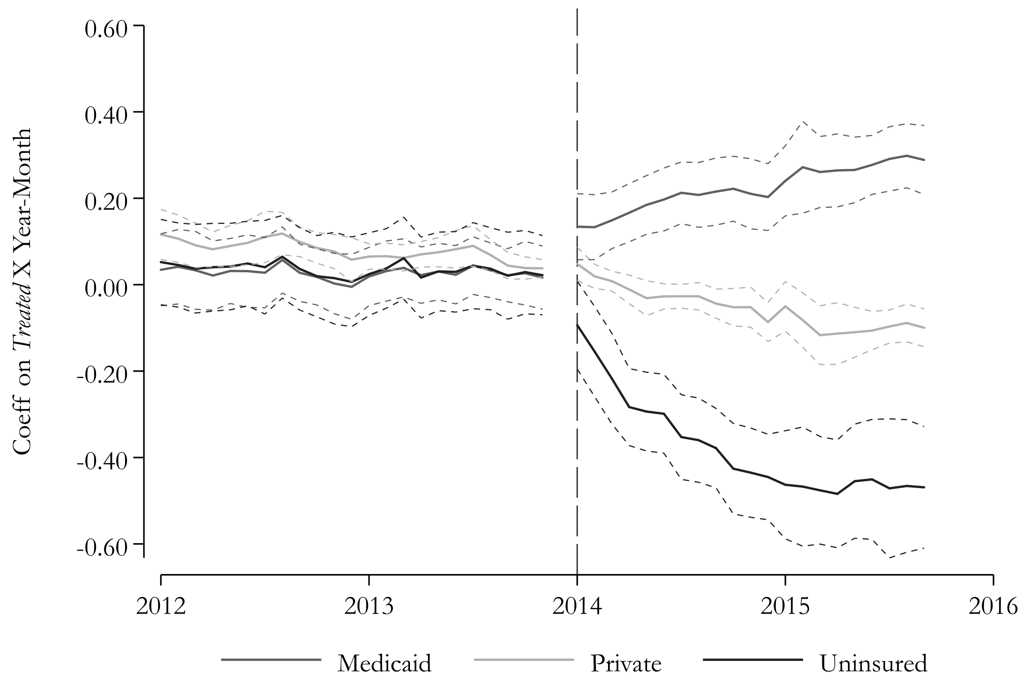
Figure 5: Share of total discharges by type of insurance



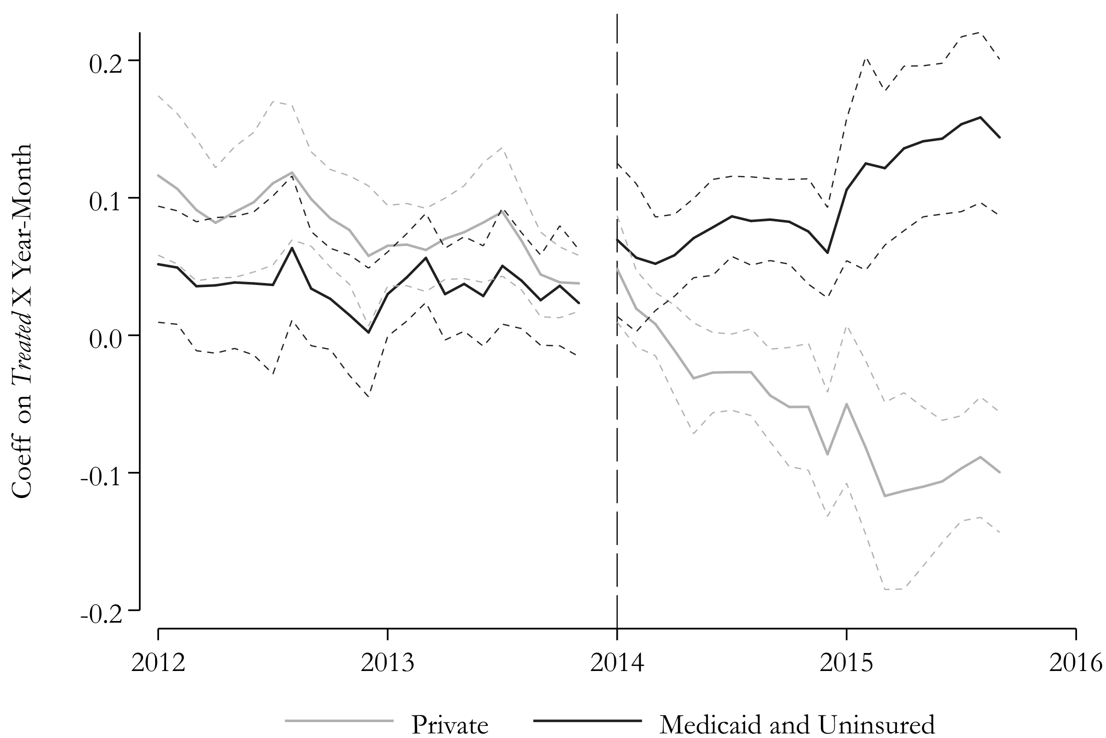
Notes: The figures above report the share of total discharges by insurance type (Medicaid, Private, Uninsured) for expansion (treated) and non-expansion (control) states based on the residualized discharges reported in the previous figures.

Figure 6. Event Study estimates, total discharges

Panel A. Separate Event Study Estimates for Each Insurance Group



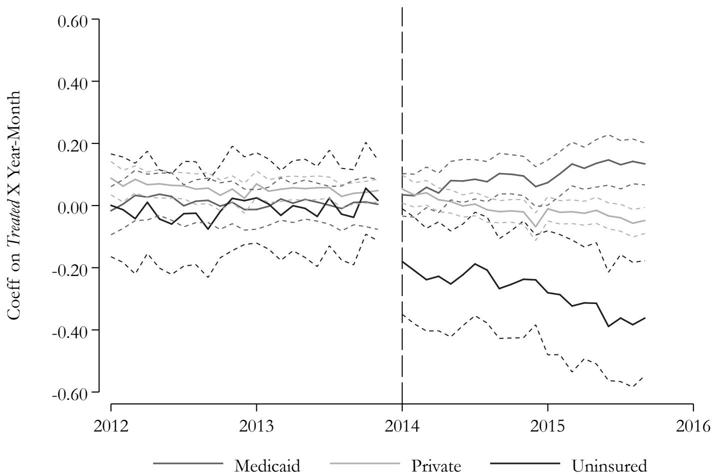
Panel B. Combining Medicaid and Uninsured



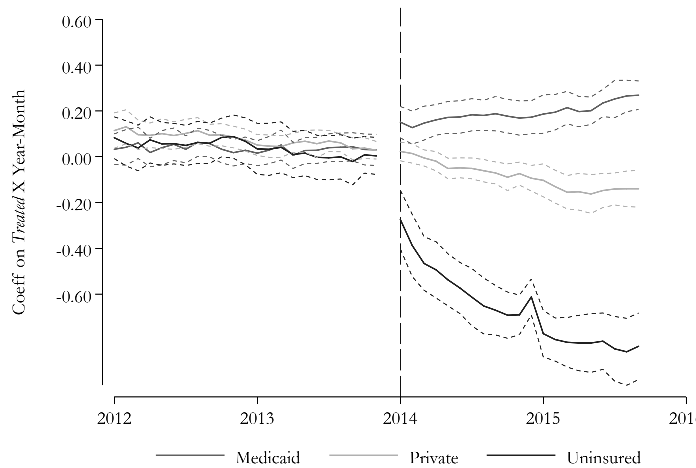
Notes: The figures above report event-study estimates analogous to the difference-in-difference estimates. See text for details on the regression equation. The standard errors are clustered by state and year-month. Each event study coefficient (for each insurance type) is relative to December 2013 (the omitted year-month).

Figure 7. Event Study Estimates by Type of Encounter (Each Insurance Type Estimated Separately)

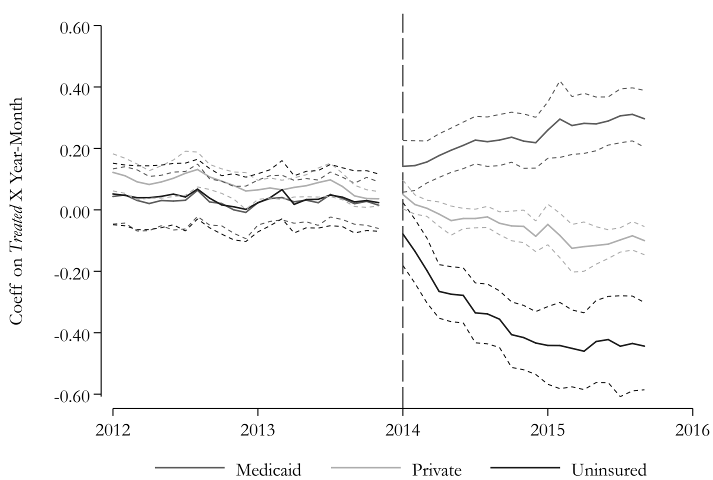
Panel A. Inpatient discharges



Panel B. Inpatient emergency discharges



Panel C. Outpatient emergency discharges

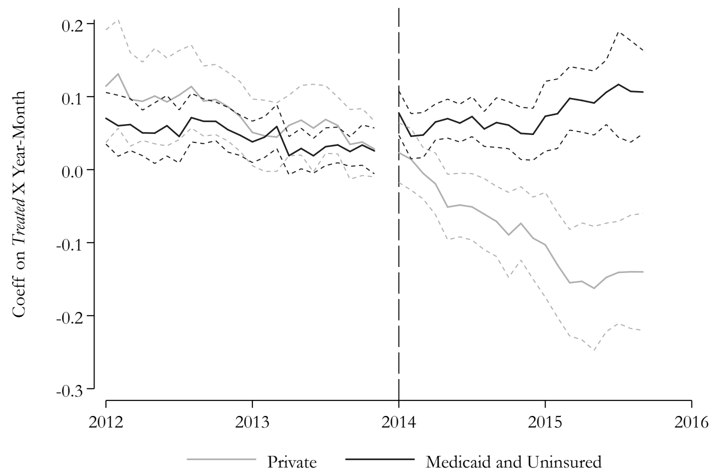


Notes: The figures above report event-study estimates analogous to the difference-in-difference estimates. See text for details. The standard errors are clustered by state and year-month. Each event study coefficient (for each insurance type) is relative to December 2013 (the omitted year-month).

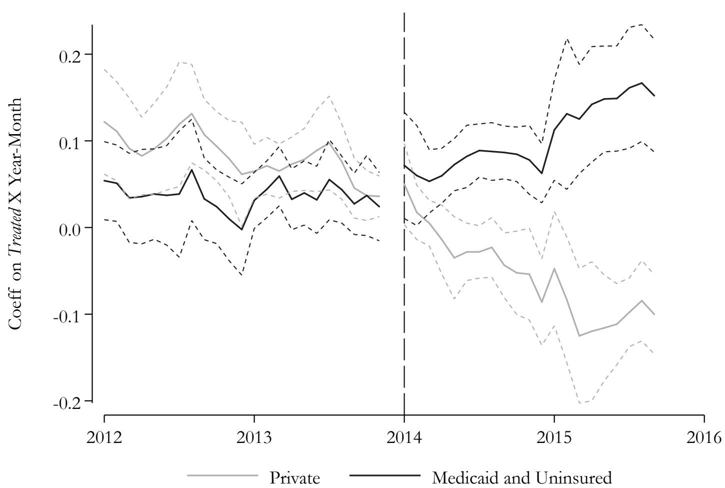
Figure 8. Event-Study Estimates by Type of Encounter (Medicaid + Uninsured)

Panel A. Inpatient discharges

Panel B. Inpatient emergency discharges



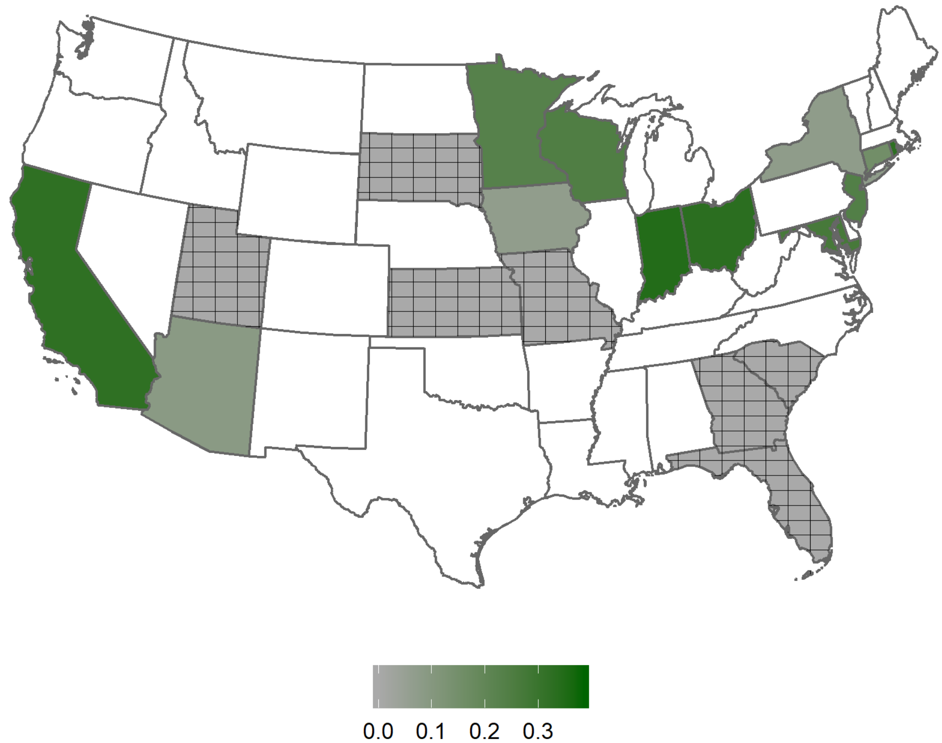
Panel C. Outpatient emergency discharges



