NBER WORKING PAPER SERIES

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Working Paper 26192
http://www.nber.org/papers/w26192

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
August 2019

The Russell Sage Foundation generously provided financial support for this project through grant number #94-17-03. This research was also supported by the U.S. Social Security Administration through grant #5 DRC12000002-06 to the National Bureau of Economic Research as part of the SSA Disability Research Consortium which facilitated data acquisition. We are grateful to Tokunbo Oluwole and Lynn Fisher at the Social Security Administration for providing us with data. We thank Diane Alexander, Misha Dworsky, Melanie Guldi, Lee Lockwood, Austin Nichols, Laura Wherry, and participants in seminars at the University of Georgia, Georgia State, Cornell, Syracuse, UC Davis, University of Central Florida, the National Tax Association, the Association for Public Policy and Management, the Society of Labor Economists, the Russell Sage Foundation, and the American Society of Health Economists for helpful comments. Louisa Abel, Mary Beth Dato, and Casey DeLano provided excellent research assistance. The findings and conclusions expressed are solely those of the authors and do not represent the views of SSA, any agency of the Federal Government, or the NBER.

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August 2019
JEL No. I10,I13

ABSTRACT

The Affordable Care Act (ACA) expanded the availability of public health insurance, decreasing the relative benefit of participating in disability programs but also lowering the cost of exiting the labor market to apply for disability program benefits. In this paper, we explore the impact of expanded access to Medicaid through the ACA on applications to the Supplemental Security Income (SSI) and Social Security Disability Income (SSDI) programs. Using the fact that the Supreme Court decision of June 2012 made the Medicaid expansion optional for the states, we compare changes in county-level SSI and SSDI caseloads in contiguous county pairs across a state border. We find no significant effects of the Medicaid expansion on applications or awards to either SSI or SSDI, and can reject economically meaningful impacts of Medicaid expansions on applications to disability programs.

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I. Introduction

One of the primary goals of the Affordable Care Act (ACA) of 2010 was to expand health insurance coverage and reduce the number of uninsured. Expanded eligibility for Medicaid was to be an important element in achieving this goal, in the process fundamentally changing the nature of Medicaid (Buchmueller, Ham, and Shore-Sheppard 2016). From its inception, Medicaid had been narrowly targeted at only subgroups of the poor: those who were elderly, disabled, or single parent families who also qualified for cash assistance. By including a provision intended to expand Medicaid to cover *all* individuals with family incomes up to 138 percent of the federal poverty level, the ACA initiated a significant increase in the availability of public insurance beyond those narrowly targeted groups. Prior to the Medicaid expansion, one path to public health insurance coverage for working-age adults was to participate in one of the two major federal disability benefit programs: Supplemental Security Income (SSI—the federally financed program providing cash assistance to low-income individuals with disabilities) offers a path to Medicaid, and Social Security Disability Income (SSDI—the portion of the Social Security program that pays benefits to workers with sufficient work history who have become disabled) allows for access to Medicare after a two-year waiting period. This long-standing link between disability program participation and public health insurance coverage means that changes in the health insurance policy landscape could affect applications to SSI or SSDI. This paper investigates whether the availability of health insurance for adults regardless of disability status affects the decision to apply for disability benefit programs.

Understanding the effects of the ACA Medicaid expansion on disability benefit applications is important. Evidence suggests that roughly 13 to 19 percent of the population have disabilities, and about half of those are in the ages 18-64 population that would be most likely to be affected by the ACA (Brault 2012, p. 4). In addition, rates of disabling health conditions and disability benefit receipt have grown substantially in recent decades (Autor and Duggan 2003, Case and Deaton 2015). The growth in disability benefit receipt is of particular concern given the sizeable public outlays on these programs (approximately $143 billion for SSDI and $55 billion for SSI respectively in 2017 (Center on Budget and Policy Priorities 2018, Social Security Administration 2018), and concerns about the possible work disincentives associated with these programs. More generally, understanding the relationship between health insurance provision and disability assistance has implications for cost-benefit analysis of health policy and an understanding of cross-program interactions.

In this paper, we explore the impact of expanded access to Medicaid on applications to disability benefit programs. We rely on the fact that the Supreme Court decision of June 2012 made the ACA Medicaid expansion optional to the states. We exploit the facts that not all states chose to expand health insurance, that the timing of expansions varied across those states that did choose to expand, and that some states had more generous income eligibility limits even before expansion.

Although state variation in expansion status and timing would seem to suggest that a difference-in-differences design would be appropriate, the parallel trends assumption required for such a design is suspect in the case of disability programs. Figure 1 shows that levels of and trends in SSI applications over time at the state level vary across the different types of states (early expanders, regular expanders, and those states that never expanded) prior to the expansion. To better identify the causal effect of Medicaid expansion, we take inspiration from the minimum wage literature and use adjacent counties on either side of a state border to estimate the effect of Medicaid expansions.