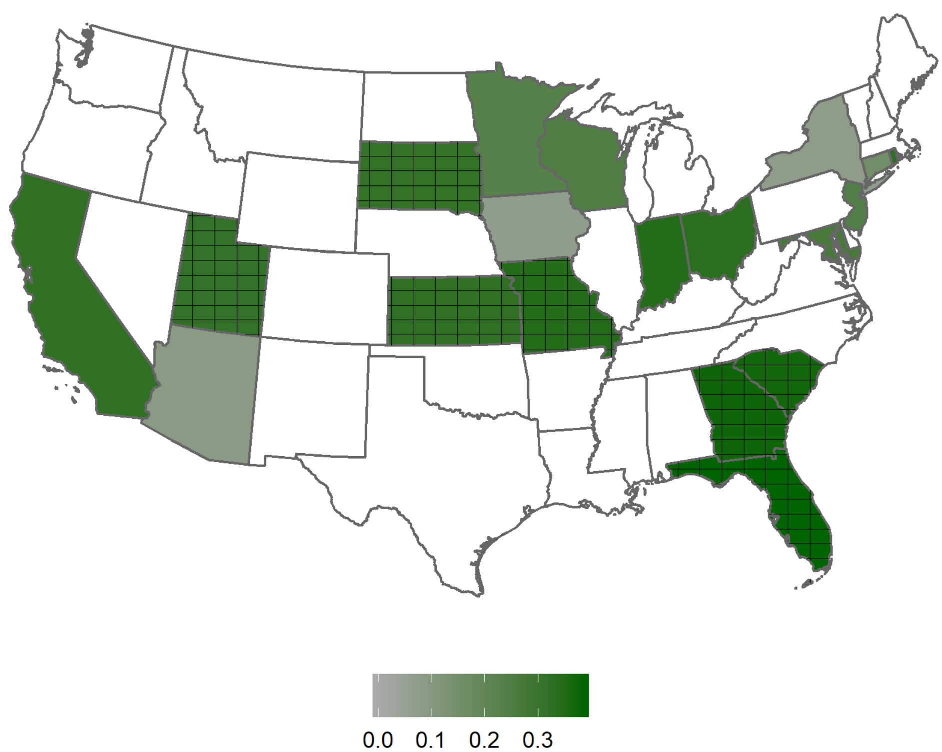
Notes: The figures above report event-study estimates analogous to the difference-in-difference estimates. See text for details. The standard errors are clustered by state and year-month. Each event study coefficient (for each insurance type) is relative to December 2013 (the omitted year-month).

Figure 9. Share of Population Treated by Medicaid Expansion

Panel A: Actual Share of Population Treated

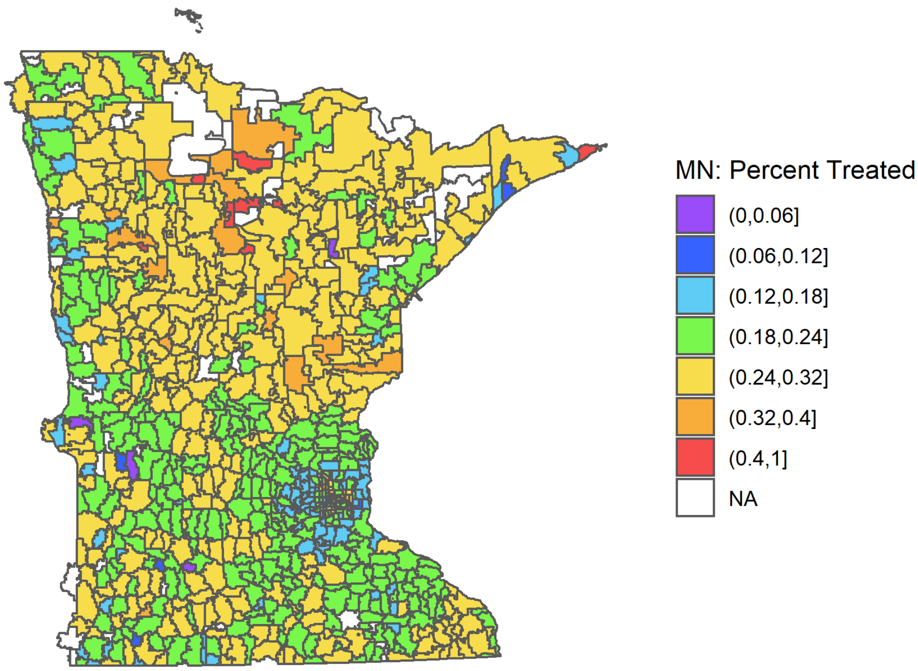


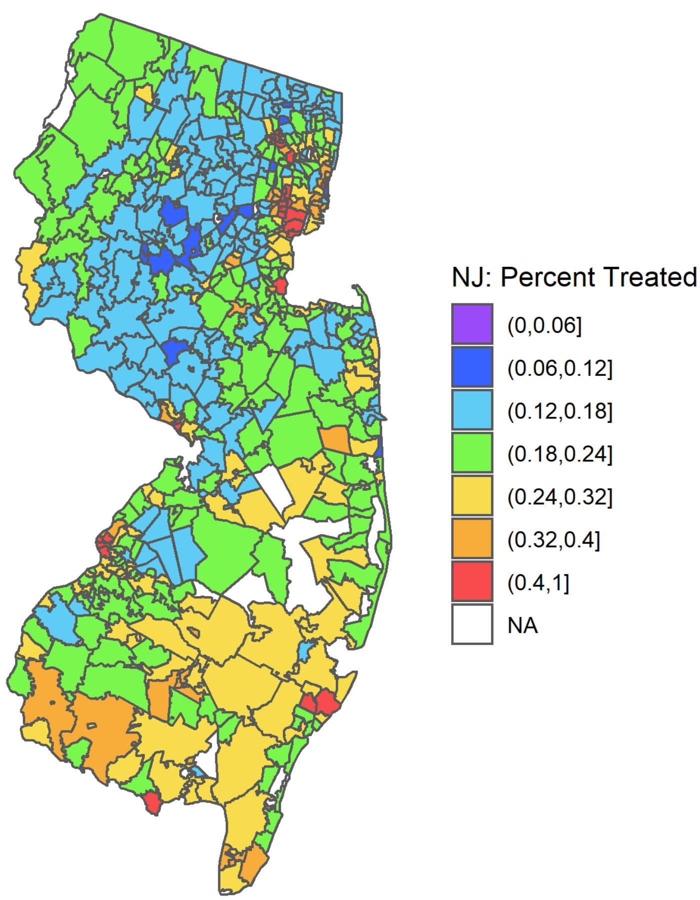
Panel B: Counterfactual Share of Population Treated



Notes: The map in Panel A shows the actual share of the population treated by the Medicaid expansion, with non-expansion states all set to zero, since these states chose not to expand Medicaid. The map in Panel B shows the counterfactual share of population that would have been treated by the Medicaid expansion in the non-expansion states (had they expanded), using the same gradient for scale. Vermont is excluded from this map because we do not have information on the share treated, but is in analysis sample for difference-in-difference results (though not in triple-difference results that uses the share treated).

Figure 10. Within-State Variation in Share of Population Treated by Expansion

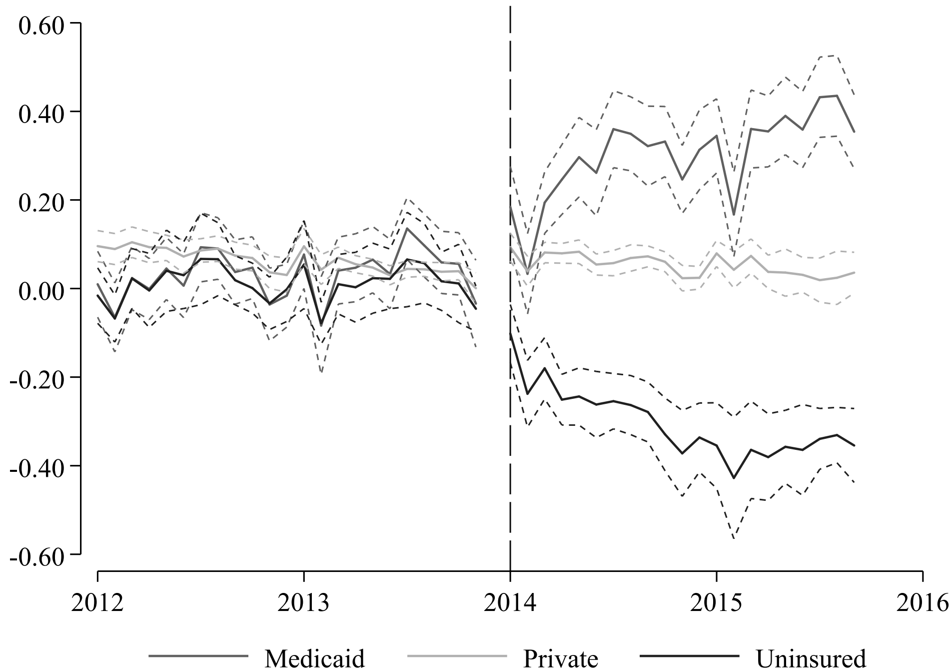




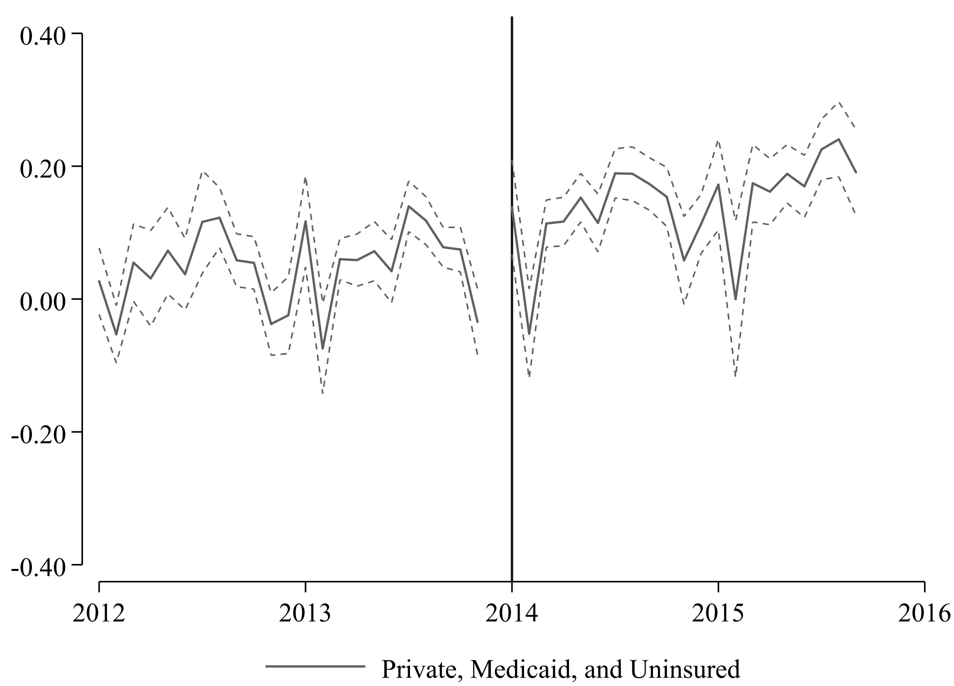
Notes: The two maps show the within-state variation in the share of each ZIP Code that was treated by the Medicaid expansion. The maps cover 2 of the 12 expansion states in our sample with information on the share treated by expansion (we do not have this information for Vermont, which is one of the 13 expansion states in our sample); analogous maps for the remainder of the expansion states are in the Online Appendix.

Figure 11. Triple-Difference Event Studies

Panel A. By Insurance Status

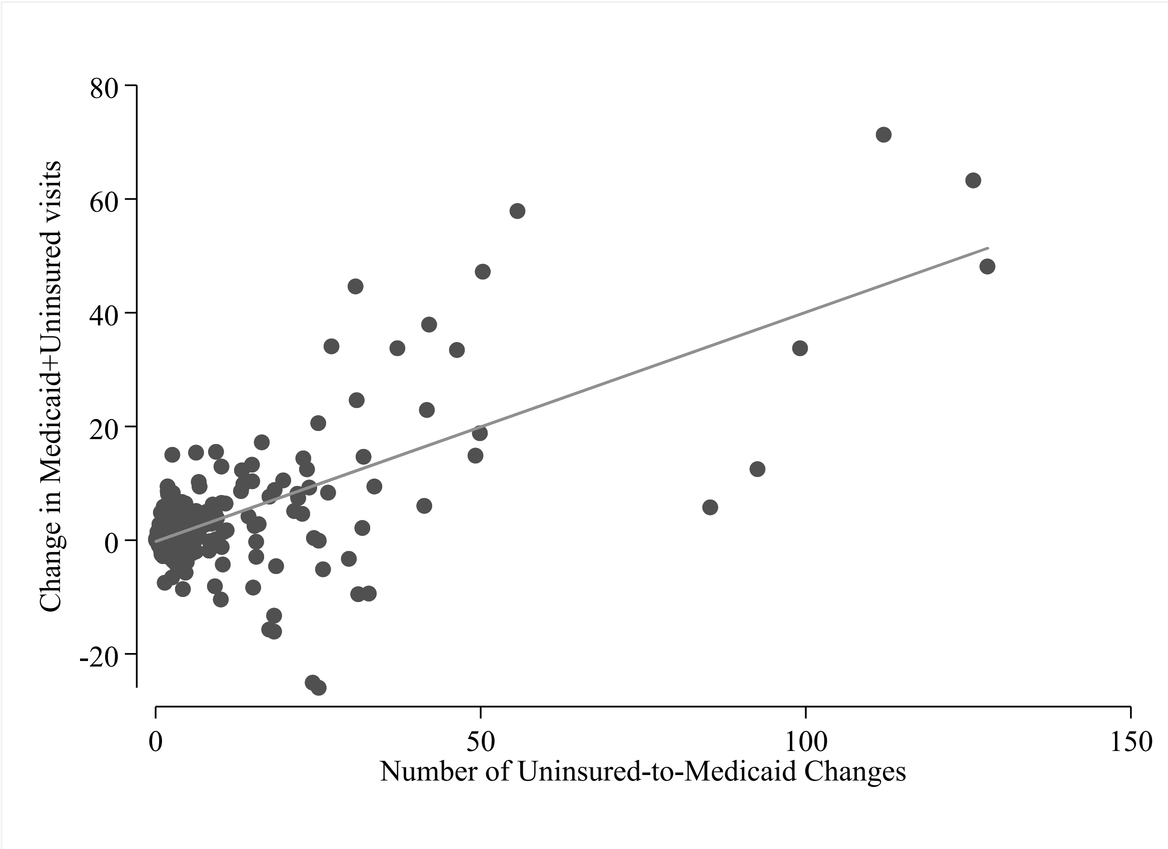


Panel B. Combining All Insurance Types



Notes: The two panels show triple-difference event-study estimates of the effect of the Medicaid expansion on total visits. The vertical axis reports event-study coefficients in log-linear regression models. The confidence intervals in figure are based on standard errors clustered by state and year-month.

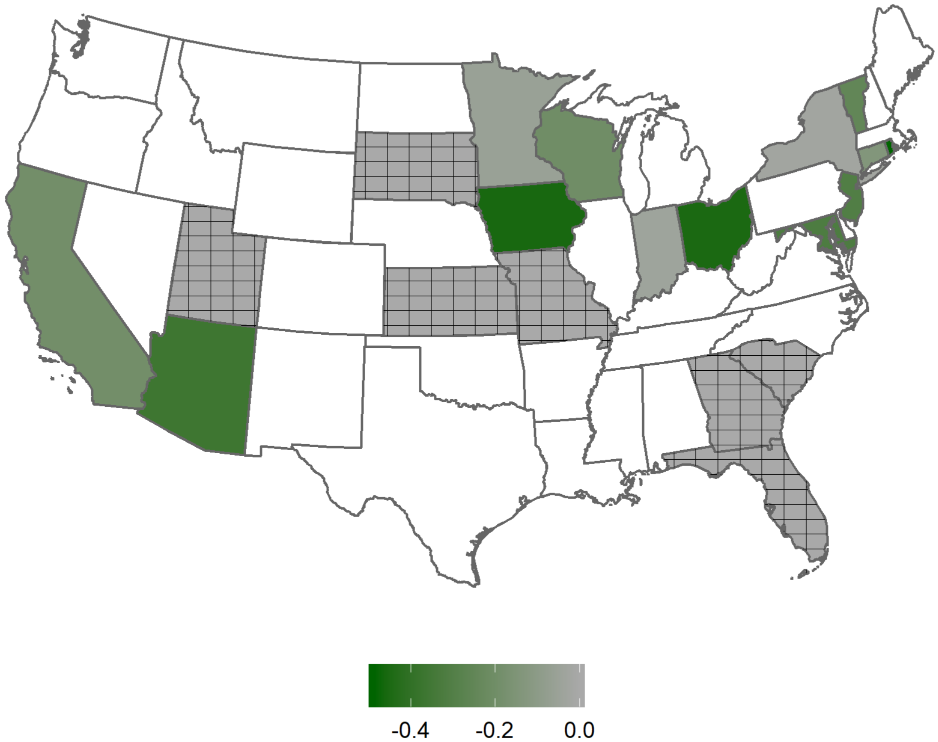
Figure 12. Correlation Between Number of Uninsured-to-Medicaid Transitions and 2013–2015 Change in Medicaid and Uninsured Visits



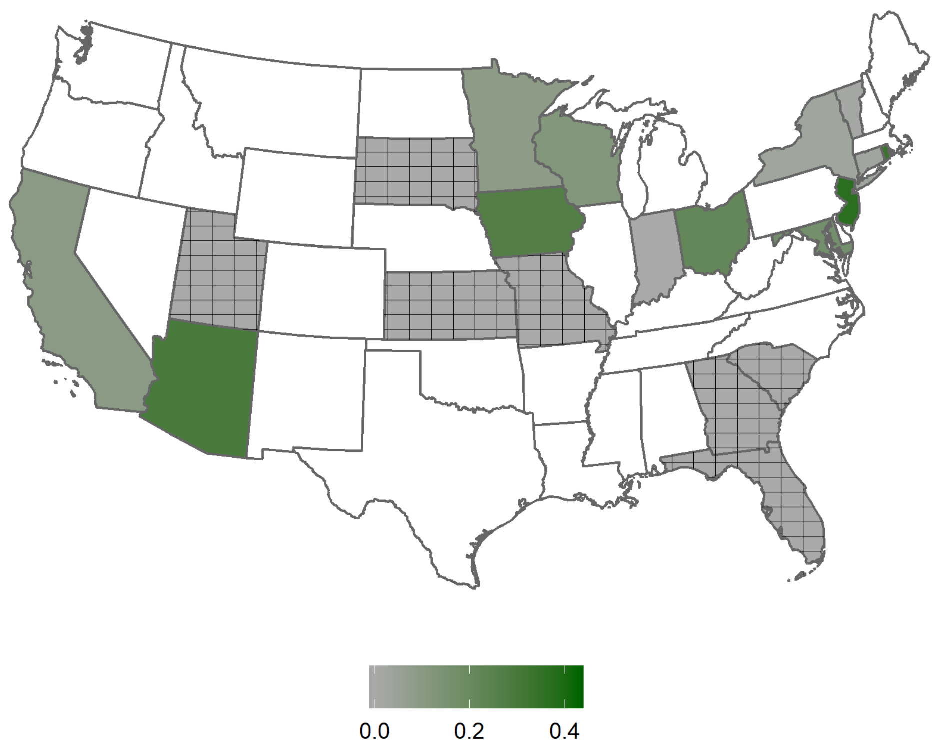
Notes: The figure above reports the association between the change in total Medicaid and Uninsured visits (between 2013 and 2015) for each county in the Medicaid expansion states in our main sample and the number of uninsured-to-Medicaid changes in that county during the same time period. The positive association is consistent with the expansion causing an increase in total Medicaid and uninsured visits, with the "compliers" (who changed insurance status) driving the overall increase. The scatter plot excludes the two largest counties in the sample for readability, but these counties are included in some of the columns in the main regression table building on this figure (Table 4). The slope of the regression line reported in this figure is 0.40 (with a standard error of 0.02), which means that each uninsured-to-Medicaid change in a county is associated with an additional 0.40 visits.

Figure 13. State Heterogeneity in Effect of Medicaid Expansion on Uninsured Visits and Medicaid Visits

Panel A: Uninsured Total Visits

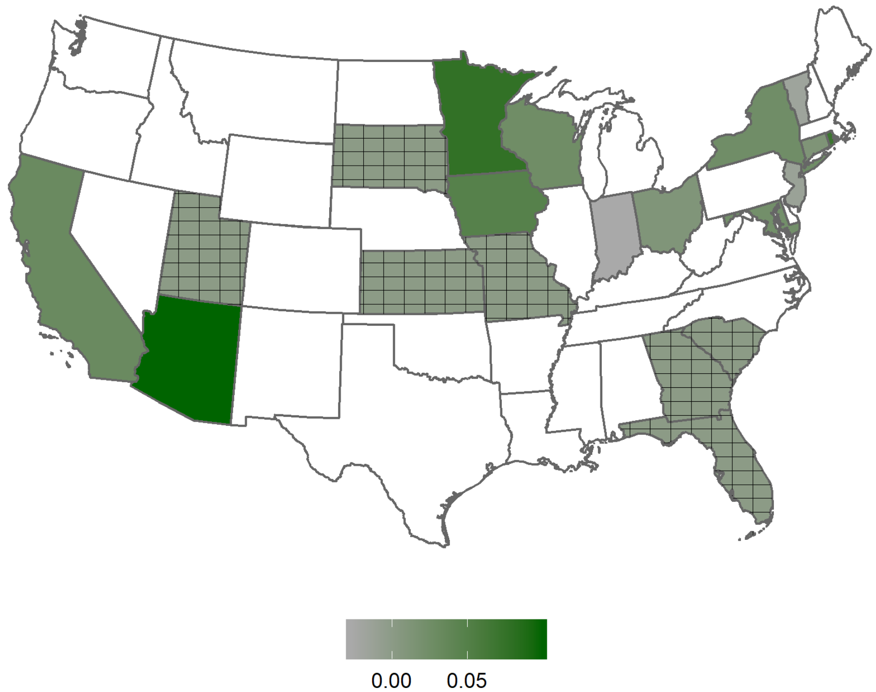


Panel B: Medicaid Total Visits



Notes: The map in Panel A shows the state-specific estimates of the effect of the Medicaid expansion on uninsured total visits relative to non-expansion states (which are normalized to 0). Panel B reports analogous estimates for Medicaid total visits.

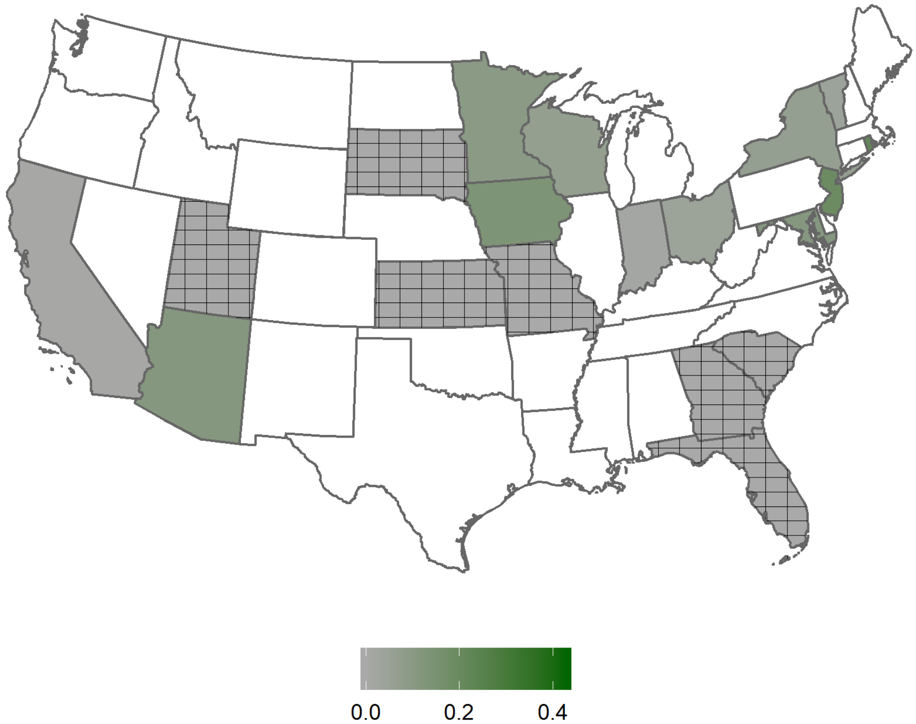
Figure 14. State Heterogeneity in Effect of Medicaid Expansion on Uninsured+Medicaid Visits



Notes: The map shows the state-specific estimates of the effect of the Medicaid expansion on combined Medicaid and uninsured visits relative to non-expansion states (which are normalized to 0).