In particular, we use county-level data on SSI and SSDI applications obtained from the Social Security Administration to examine contiguous county pairs. Our identification is based on approximately 500 such pairs within which one state took up the Medicaid expansion and the other did not. Relative to a broad comparison of counties in states that expanded and those that did not, counties bordering each other are more likely to share similar labor markets, are more likely to be affected by the same local trends, and are more likely to share macroeconomic shocks. A border county approach that controls for county pair by year fixed effects allows us to focus narrowly on differences arising from the ACA Medicaid expansion choice.[1] Our primary results use a continuous measure of the state Medicaid income eligibility limits over time, which allows us to exploit additional variation across states and over time in Medicaid income eligibility, although we also show that results are similar if we examine a binary indicator for expansion as is common in the existing literature.

Using data from the Census Bureau's Small Area Health Insurance Estimates at the county level, we first show that the border-county expansion discontinuity strategy finds negative Medicaid expansion effects on uninsurance, with magnitudes similar to those found in the existing literature. We then examine county-level data from the Social Security Administration on applications to SSI and SSDI. The results suggest no significant relationship between the ACA Medicaid expansion and applications to either disability program, and we can rule out economically meaningful impacts in either direction. For comparison with the existing

[1] One concern that might arise with this identification strategy is the possibility that individuals might migrate across county lines in order to obtain Medicaid. However, evidence to date suggests that any such migration is likely to be minimal. Goodman (2017) finds no evidence of a migration response to the ACA Medicaid expansion at the public-use microdata area (PUMA) level, consistent with findings by Schwartz and Sommers (2014) for earlier health insurance expansions. The results suggest that low-income people do not migrate in response to Medicaid eligibility, and the authors can rule out all but very small migration responses.

literature, we also estimate state difference-in-differences and state border discontinuity models, and find that the results are similar across identification strategies. Prior to the implementation of the ACA, some scholars predicted that it would reduce health insurance motivated disability enrollment (Kennedy and Blodgett 2012), while there was also a possibility that health insurance access would reduce job lock and promote disability program applications. Our results suggest that neither of these predictions materialized; we find no net impact of the ACA Medicaid expansions on disability program applications or awards.

II. Background

To participate in SSI or SSDI, individuals must be determined to have a disability as defined by the Social Security Administration (SSA). In addition to a medical diagnosis, the individual must demonstrate the inability to engage in "substantial gainful activity"—work that would pay more than a set amount.[2] Thus, to qualify for either program, individuals must work very little or not at all. Beyond those requirements, the two programs have different sets of eligibility criteria for potential beneficiaries. To receive SSI, an individual must have income and resources below certain standards, but need not have a work history. To receive SSDI, on the other hand, an individual need not have limited resources (for example, the individual could have extensive assets and a spouse with high earnings), but must have sufficient work history before a period of non-work to qualify.

Since the process for determining whether an individual meets the medical standard for disability is lengthy, an individual with a disability faces the prospect of a substantial delay

[2] The disability determination process contains five steps, of which the substantial gainful activity test is the first. See Lahiri et al. (1995) for a detailed discussion of the disability determination process.

between the time of application and the time of disability determination. From application to initial decision takes on average four months. One third of applicants receive a successful decision on appeal, and appealing to the highest level (to the administrative law judge) usually takes two years (Duggan, Kearney, and Rennane 2016). Moreover, for SSDI there is a five-month waiting period after disability begins before payments can begin and an additional 24 months before Medicare can begin.

In the absence of a robust public health insurance program, applying for disability may require going without health insurance for a period of months or years. The restriction on gainful activity means potentially SSI- or SSDI-eligible individuals with disabilities are unlikely to obtain health insurance through their employer, the most common source of health insurance for nonelderly adults in the United States. In the case of SSI, it is also unlikely that the recipient would have health insurance through a spouse's employer, as most jobs offering health insurance would pay a salary that exceeds the very low household income limits for SSI.

There are several pathways through which the changes in health insurance access provided by the ACA Medicaid expansion may affect SSI and SSDI applications. First, the Medicaid expansion represents an alternative means of obtaining health insurance that does not require participation in a disability program. From the time of its enactment until the ACA, Medicaid has had a categorical requirement—that is, only individuals who are members of an eligible category could receive coverage under Medicaid. These categories include children and their parents, and the disabled, blind, and elderly, with each category having its own set of income limits.[3] With Medicaid eligibility expanded to all low-income adults, individuals with

[3] Prior to the ACA, some states received permission to extend coverage to limited groups of childless adults under a waiver of the federal rules. We account for this waiver coverage in our empirical work.

disabilities have the option to enroll in Medicaid without going through the onerous process of applying for cash SSI or SSDI benefits. We refer to this as the "alternative source of health insurance" channel. If this channel is important, it would suggest that Medicaid expansions could reduce applications to disability programs.