Figure 15. State Heterogeneity in Effect of Medicaid Expansion, by Type of Encounter

Panel A: Medicaid Scheduled Inpatient Visits



Panel B: Medicaid Inpatient Emergency Visits

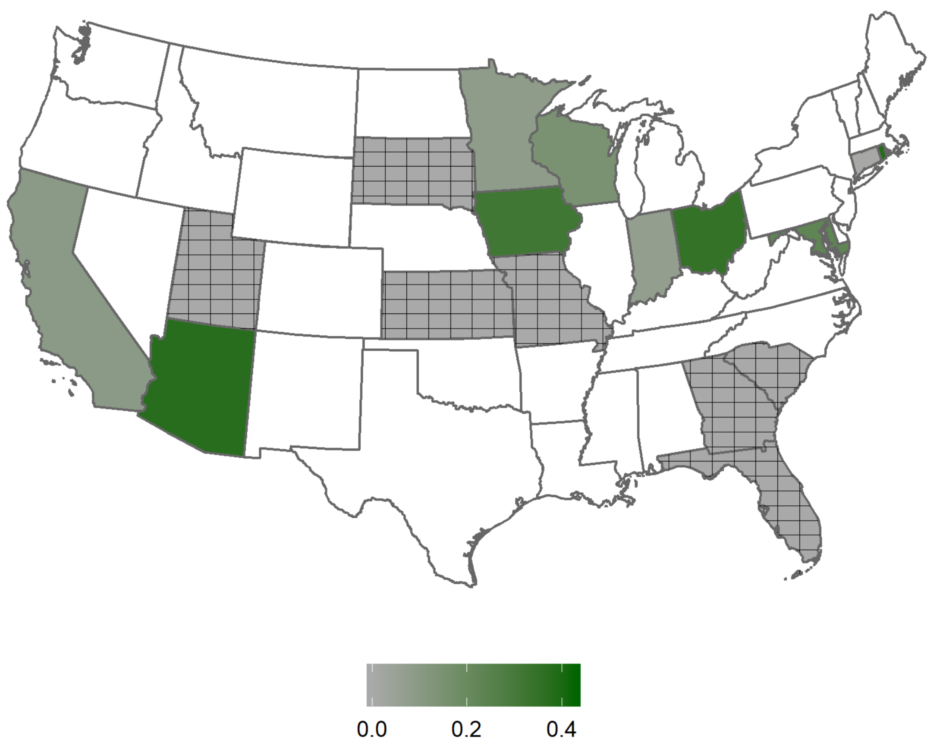
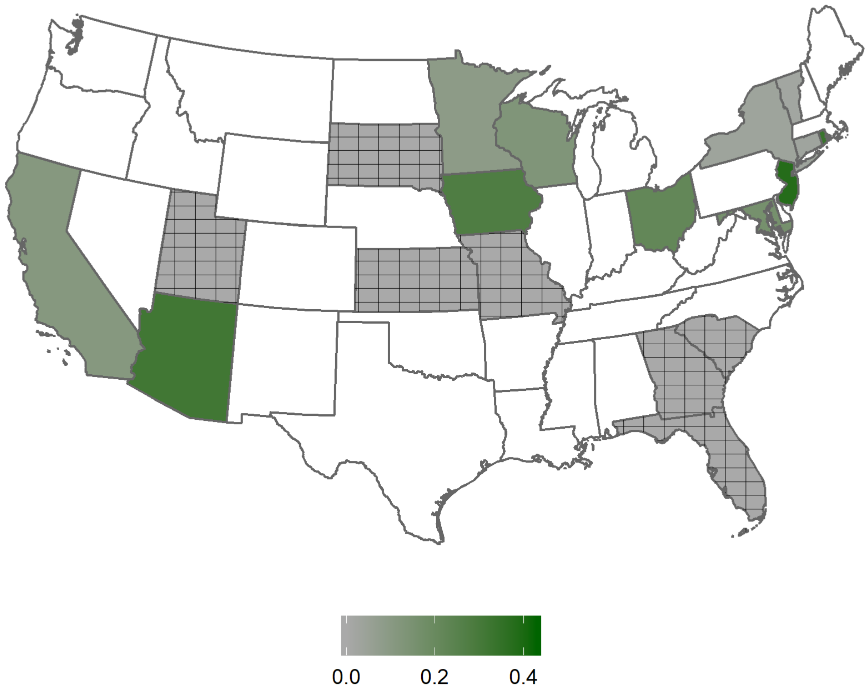


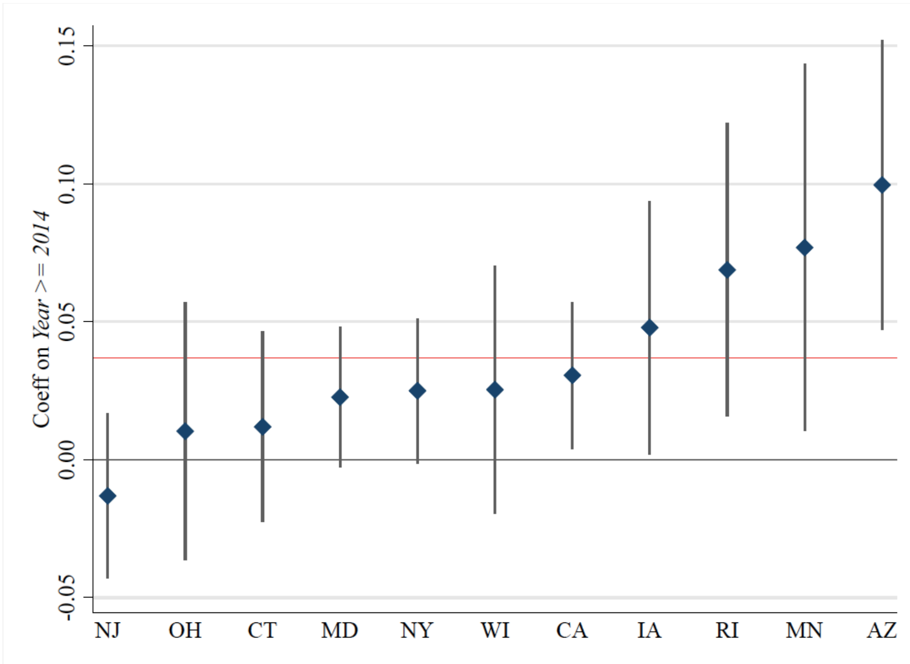
Figure 15. State Heterogeneity in Effect of Medicaid Expansion, by Type of Encounter (continued)

Panel C: Medicaid Outpatient Emergency Visits



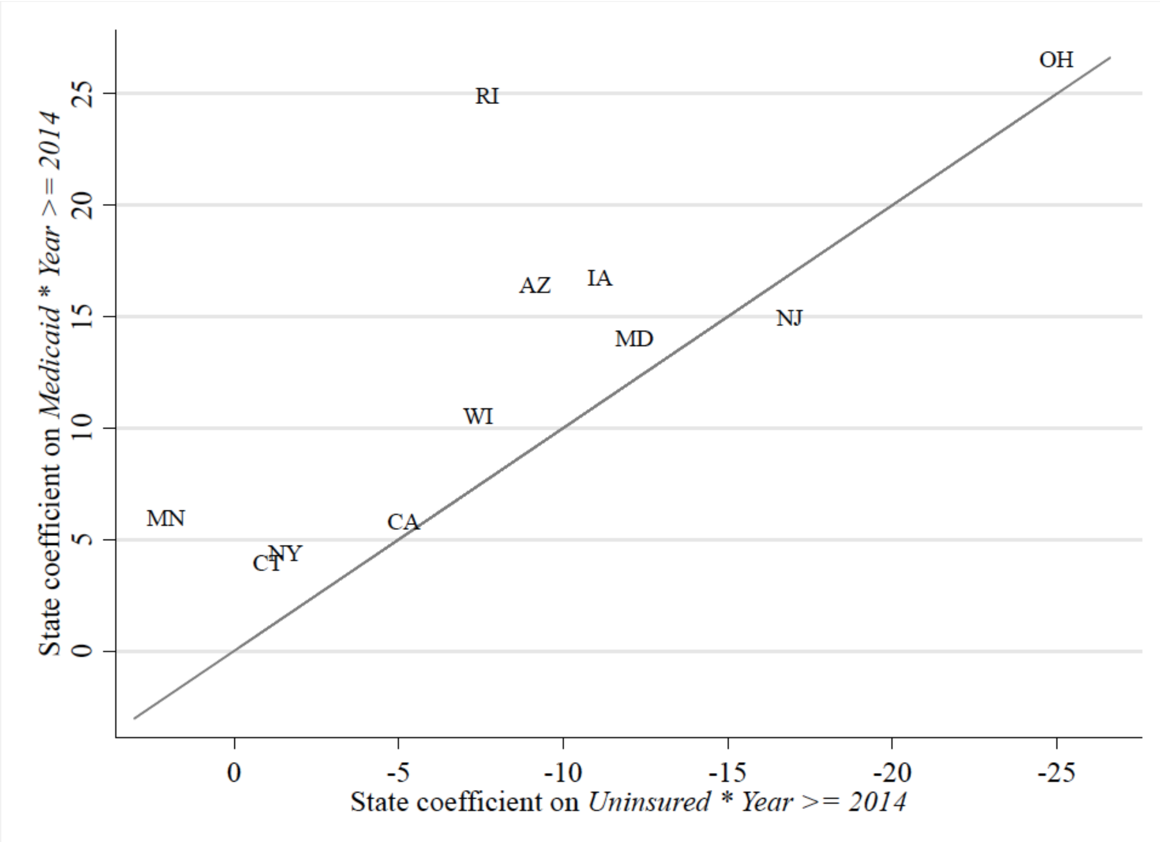
Notes: The maps in each panel show the state-specific estimates of the effect of the Medicaid expansion on Medicaid visits (for each category of visits – scheduled inpatient visits, inpatient emergency visits, and outpatient emergency visits), relative to non-expansion states which are normalized to 0. Each map uses the same gradient for scale.

Figure 16. State-Specific Heterogeneity in the Estimated Effect of ACA Medicaid Expansion on Combined "Medicaid + Uninsured" Encounters



Notes: The figure above reports state-specific difference-in-difference estimates of the effect of the ACA Medicaid expansion on total encounters (hospital and ED visits) combining Medicaid visits and uninsured visits. The solid red line is the average, and the state-specific estimates are reported along with 95-percent confidence intervals based on standard errors clustered by state and year-month.

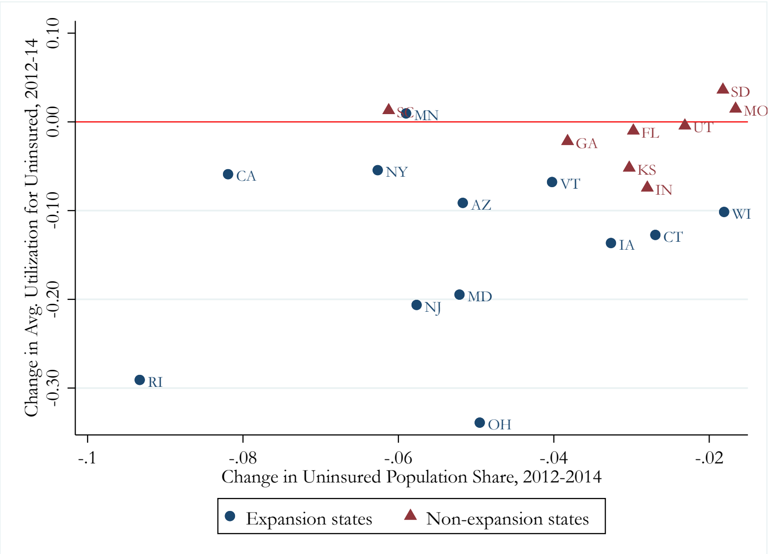
Figure 17. Correlation Between State-Specific Estimates of the Effect of ACA Medicaid Expansion on Medicaid Encounters and Effect of ACA Medicaid Expansion on Uninsured Encounters



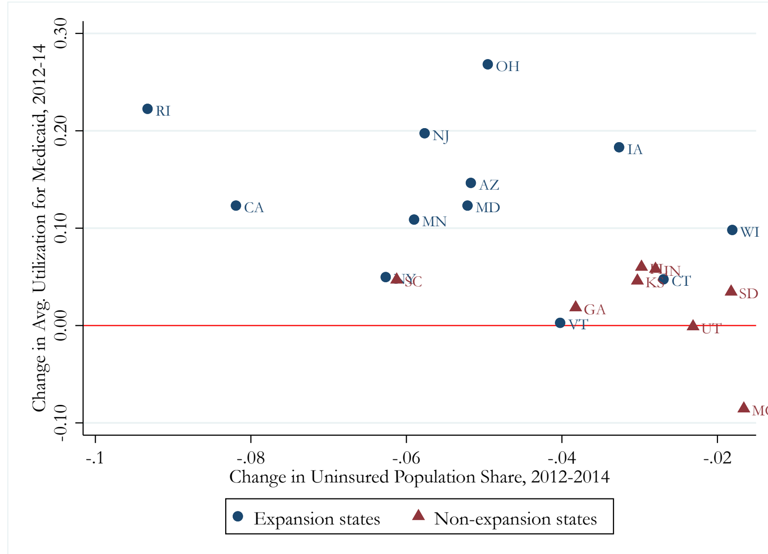
Notes: The figure above reports correlation between the state-specific estimate on uninsured visits and the state-specific estimate on Medicaid visits for each of the expansion states. The solid line is the 45-degree line; all states above the 45-degree line have larger increases in Medicaid visits than they have decreases in uninsured visits.