Second, as Maestas, Mullen, and Strand (2014) point out, without public health insurance, some disabled individuals do not apply for disability benefits because they would lack health insurance coverage throughout the lengthy application process. The expansion of Medicaid access through the ACA may allow disabled individuals to quit their jobs to apply for disability benefits, reducing health-insurance-related "employment lock." The Medicaid expansion could affect all members of a family with a disabled person; since disability program participation leads to insurance coverage only for the disabled individual, Medicaid expansion could allow multiple members of a family to have insurance coverage even if the former primary earner began receiving SSI or SSDI. This "employment lock" pathway would tend to increase disability applications.

Third, expanded access to Medicaid may make individuals more aware of the possibility of eligibility for additional public programs. Specifically, as individuals apply for Medicaid, they may be directed by state offices to apply for disability benefits if they are considered to be eligible. This "information channel" would tend to increase applications to disability programs.

Finally, by improving access to health insurance, Medicaid may give individuals additional resources to diagnose and document health conditions, ultimately leading to higher rates of disability program applications, and possibly higher success rates for existing applications. It is also possible that access to health insurance improved health, leading to lower rates of disability in the future and thus lower applications. These health-related channels are unlikely to be evident in the early years of the Medicaid expansion, however, and we do not expect to see evidence of them in the time period we study.

In sum, the various pathways by which Medicaid expansion could affect disability program applications go in both directions. In the analysis we use in this paper it will not be possible to distinguish the relative magnitude of the different pathways; we will only be able to see the sign and magnitude of any net effect. We expect estimated effects to be smaller for SSDI than for SSI because SSI is means-tested and more likely to be taken up by individuals under 138 percent of the poverty line, the noncategorical Medicaid income threshold in most expansion states. SSDI has a work history requirement, implying that potential SSDI recipients are relatively higher income, so the Medicaid expansion may be relatively less important for this group.

Our focus in this paper is on applications to disability programs, since that is the initial margin upon which Medicaid expansion may have an impact. To provide further information about the relative disability status of applicants and to understand the implications for the disability programs, we also examine new awards of disability benefits. If applicants who are marginal—in the sense that their decision to apply is changed by the expansion of Medicaid—have less severe impairments, then a change in applications may not translate into a change in awards.

The Medicaid expansion also has potential implications for disability program caseloads through its impact on awards (and perhaps impacts on exits). However, there are serious limitations to the empirical investigation of disability caseloads per se because they are a stock that evolves slowly. Disability programs usually have very low exit rates (Raut 2017; SSA 2004; Duggan, Kearney, and Rennane 2016), and as a result, the stocks do not respond as quickly to external policy changes as flows do. In addition, caseloads reflect policy and economic changes in previous periods, so it is unclear how long it would take for any Medicaid expansion impacts to become apparent in caseloads.

In the context of welfare caseloads following the 1996 welfare reform, Klerman and Haider (2004) show that a static model of stocks is likely to be misspecified. A static stock model suffers from omitted variables bias; in particular, such a model omits necessary lags of the explanatory variables and interactions between the lags. Their intuition for this finding is that since the stock depends on previous economic conditions and policies, even under the extremely restrictive assumption of no duration dependence, information about previous conditions is necessary to explain caseload sizes. This is likely more of a concern for disability programs, which by design have long spells of participation. Thus, to understand the impacts of ACA Medicaid expansions, we focus on applications and awards rather than caseloads.

III. Previous Literature

There is a small but growing literature on the relationship between public health insurance and disability programs, although relatively few papers have examined applications. Maestas, Mullen, and Strand (2014) examine county-level disability program applications in Massachusetts following changes in access to public health insurance from the health insurance reform in 2006, comparing the change in county-level disability program applications in Massachusetts relative to the change in a group of counties in comparison states. They find modest increases in disability applications (1–3 percent) in Massachusetts relative to neighboring states in the first year after reform, and no difference after the first year.

A recent paper by Levere et al. (2019) examines child SSI applications following state Medicaid expansions in the 1990s. The authors use a state-age-year simulated eligibility approach and find no effect of state Medicaid eligibility expansions on SSI applications overall. However, they do find a negative effect of Medicaid eligibility on SSI applications in the subset of states for which SSI recipients required separate paperwork to obtain Medicaid. These negative impacts are evident in both the short and long run applications to SSI for affected children.

Baicker et al. (2014), studying a randomized lottery offering Medicaid to some residents of Oregon, also examine disability programs as outcomes. The authors focus primarily on caseload or participation measures but also report some findings on applications in a footnote. They characterize their findings as “suggestive evidence of statistical effect on SSDI and SSI applications, but not one that was economically meaningful (e.g., Medicaid coverage may cause about a 1 percentage point increase in applications to each program, and perhaps a half a percentage point increase in approvals for SSDI).” The results for disability participation are insignificant.

Chatterji and Li (2017) examine the impact of public insurance expansions that took place in three states (Connecticut, Minnesota, and California) and the District of Columbia between 2010 and 2013 on the percent of state nonelderly population receiving SSI. All four “states” (including DC as a state) had previously offered some public health insurance to low-income adults and the expansions represented a transition from pre-existing state or local insurance programs. Typically, those previous programs had limits on benefits or the number of enrollees, and both the previous programs and the expansion programs varied substantially by state. As a result, Chatterji and Li examine each state separately using a synthetic control approach, and find an effect that is statistically distinguishable from zero only in Connecticut: a marginally statistically significant 0.11 percentage point reduction in SSI receipt. They also report trying to examine SSI application rates but being unable to form suitable synthetic controls for application rates for those four states.

Anand et al. (2019) is the work most similar to ours, examining the response to the ACA Medicaid expansion using quarterly administrative data from the Social Security Administration on application rates by Public Use Microdata Area (PUMA). The authors carefully match PUMAs based on pre-2014 characteristics, keeping only those PUMAs in expansion and non-expansion states (where expansion is defined as of January 2014) that match closely with at least one other PUMA. They use these expansion and non-expansion PUMAs in their matched sample in a straightforward difference-in-differences regression of the application rate by PUMA and quarter, thus comparing all matched expansion PUMAs to matched non-expansion PUMAs rather than focusing on comparing outcomes in the close matches to each other. They find that SSI applications were slightly higher in PUMAs in states that expanded in the first quarter of 2014 than in non-expansion PUMAs between one and five quarters after the expansion. There is some evidence of dissimilar pre-expansion trends in the expansion and non-expansion groups, however, raising the question of whether the effect they find is due to the expansion or differential underlying trends related to recession recovery.

Two other papers, Burns and Dague (2017) and Soni et al. (2017), focus exclusively on stock measures such as participation and caseloads. Burns and Dague (2017) investigate Medicaid expansions to childless adults that occurred prior to most ACA-related expansions between 2001 and 2013. The authors use individual data from the American Community Survey, comparing states with coverage for childless adults to states without coverage and also estimating similar specifications comparing differences in income eligibility limits for childless adults across states. They find that when a state covers childless adults under Medicaid SSI participation is lower by 0.17 percentage points, a 7 percent relative decrease. Soni et al. (2017) use a state difference-in-differences approach to examine the ACA Medicaid expansion, comparing SSI participation in states that expanded Medicaid as of 2015 with participation in states that did not expand Medicaid or did not expand until after 2015. They report results suggesting that the number of SSI recipients in a state fell by about 3500 per year in expansion states relative to nonexpansion states (a 3.3 percent change in participation) in expansion states relative to nonexpansion states after 2014.[4] In sum, the existing literature tends to find economically small but mixed effects of Medicaid eligibility expansion on disability applications, and estimated participation and caseload effects tend to be negative or near zero.

Our work contributes to the existing literature in several important ways. First, we focus on applications and awards, which as discussed above are the key margins upon which Medicaid expansion may have an impact and are not susceptible to the estimation problems faced by static models of caseload stocks. Second, we use a new identification strategy (differences in adjacent county pairs that differ in their Medicaid expansion status) that, compared to a state differences model, more plausibly delivers an unbiased estimate. Third, we allow for a rich specification of Medicaid eligibility, treating the Medicaid expansion not just as something that turns “on” or not at a given time, but allowing for the possibility of differential effects based on the levels of Medicaid income eligibility limits prior to the ACA expansion.

[4] The Soni et al. results appear to be sensitive to specification. In particular, we find that specifications using similar data but caseload rates (recipients per population) instead of numbers of recipients show no impact of the expansion. Also, their participation results appear sensitive to the inclusion of lagged unemployment rates, as Klerman and Haider’s (2004) results would suggest (results available from the authors).

IV. Empirical Approach

To identify the impact of expanded access to Medicaid via the ACA on SSI and SSDI applications and awards, we use variation in noncategorical Medicaid eligibility (that is, Medicaid eligibility that does not require the individual to establish the presence of a disability or a dependent child) resulting from the June 2012 Supreme Court decision making the Medicaid expansion optional to the states. Like other studies of the ACA, we take advantage of variation by state and over time in the Medicaid expansion. A key empirical challenge is that there is non-randomness including a strong geographic correlation in which states chose to expand, and the outcomes of interest may be trending differently in different parts of the country. For example, trends in disability status are different in Southern states than from states outside the South, and the fact that many of the non-expansion states are in the South could lead to spurious correlation between expansion status and applications to disability programs. Indeed, Figure 1 presents visual evidence that trends in SSI application rates prior to the ACA differed between states that would become early expansion, later expansion, and non-expansion states. To address this challenge, we conduct our analysis at the county level, and compare changes in disability benefit participation within contiguous county pairs, where one county is in a state that expanded while the other is in a state that did not.