Figure 18. State Heterogeneity in Targeting

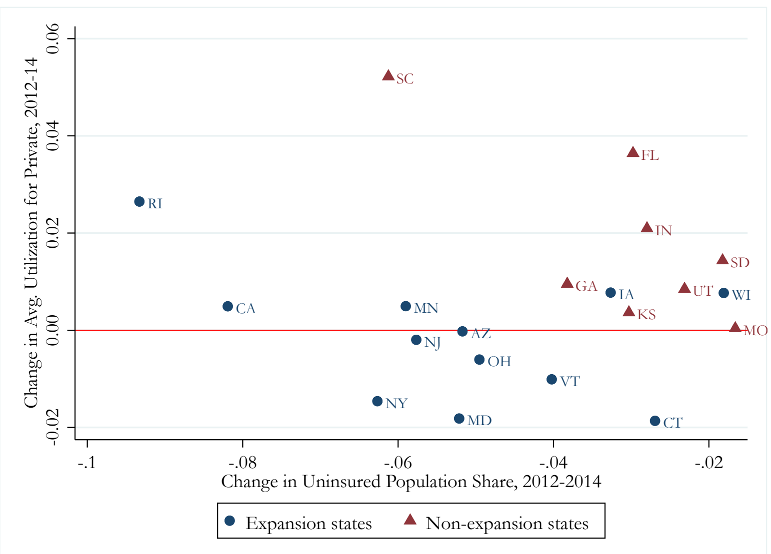
Panel A. Average Utilization of Uninsured



Panel B. Average Utilization of Medicaid



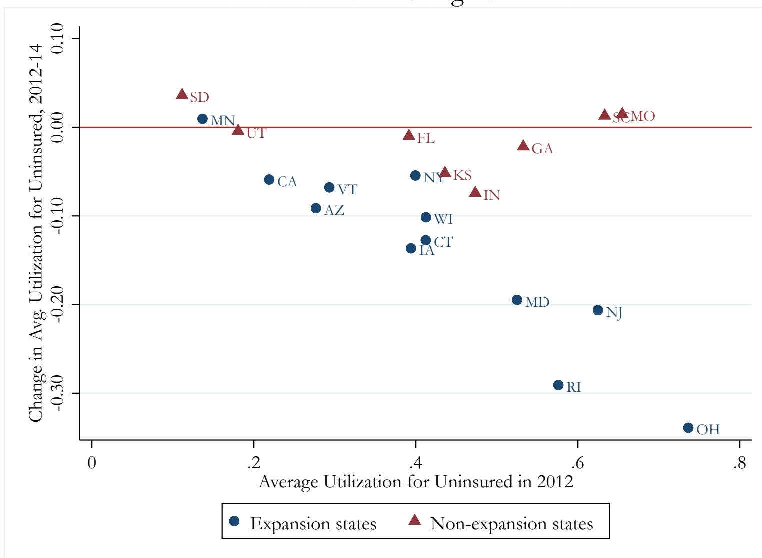
Panel C. Average Utilization of Private



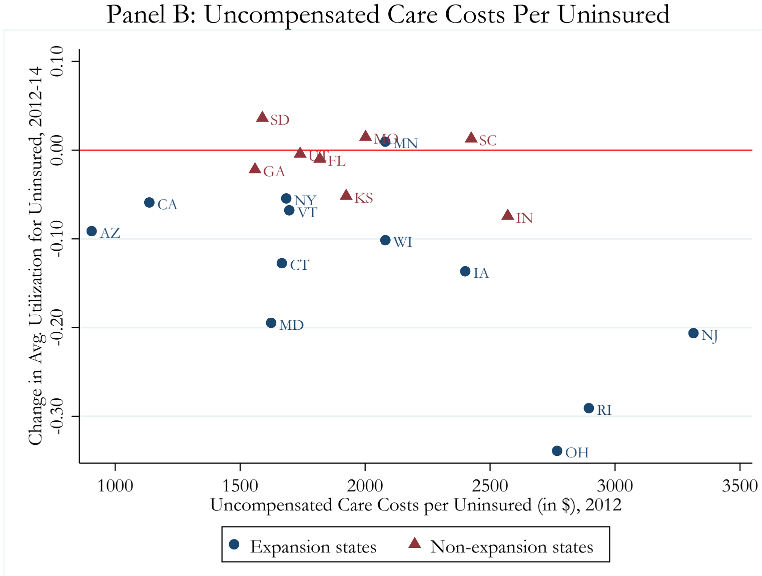
Notes: Each panel in this figure reports association between change in average utilization (for uninsured, Medicaid, and private) and the change in the share uninsured. Both changes are calculated as long differences between 2012 and 2014. Panel A shows that the larger reduction in average utilization among the uninsured in expansion states (relative to non-expansion states) masks considerable heterogeneity across expansion states. The pattern for average utilization for Medicaid is similar, with more variation along the vertical axis for expansion states relative to non-expansion states (Panel B). Lastly, Panel C shows change in utilization for private, and the figure shows more variation in non-expansion states (in contrast to the other two panels).

Figure 19. Exploring State Heterogeneity in Changes in the Average Utilization for Uninsured

Panel A: Pre-ACA Average Utilization



Panel B: Uncompensated Care Costs Per Uninsured



<u>Notes:</u> Each panel in this figure reports the association between the change in average utilization for the uninsured and a potential explanatory variable. Both panels show more variation among expansion states in change in average utilization, and both panels show negative association, with larger declines in average utilization in states that had higher average utilization for the uninsured pre-ACA and larger hospital uncompensated care costs.

Appendix Table A1. Heterogeneity Across Counties in Number of Uninsured Who Transitioned to Medicaid, IV Estimates
Dependent variable: Change in total number of Medicaid and uninsured visits, 2013–2015

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Full Sample				Exclude Largest Counties			
Number of Uninsured Who Transitioned to Medicaid	0.319	0.316	0.293	0.340	0.325	0.318	0.299	0.312
	(0.014)***	(0.014)***	(0.051)***	(0.067)***	(0.045)***	(0.048)***	(0.098)***	(0.106)***
Total Encounters in July 2012 - June 2013 period			0.010	0.033			0.006	0.018
			(0.022)	(0.028)			(0.026)	(0.039)
Initial Number of Uninsured Residents				-0.020				-0.009
				(0.019)				(0.025)
State Fixed Effects		✓	✓	✓		✓	✓	✓
N	553	553	553	553	551	551	551	551

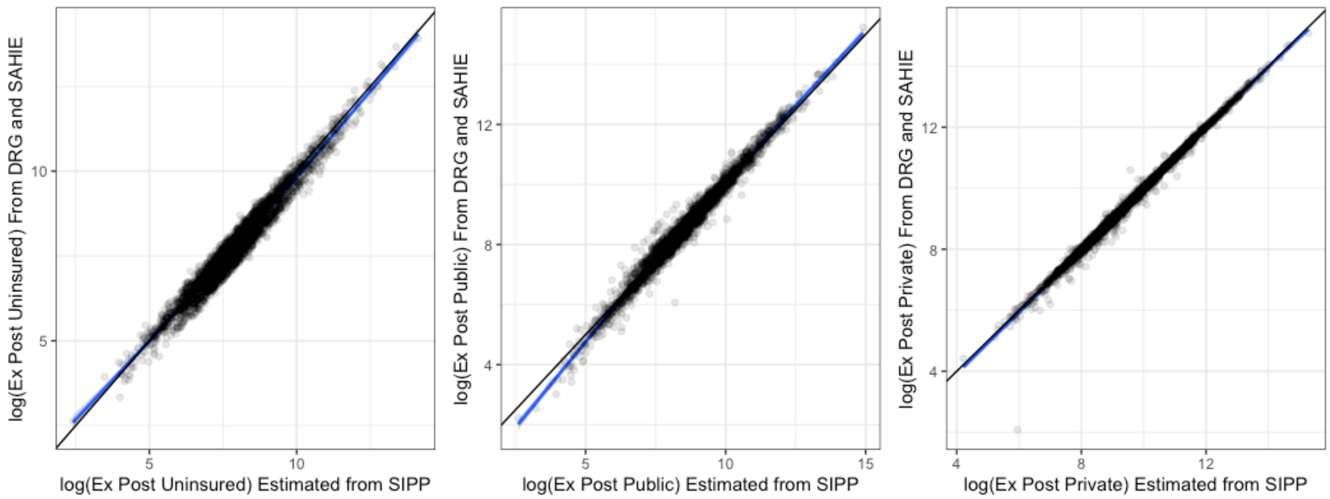
Each column presents IV estimates where the dependent variable is the 2013-to-2015 change in the total number of Medicaid and uninsured visits (inpatient and ED visits combined). The sample is the set of counties in the 11 Medicaid-expansion states we study. The key right-hand-side variable is the number of uninsured individuals who transitioned to Medicaid. See text for details on construction of this variable. This variable is instrumented with the 2013 to 2015 change in the number of uninsured individuals in the county. The columns report results from alternative specifications, and the last four columns exclude the two largest counties in the sample. Robust standard errors are reported in parentheses.

Appendix Table A2. Heterogeneity Across Counties in Number of Uninsured Who Transitioned to Medicaid
Dependent variable: Change in total number of Medicaid plus uninsured plus private visits, 2013–2015

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Full Sample				Exclude Largest Counties			
Number of Uninsured Who Transitioned to Medicaid	0.388	0.384	0.436	0.487	0.403	0.403	0.572	0.590
	(0.018)***	(0.019)***	(0.074)***	(0.073)***	(0.055)***	(0.056)***	(0.115)***	(0.114)***
Total Encounters in July 2012 - June 2013 period			-0.013	0.004			-0.029	-0.021
			(0.018)	(0.022)			(0.021)	(0.030)
Initial Number of Uninsured Residents				-0.022				-0.010
				(0.016)				(0.023)
State Fixed Effects		✓	✓	✓		✓	✓	✓
N	553	553	553	553	551	551	551	551
R^2	0.784	0.816	0.818	0.822	0.495	0.574	0.589	0.590

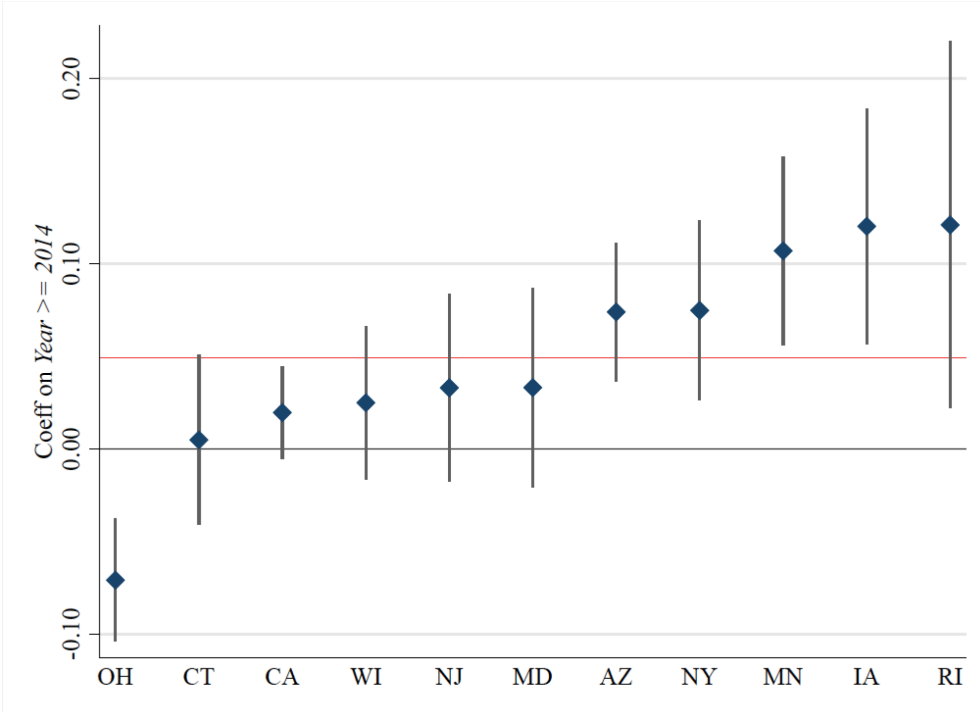
Each column presents regression estimates where the dependent variable is the 2013-to-2015 change in the total number of Medicaid and uninsured visits (inpatient and ED visits combined). The sample is the set of counties in the 11 Medicaid-expansion states we study. The key right-hand-side variable is the number of uninsured individuals who transitioned to Medicaid. See text for details on construction of this variable. The columns report results from alternative specifications, and the last four columns exclude the two largest counties in the sample. Robust standard errors are reported in parentheses.