The county border approach has been used effectively to study the employment effects of state minimum wages (see Dube, Lester, and Reich 2010, 2016). Counties bordering each other are more likely to share similar labor markets, are likely to be affected by the same local trends, and are more likely to share macroeconomic shocks than are counties that do not share a common border (Allegretto et al. 2013; Dube, Lester, and Reich 2016). This research design allows us to focus narrowly on differences arising from the ACA Medicaid expansion choice by comparing changes over time in outcomes from U.S. counties on either side of a state border. In this approach, the identifying assumption is that the change in the outcome of interest in the county in the non-expanding state is a reasonable counterfactual estimate for how the outcome of interest would have changed in its neighboring county across the border if the Medicaid expansion had not occurred.

A simple illustration of the nature of our research design can be seen in Figure 2, where the sub-state divisions shown are counties, and contiguous border county pairs that differed in their Medicaid expansion status as of April 2014 are highlighted. At that time, there were 488 discordant county pairs (where one county was in a state that had expanded Medicaid and the neighboring county was in a state that did not) out of a total of 1197 county pairs. In addition, we take advantage of two sources of variation not visible in Figure 2. First, states had different income eligibility limits for Medicaid prior to the ACA expansion, which means that the ACA expansion represented a more substantial increase in access to public insurance in some states than in others. Second, the timing of Medicaid expansion was not uniform, with some states choosing to expand earlier or in a gradual way, and others choosing to expand later. [5] Some states began to expand starting in 2010, and while 21 states officially adopted the ACA Medicaid expansion on January 1, 2014, other states did not expand until later in 2014 or subsequent years.[6] We incorporate expansions through 2016 in most specifications.

States typically have three Medicaid income limits applying to working-age adults. The noncategorical limit applies to all adults regardless of family structure or disability status. As of

[5] The number of county pairs that are discordant using this method is considerably higher, varying by year from a high of 913 discordant county pairs in 2010 to 768 in 2015.
[6] There is also some variation at the county level in the timing in California, which was the only state to roll out its early Medicaid expansion on a county-by-county basis, although we do not exploit the within-California variation in our border county design.

2010, only eight states (including D.C.) had any eligibility for adults that had neither dependents nor a disability; in seven of these states eligibility ranged from 73 to 110 percent of the poverty line, and D.C. had a limit of 211 percent. All states had categorical eligibility for parents and individuals with disabilities in 2010, with limits ranging from 17 to 215 percent of the poverty line for parents and 65 to 150 percent of the poverty line for individuals with disabilities.[7] In states that adopted the ACA Medicaid expansions, the noncategorical limit was set to a minimum of 138 percent of poverty (almost always set exactly at 138 percent), effectively setting 138 percent as a floor for parents and those with disabilities as well.

Because a disability benefit determination would be necessary before the disability limit would apply, the relevant Medicaid limit for individuals making a decision about the value of disability benefits or facing "employment lock" is the parent or noncategorical income limit. We cannot distinguish between parents and non-parents in the applications data, and because a majority of adults do not have dependent children at a given point in time (especially older working age adults who are more likely to have a disability), the noncategorical income limit is most relevant.

We consider the following difference-in-differences specification estimated on a sample of all counties in the continental U.S. for the period 2010-2016:

$$(1) \qquad y_{ct} = \alpha + \beta MedicaidLimit_{s(c)t} + X_{ct}\Gamma + \varphi_c + \tau_t + \varepsilon_{ct}$$

[7] Prior to the ACA, there were two eligibility pathways to Medicaid for individuals with disabilities: SSI-related eligibility and poverty-related eligibility. In most states, SSI-related eligibility includes all individuals eligible for federal SSI payments or for the optional state supplements. The income cutoffs for SSI recipients were typically below the poverty line, and in some states individuals with disabilities could access Medicaid with higher incomes.

where y_{ct} denotes the various outcomes of interest (described in detail in the Data section below) for county c in time t, where t denotes year. The variable $MedicaidLimit_{s(c)t}$, which is typically set at the state level (and thus denoted by s(c)), is the Medicaid noncategorical income limit, that is, the baseline income limit that applies to adults whether or not they have children or disabilities. It is measured as a percentage of the Federal poverty line. The vector X_{ct} includes time-varying controls such as demographic characteristics, and φ_c and τ_t are county and time fixed effects, included to account for unmeasured heterogeneity in outcomes across space and time that may be correlated with expansion status.[8] This equation corresponds to the approach commonly used in the ACA Medicaid expansion literature thus far, although it has typically been estimated at the state level or individual level with state and year fixed effects rather than at the county level. The identifying assumption implicit in this approach is that after accounting for county-specific and time-specific fixed effects, outcomes in counties with different levels of noncategorical Medicaid income limits would be changing in the same way over time if the expansion had not occurred. We estimate this model using our county-level data, clustering our standard errors at the state level to account for the fact that the variation in expansion status is at the state level.