Appendix Figure A1. SIPP Transition Model Calibration Plots



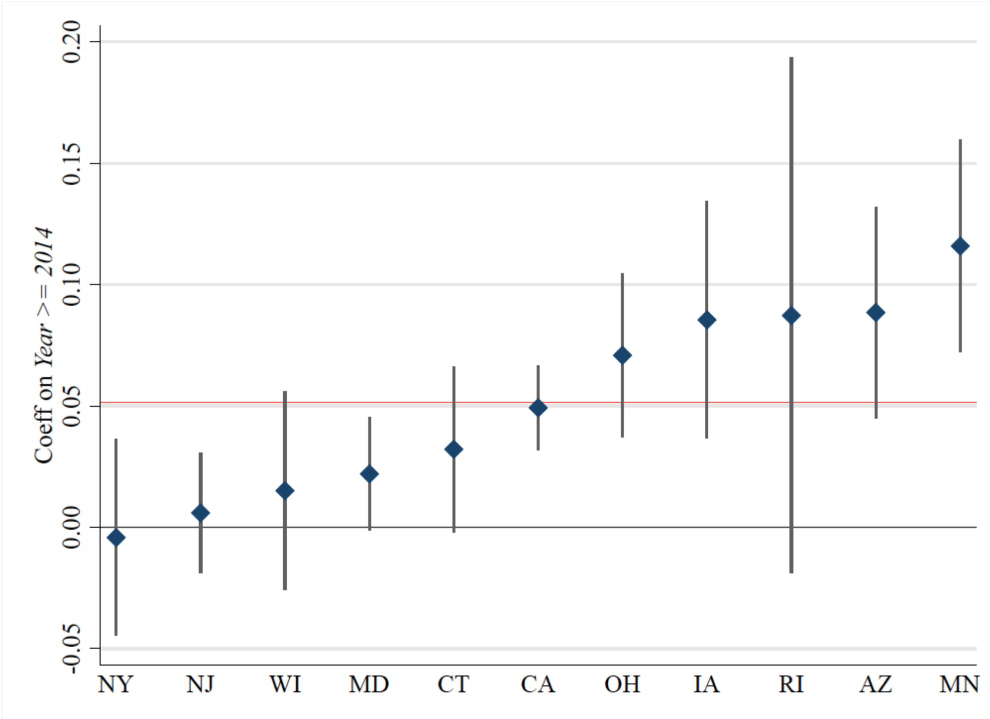
Notes: The figures above show calibration plots comparing the predicted vs. estimated number of individuals in each coverage category (private, public, uninsured) after Medicaid expansion in 2015. Predicted population counts (x-axis) are based on 2013 county health insurance data projected to 2015 using county-specific transition matrices constructed using parameters estimated in the SIPP transition model. This model fits the probability of transition between the three coverage types as a function of Medicaid expansion decisions and the Medicaid expansion "dose," i.e., the fraction of the population potentially eligible for Medicaid. Estimated 2015 population totals (y-axis) are drawn from the Census Bureau's Small Area Health Insurance (SAHIE) program (# uninsured) and Decision Resources Group private and public coverage enrollment data. The blue line fits a LOESS regression to the data points, while the solid black line denotes the 45-degree line. Each data point is the population count estimate for a single county. The data show clearly that the SIPP model calibrates well with "observed" 2015 population totals from the SAHIE county insurance and DRG county enrollment data.

Appendix Figure A2. State-Specific Heterogeneity in the Estimated Effect of ACA Medicaid Expansion on Total "Medicaid and Uninsured" Inpatient Non-Emergency Encounters



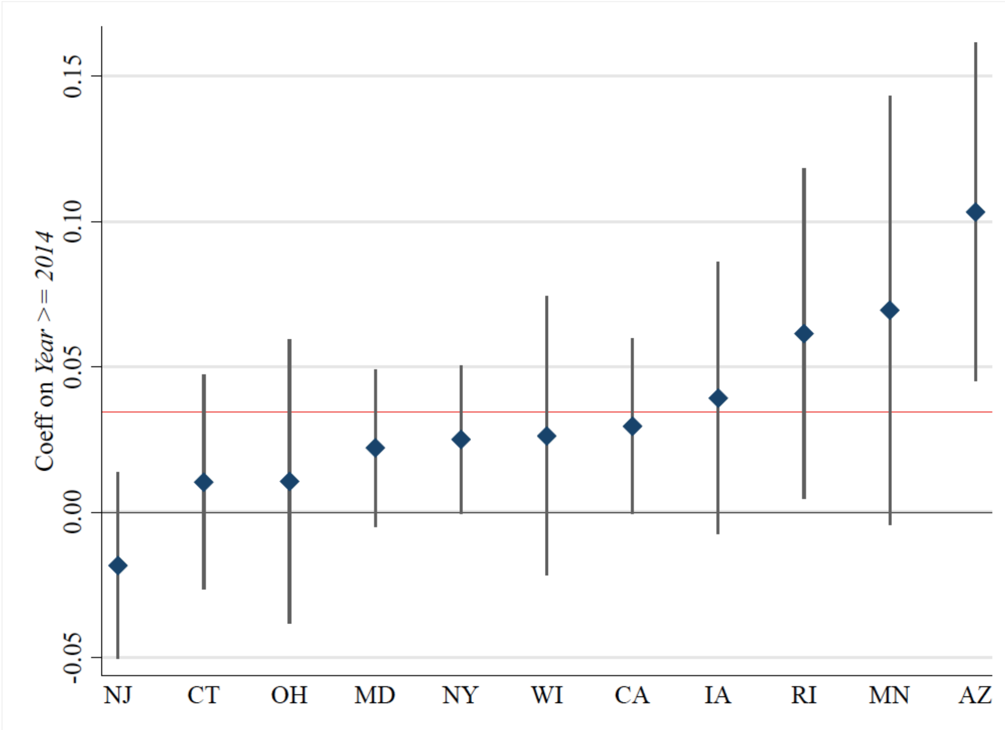
Notes: The figure above reports state-specific difference-in-difference estimates of the effect of the ACA Medicaid expansion, combining Medicaid visits and uninsured visits. The solid red line is the average, and the state-specific estimates are reported along with 95-percent confidence intervals based on standard errors clustered by state and year-month.

Appendix Figure A3. State-Specific Heterogeneity in the Estimated Effect of ACA Medicaid Expansion on Total "Medicaid and Uninsured" Inpatient Emergency Discharges



<u>Notes:</u> The figure above reports state-specific difference-in-difference estimates of the effect of the ACA Medicaid expansion, combining Medicaid visits and uninsured visits. The solid red line is the average, and the state-specific estimates are reported along with 95-percent confidence intervals based on standard errors clustered by state and year-month.

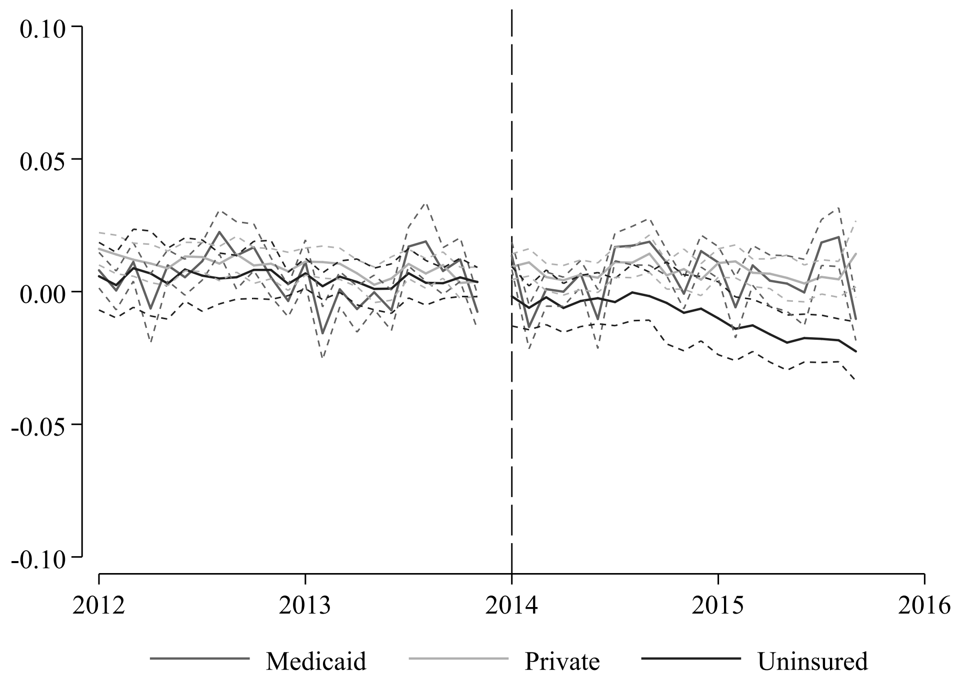
Appendix Figure A4. State-Specific Heterogeneity in the Estimated Effect of ACA Medicaid Expansion on Total "Medicaid and Uninsured" Outpatient Emergency Discharges



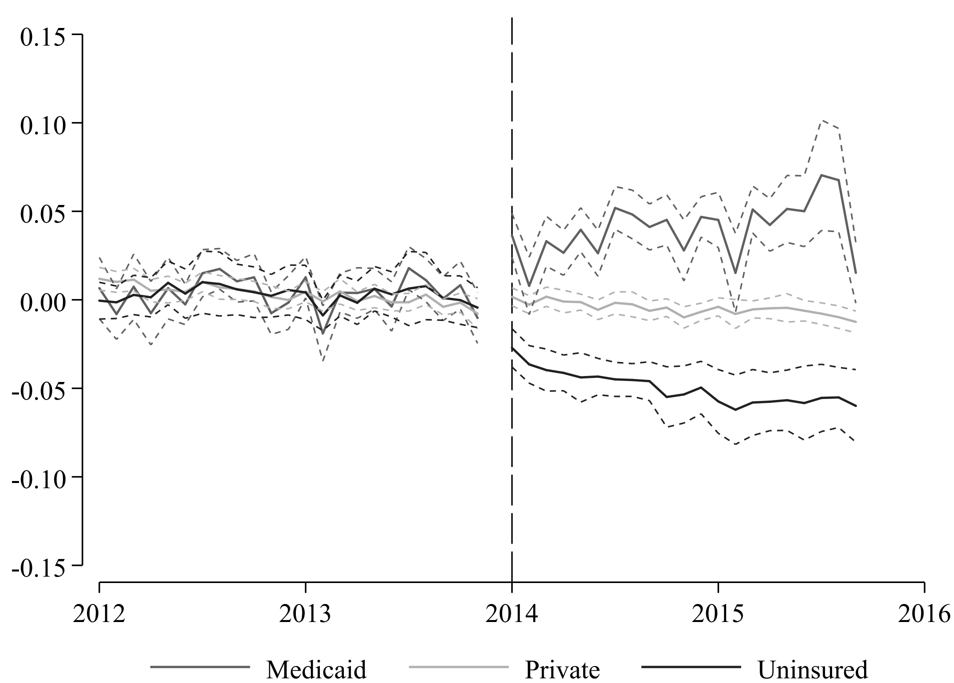
Notes: The figure above reports state-specific difference-in-difference estimates of the effect of the ACA Medicaid expansion, combining Medicaid visits and uninsured visits. The solid red line is the average, and the state-specific estimates are reported along with 95-percent confidence intervals based on standard errors clustered by state and year-month.

Appendix Figure A5. Triple-Difference Estimates by Payer for Each Type of Encounter

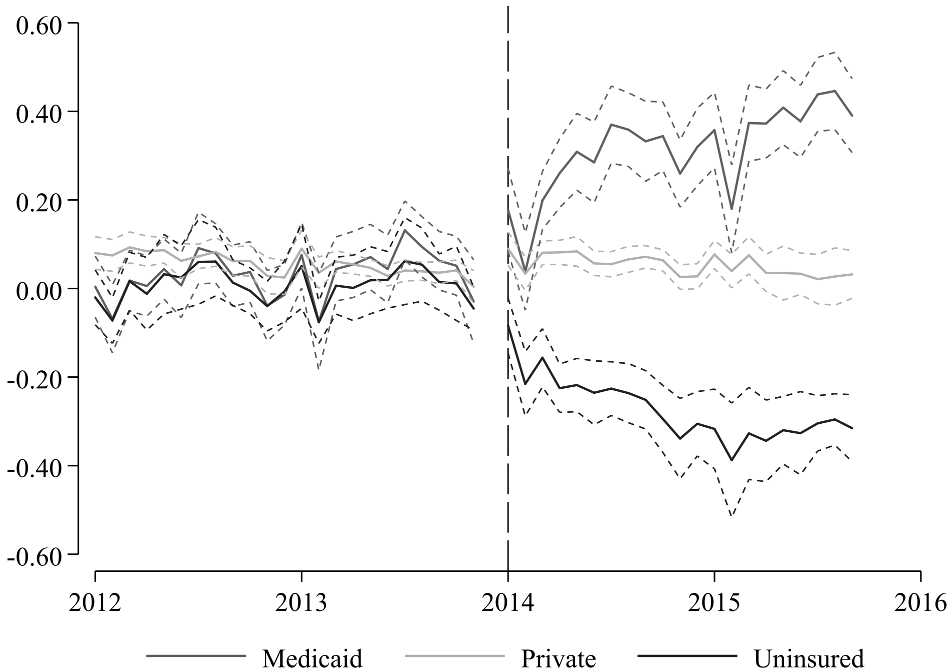
Panel A. Scheduled Inpatient Visits



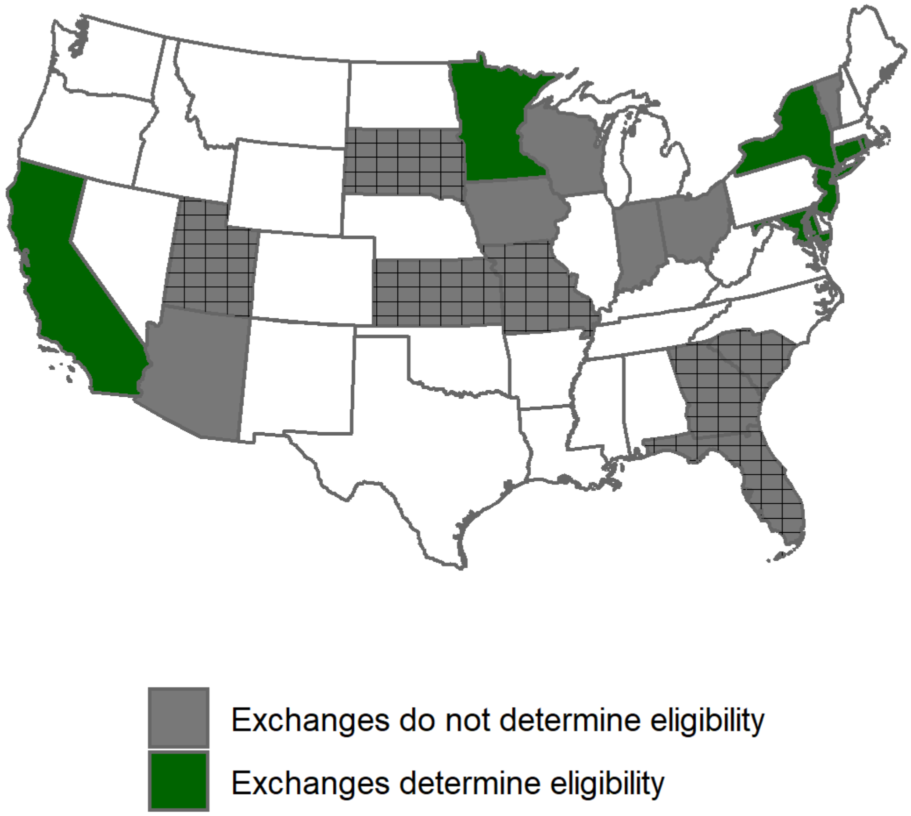
Panel B. Inpatient Emergency Visits



Panel C. Outpatient Emergency Visits

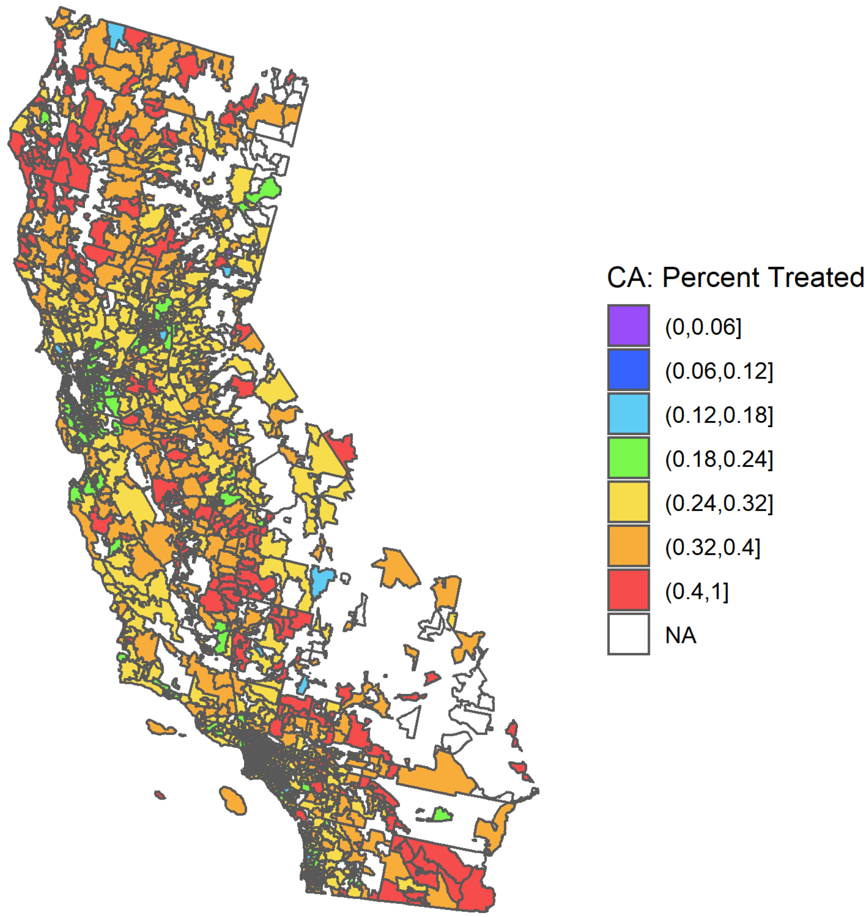


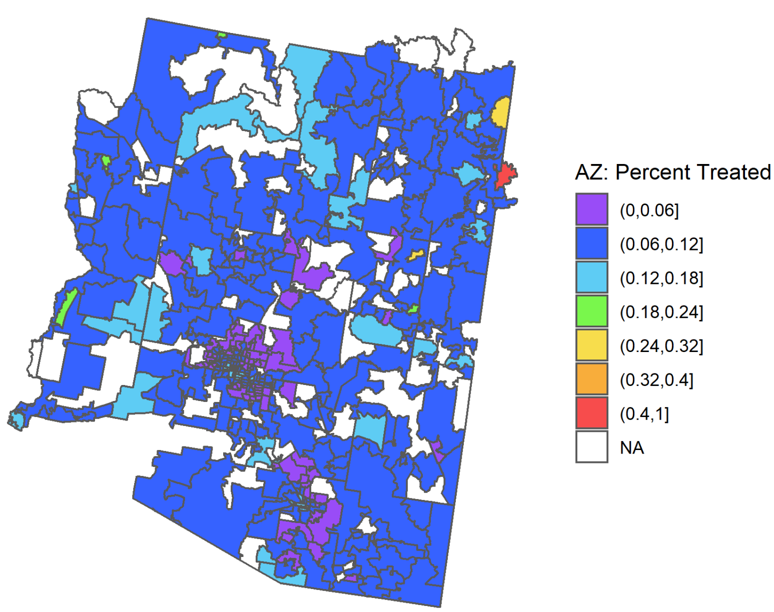
Appendix Figure A6. Map of states in analysis sample along with whether exchanges determined eligibility

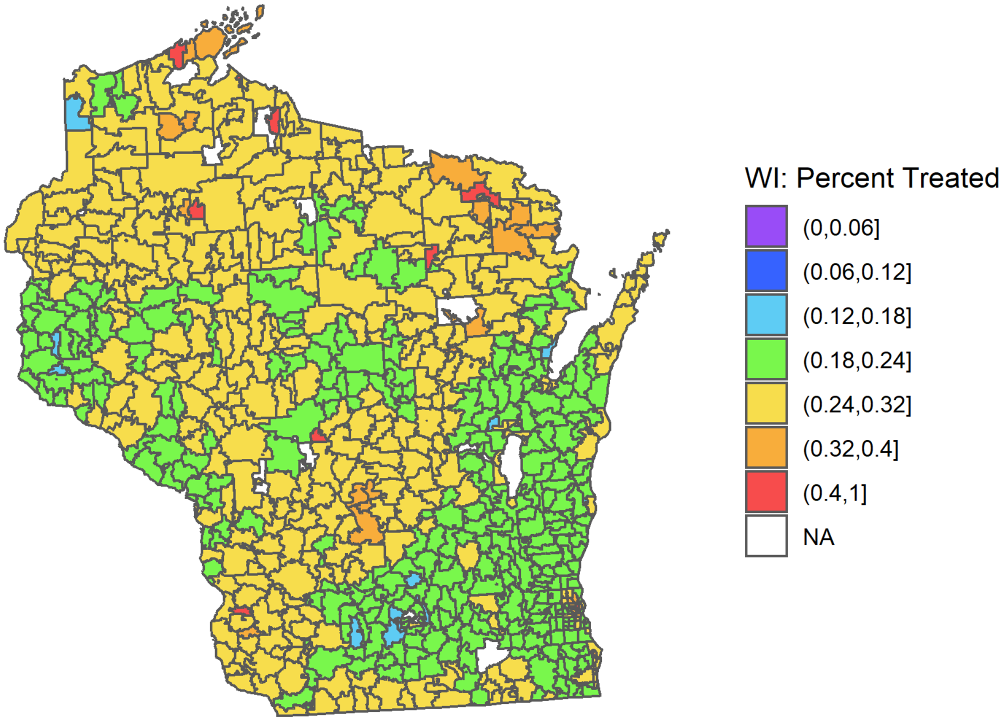


<u>Notes:</u> The map shows the sample of states in the main sample, as in Figure 1, and additionally indicates which states allowed exchanges to determine eligibility. See text for details on this definition and Table 6 for regression results that use indicator for eligibility determination.

Figure A7. Within-State Variation in Share of Population Treated by Expansion






WI: Percent Treated
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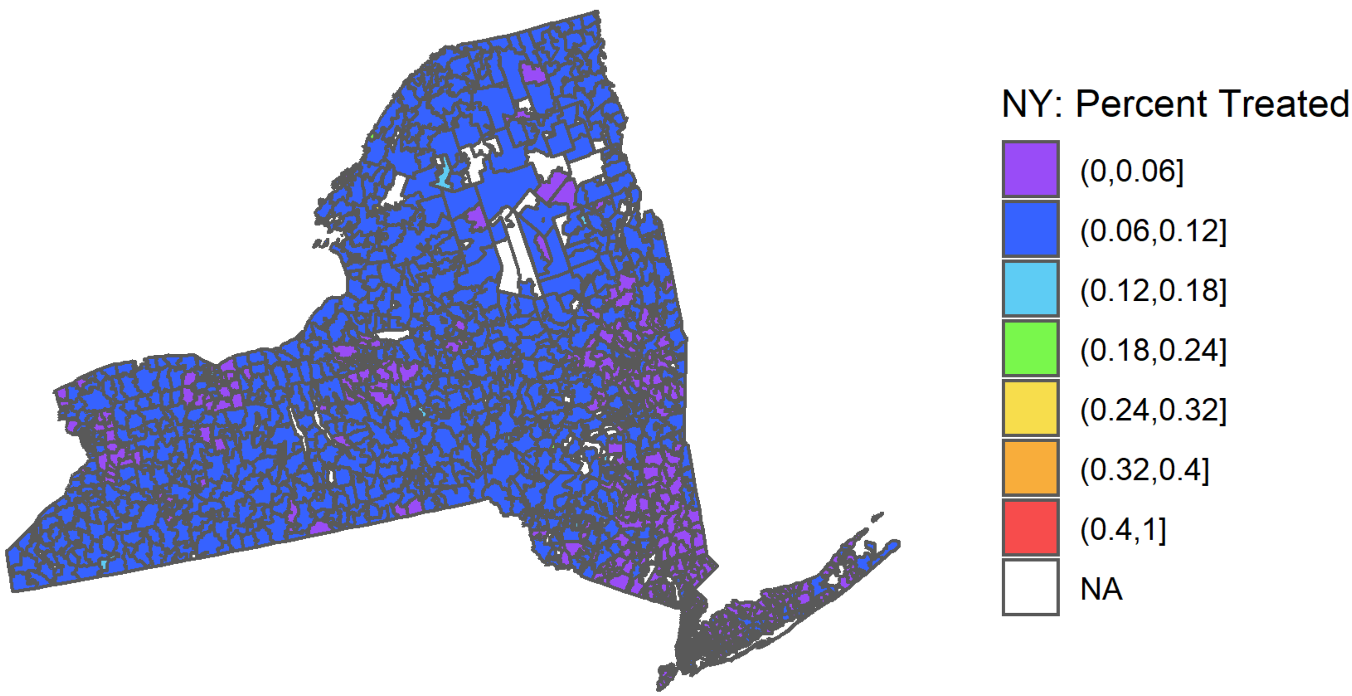
(0.12,0.18]
(0.18,0.24]
(0.24,0.32]
(0.32,0.4]
(0.4,1]
NA