The county border discontinuity approach requires limiting the data to border counties and restructuring the data so that each county is observed once per year per adjacent pair. A county which is part of more than one county pair could be observed multiple times, and the

[8] We also try including county unemployment rates in our specifications, but including them does not substantively change our estimates (see Appendix Tables 4 and 5).

regressions are re-weighted so that the final weight of the county is proportional to population.[9] Standard errors are adjusted accordingly.

Using the restructured data, we estimate a modified version of equation (1) :

$$(2) \qquad y_{cpt} = \alpha + \beta MedicaidLimit_{s(c)t} + X_{ct}\Gamma + \varphi_c + \tau_{pt} + \varepsilon_{cpt}$$

where the subscript *p* denotes a county pair and τ_{pt} is a pair-specific time effect instead of a national time effect. The use of the pair-specific time effect means that we are using only variation in expansion status within each contiguous border county pair. The identifying assumption is thus that a difference in expansion status within a contiguous border county pair is uncorrelated with pair-specific unobservables, that is, within a pair the outcome in the county with the expansion would have changed in the same way as in the non-expansion county if the expansion had not occurred. To determine the impact of the loss of statistical power resulting from moving to a smaller number of counties in our estimation sample, we estimate the model of equation (1) on the subsample of counties used in the estimates of equation (2) and examine the changes both in parameter estimates and in confidence intervals as we change samples and estimation strategies.

V. Data

We combine data from a number of different sources for the analysis. Our primary outcomes of interest are applications and awards for SSI and SSDI, which were constructed for us at the county level by the Social Security Administration.[10] We use data from 2010-2016 for

[9] As a robustness check we also estimate our models without weighting and find similar results (see Appendix Tables 4 and 5).

[10] SSDI applications and awards by county were estimated using the most recently updated Title II Disability Research Files, while the same measures for SSI are estimates from the most

applications to determine the effect of the current Medicaid noncategorical limit. Given that there is likely to be a delay in awards relative to applications, we use data from 2011 through 2017 to analyze awards, and allow both the current and lagged Medicaid limits to have an effect. We denominate these county aggregates by estimates of the prime age (20-64) population from the Census Bureau.

In addition to disability program applications and awards, we examine health insurance coverage at the county level. While other researchers have already shown that the Medicaid expansion was associated with a significant increase in health insurance coverage (see, for example, Kaestner et al. 2017, Courtemanche et al. 2017, and others), it is useful to investigate whether a similar increase can be seen at the county level using our border county identification strategy. Health insurance coverage data at the county level are only available from the Census Bureau's Small Area Health Insurance Estimates (SAHIE) program, which produces estimates of the fraction with and without health insurance coverage by age, sex, and income group at the county level.[11] The SAHIE estimates are model-based, incorporating information from the American Community Survey, federal tax return data, data on Supplemental Nutrition Assistance Program caseloads, Medicaid and Children's Health Insurance Program caseloads, Census population estimates, County Business Patterns, and the 2010 Census.

We determine the noncategorical Medicaid income eligibility limits from a variety of sources. The primary sources for Medicaid income eligibility levels are reports published by the Kaiser Family Foundation (Cohen Ross et al. 2009, Heberlein et al. 2011, Heberlein et al. 2012,

recently updated Title XVI Disability Research Files. Applications and awards are for the calendar year, reported in June of the following year.

[11] While we would also like to examine Medicaid coverage rates, unfortunately such data do not exist at the county level.

Heberlein et al. 2013, Brooks et al. 2015, Brooks et al. 2016, Kaiser Commission on Medicaid and the Uninsured 2013) and the Urban Institute's TRIM3 program rules database supplemented by information from state plan amendments available from the Centers for Medicare and Medicaid Services and state websites.

The county level control variables include the share of the county level population that is non-Hispanic black, the share that is Hispanic, and the share ages 50-64 from annual Census Bureau estimates. In robustness tests, we control for the unemployment rate, which we obtained from the Bureau of Labor Statistics Local Area Unemployment series, but we do not include these in our main specifications due to potential endogeneity. We determine which counties are contiguous using two files from the Census Bureau: a 2015 county adjacency file, which lists all adjacent counties, regardless of type of adjacency, and a county adjacency file from 1991 which gives the type of adjacency. We adjusted the 2015 county pair list to keep only counties that share a common land border or that are separated by a body of water but connected by a bridge or boat.[12]

Table 1 presents summary statistics for 2010 and 2016, broken out by sample (all counties versus contiguous counties). Both SSI applications and awards decline significantly during our sample time period as the economy recovers from the Great Recession. The two samples are very similar in their unemployment rates, but the contiguous counties sample has slightly higher rates of disability receipt and percentages of black residents and older residents, and slightly lower percentages of Hispanic residents.

[12] We eliminated counties that meet at a corner only and counties that are separated by a body of water and that have no direct bridge or boat connection. We also merged incorporated cities in Virginia that were entirely contained within another county into that county.