NY: Percent Treated
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(0.06,0.12]
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(0.18,0.24]
(0.24,0.32]
(0.32,0.4]
(0.4,1]
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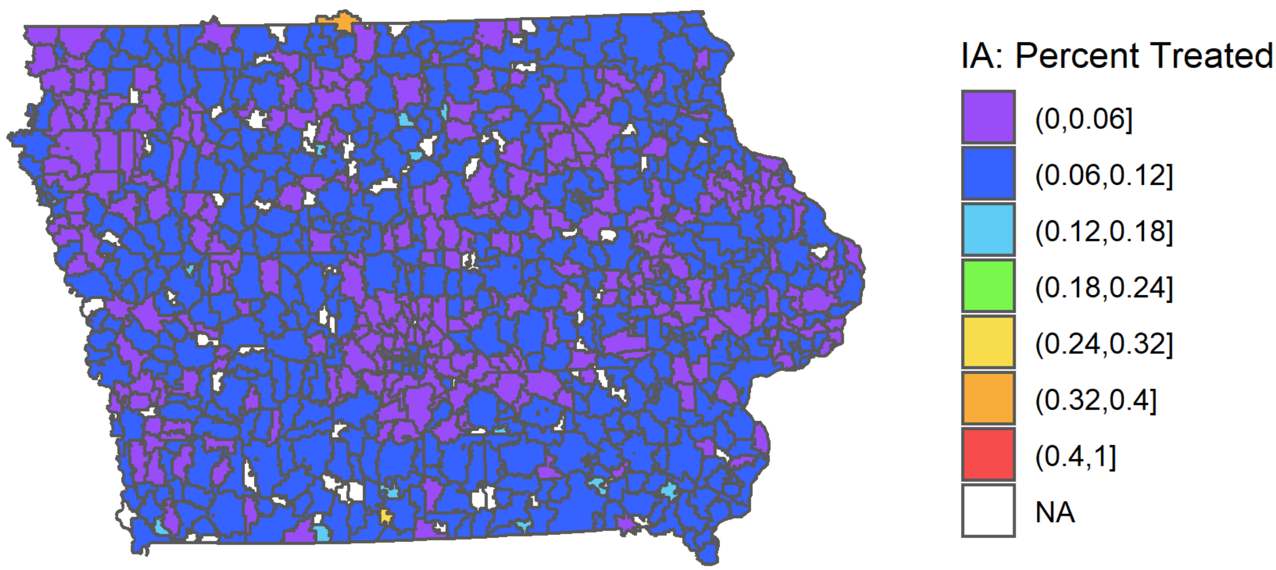
IA: Percent Treated
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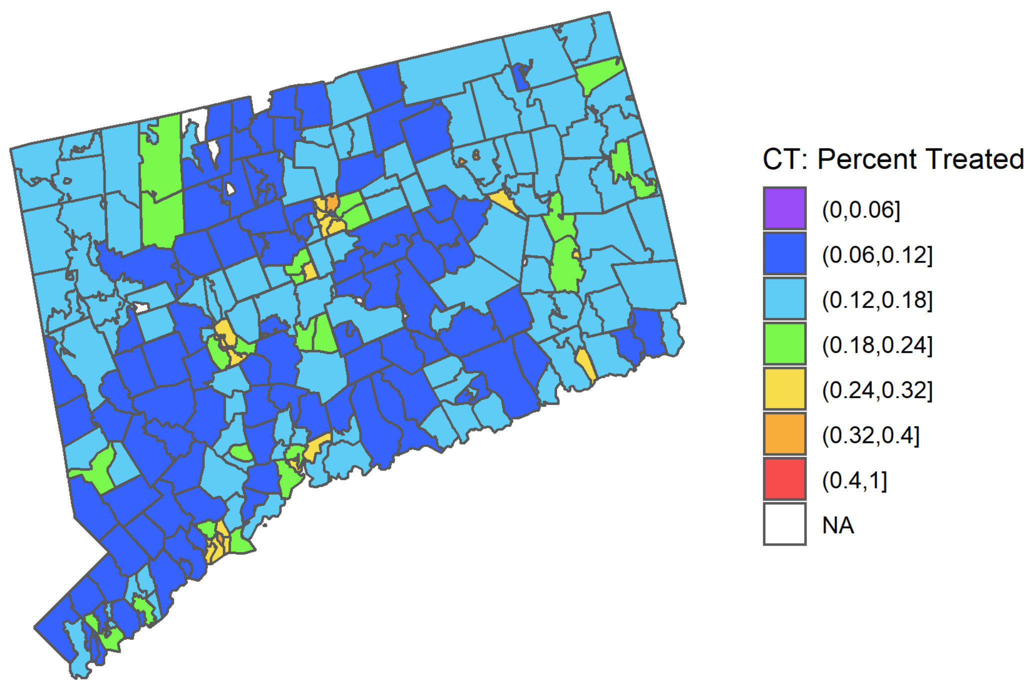
CT: Percent Treated
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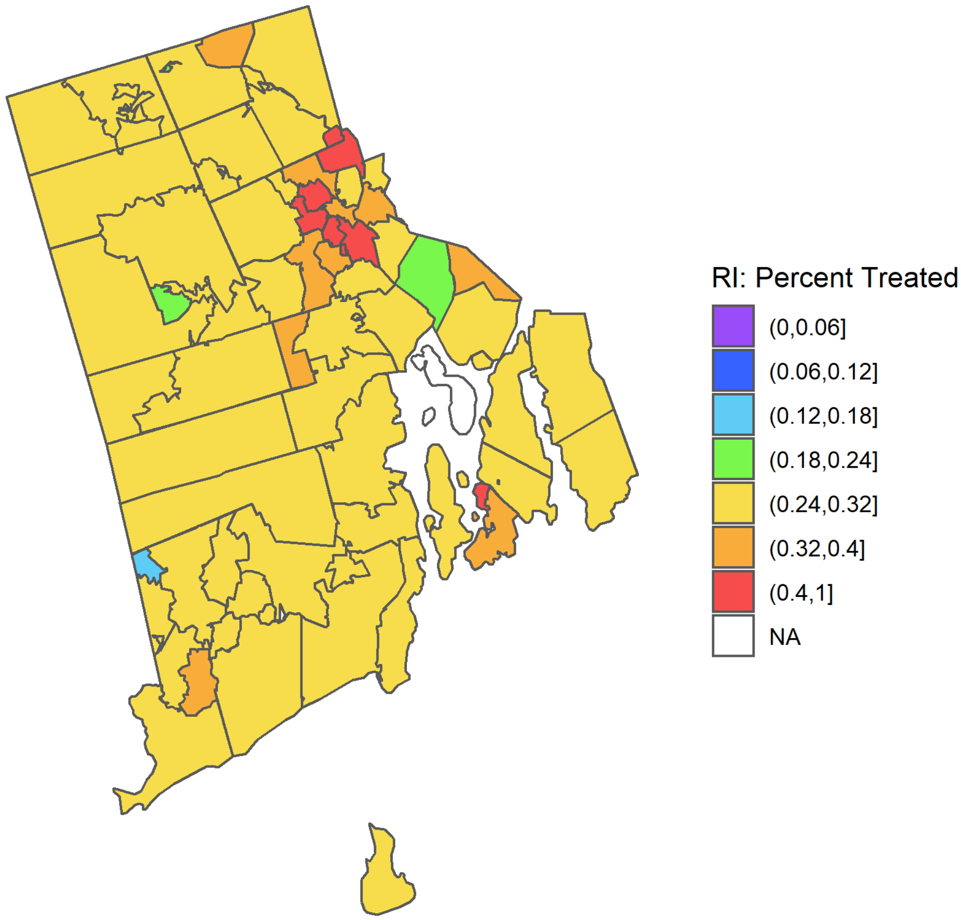
RI: Percent Treated
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(0.24,0.32]
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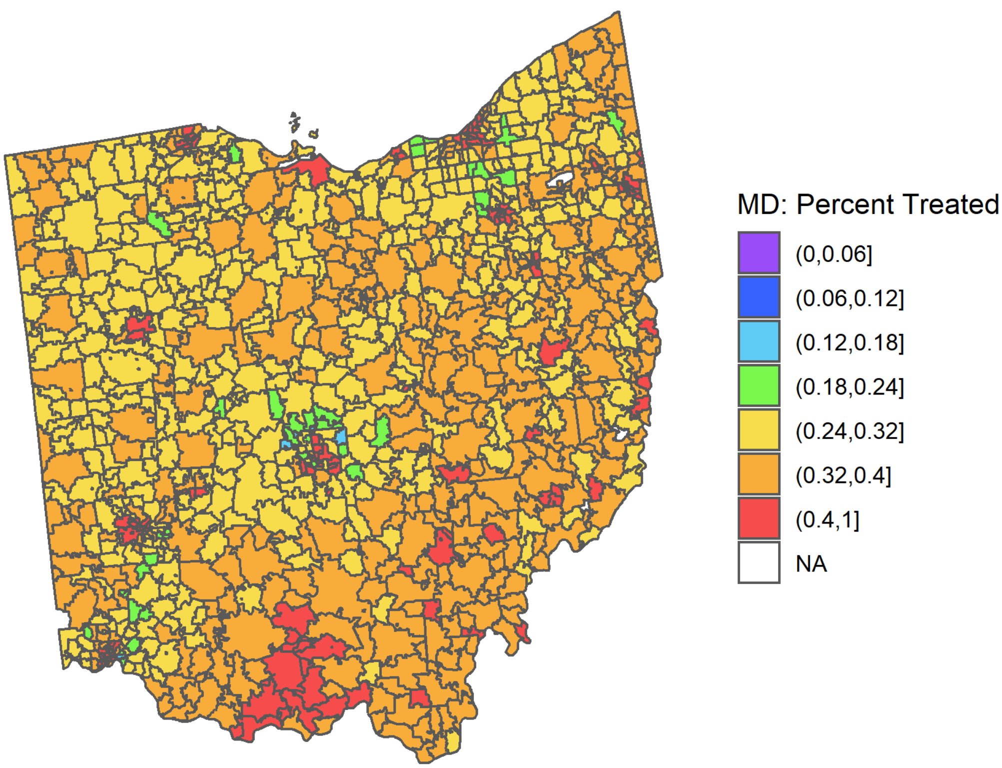
(0.4,1]
NA


MD: Percent Treated
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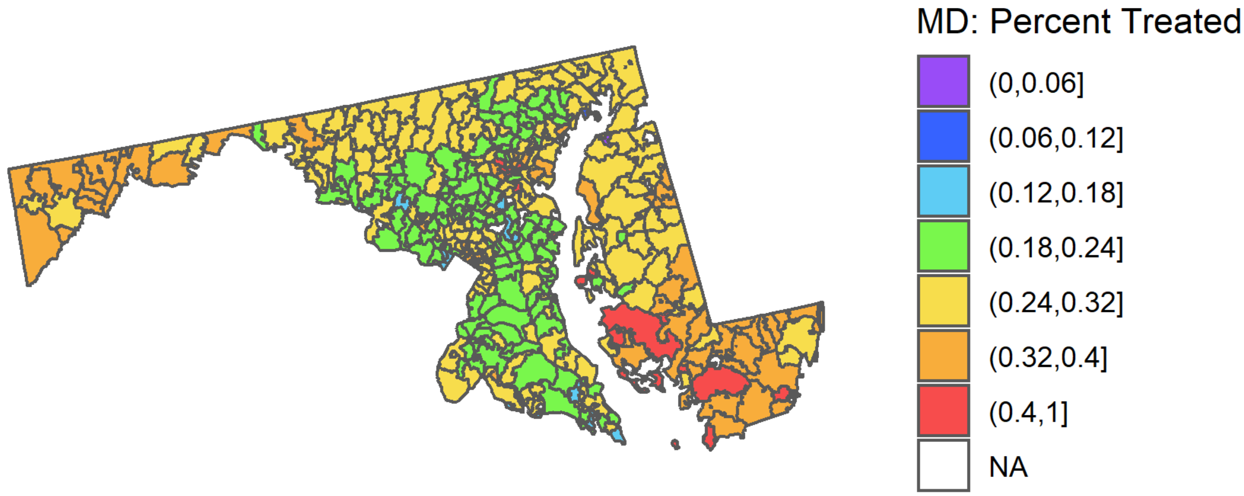
(0.4,1]
NA


MD: Percent Treated
(0,0.06]
(0.06,0.12]
(0.12,0.18]
(0.18,0.24]
(0.24,0.32]
(0.32,0.4]
(0.4,1]
NA