VI. Results

A. Descriptive Analysis

While the county border discontinuity approach has strong intuitive appeal since it narrows the comparison to an arguably more similar counterfactual, it is important to evaluate it against the typical difference-in-differences approach that is common in the literature. While it is not possible to test the models against each other explicitly, since each involves a different identifying assumption, various methods of examining the validity of these models have been suggested in the literature (see Dube, Lester, and Reich (2010, 2016), Allegretto, et al. (2013), and Neumark, Salas, and Wascher (2014)). In Appendix Table 1, we show that mean differences in values of SSI and SSDI applications and awards, as well as our covariates, are smaller for contiguous pairs in data from before the ACA generally became effective (2010-2011) than they are for pairs formed by matching every other county from outside the state with each county in the data.

As a second set of descriptive analyses, we divide both the all-county sample and the contiguous county sample into two groups: those in states that ever expanded Medicaid and those in states that did not, where "ever expanded" is defined as having a noncategorical eligibility limit above zero at some point during the 2010-2016 period. We then regress dependent variables of interest on the interaction of the "ever expanded" dummy with dummies for each year (using 2010 as the baseline), controlling for county fixed effects and fraction black, fraction Hispanic, and fraction ages 50 to 64. The models also include either year fixed effects (for the all-county sample) or county pair by year fixed effects (for the contiguous county sample), so the coefficients represent the effect of being an expansion county in a particular year relative to being a non-expansion county (either in general or the border pair county) in that year, after accounting for 2010 level differences. These regressions are somewhat analogous to equations (1) and (2). However, they do not account for *when* a particular county experienced its expansion and they do not account for differential levels of the noncategorical limit in different states.

Figures 3-6 show graphically the coefficients on the year-by-ever-expanded interaction, where a value of zero indicates that expansion and non-expansion states did not differ in that outcome in that year conditional on the covariates. In each pair of graphs, the top panel shows the all county specification and the bottom panel shows the contiguous county specification, where the plotted coefficients reflect the difference in the outcome variable for each "ever expansion" county relative to its adjacent "never expansion" county.

Figure 3 shows the results of these analyses with the noncategorical Medicaid income limit as the dependent variable—that is, these graphs show evidence of the policy change. As expected, the difference between expansion and non-expansion counties grows dramatically in 2014 when most states implemented their Medicaid expansion. The results are similar in both specifications, although the comparison of contiguous counties in the bottom panel indicates that the difference in the noncategorical limit between "ever expansion" counties and adjacent "never expansion" counties remained near zero until 2014 because 2011 to 2013 expanders are less heavily represented in the contiguous county sample.

Figures 4a and 4b show the results of a comparable graphical analysis for uninsurance rates (Figure 4a) and uninsurance rates among individuals with family incomes below 250 percent of the federal poverty line (Figure 4b). Again the results are fairly similar for the two specifications, with neither showing evidence of differential trends prior to 2014, and both specifications demonstrating relative declines in uninsurance starting in 2014. Consistent with bigger differential policy changes in 2014 in the contiguous county sample, the contiguous pairs strategy indicates relative reductions in uninsurance starting in 2014 in expansion counties that are particularly pronounced.

By contrast, the graphical analysis of SSI applications and awards (Figures 5a and 5b) raise the possibility of differential trends between expansion and non-expansion states remaining even after including controls in the difference-in-differences specification. Although the pre-2014 differences are not statistically different from zero in either specification, they are smaller in the contiguous county pair specification, suggesting that trends in the bordering counties may be more similar to those of their neighbors than trends in ever-expanding and never-expending states more generally.

The difference in the two specifications is even more notable in the case of SSDI (Figures 6a and 6b): SSDI applications appear to be trending upward in expansion counties relative to non-expansion counties prior to 2014 (i.e. SSDI was declining less quickly in expansion counties), casting doubt on the validity of a differences-in-differences approach. The use of the border county design results in pre-2014 differences that are much closer to zero. These figures suggest that the county border pair design yields a more believable counterfactual for our outcomes of interest. Although SSDI applications are the only outcome with pre-2014 expansion versus non-expansion trends that are significantly different from each other, the fact that the trend differences appear muted for all disability program outcomes we study when using the border pair design leads us to prefer the border pair specification. However, we also show results from a straightforward differences-in-differences design for reference.

B. Insurance Rates

We now turn to our main regression analyses. As a first step, we document that the effect of Medicaid on uninsurance seen in the prior literature can be replicated using the county border pair design. In Table 2, we present the effects of higher noncategorical Medicaid income eligibility limits on uninsurance. Column (1) presents analysis for the all-county sample with county fixed effects and year fixed effects, analogous to the standard difference-in-differences model. Column (2) uses the same differences-in-differences specification, but restricts to the smaller sample of contiguous county pairs, and therefore shows (relative to Column (1)) any differential effects in the border county sample relative to the all county sample. Column (3) incorporates county pair by year fixed effects as described in equation (2) above. The county pair approach suggests that an expansion in the noncategorical income limit from 0 to 100 percent of the poverty line is associated with a reduction of uninsurance of about 1.3 percentage points. For comparison, the typical expansion was moving from an income limit of 0 percent to 138 percent of the poverty line, and the mean uninsurance rate in 2010 (prior to the ACA) was 18.7 percent. Therefore, a typical expanding county reduced uninsurance by about 1.7 percentage points relative to an adjacent non-expanding county, around 9 percent of the baseline uninsurance level.

In Columns (4) through (6) of Table 2, we use the same set of specifications, but instead examine the percent of the population with family incomes under 250 percent of the federal poverty level that is uninsured. The coefficients here are larger in magnitude, which is unsurprising since we expect the effects of the ACA Medicaid expansion to be concentrated in the low-income group. Our preferred specification in column (6) includes county pair by year fixed effects, and these results suggest that increasing the Medicaid income limit from 0 to 100 percent of the federal poverty line reduced uninsurance by 2.1 percentage points. Expansion counties moving from 0 to 138 percent of the poverty line would therefore be estimated to have experienced a reduction in uninsurance in the low-income group of 2.9 percentage points compared to bordering counties. This is again around a 10 percent reduction in uninsurance for this group relative to the baseline mean of 29.5 percent in 2010. Overall, our results in Table 2 show that our contiguous border counties approach finds similar effects of the ACA Medicaid expansion on insurance to prior research using a state differences-in-differences approach.

C. SSI and SSDI Applications

In Table 3 we turn to our main estimates of interest, the impact of higher noncategorical Medicaid income eligibility limits on applications for the SSI and SSDI disability programs. Panel A shows results for SSI applications. As in Table 2, Column 1 presents results from our all counties sample with county- and year-fixed effects, most analogous to the standard difference-in-differences models estimated in the previous literature. It shows a small positive estimated coefficient that is not significantly different from zero. Column 2 presents the same specification, but on the set of border counties, while Column 3 adds county pair by year fixed effects, so that results are driven entirely from variation within contiguous county pairs. The estimated coefficients decrease in magnitude when we move to the contiguous counties sample in Column 2, and fall even more when we include the county pair by year fixed effects in Column 3, but all three coefficients are statistically insignificant. Using our preferred specification, the range of coefficients within the confidence interval are -0.05 per 100 to 0.05 per 100 working age adults, suggesting that we can reject full expansion (i.e. moving from zero to 138 percent of the federal poverty line) effect sizes of five percent or greater relative to baseline applications.

Panel B presents results for SSDI applications, and shows a similar pattern. None of the models provide evidence that the higher Medicaid income limits created by the ACA Medicaid expansion had impacts on applications to the SSDI program, and as with SSI, we can reject effect sizes of five percent or greater relative to baseline using our preferred specification.

D. SSI and SSDI Awards

In Table 4, we examine SSI (Panel A) and SSDI (Panel B) awards in the years 2011-2017. Columns (1), (3), and (5) look at the contemporaneous effect of expansions on SSI awards in the three specifications, and none suggest any relationship. Given the length of time between initial applications and ultimate awarding of benefits, in the even-numbered columns we allow Medicaid income limits to affect awards in the current period and also with a one-year lag. This approach also yields no significant results. There are no significant results looking at SSDI awards in Panel B. In sum, using a variety of specifications, the results suggest a fairly precisely estimated zero for the relationship between Medicaid and disability awards.

E. Robustness

In the Appendix, we examine the robustness of results to additional specification decisions. Appendix Tables 2 and 3 repeat the analysis for disability applications and awards using a binary expansion indicator rather than a continuous variable. We define a county to have expanded if its noncategorical income limit is higher than zero. This approach, like the continuous variable approach, does not suggest any relationship between ACA Medicaid expansions and disability program applications (Appendix Table 2) or awards (Appendix Table 3).

In Appendix Tables 4 (for applications) and 5 (for awards), we test the robustness of our results to a number of alternate specifications. For ease of presentation, we only present results from the specification with county border pair by year effects, and we only present the awards coefficients from regressions that include both the current and the lagged noncategorical income limit. In each table, Column 1 presents the baseline results from Tables 3 and 4. In Column 2, we omit states that expanded prior to 2014 from the analysis.[13] The early portion of the Medicaid expansion in these states was often less robust than the 2014 expansions in that income limits were often lower than 138 percent and there were sometimes limits on program availability. Excluding early expander states from the analysis makes no substantive difference to the results.

In Column 3, we add a control for the unemployment rate. We prefer models that exclude the unemployment rate because employment decisions may respond to the Medicaid expansion directly, so controlling for unemployment may be over-controlling. Local economic conditions should be largely captured by pair-year controls in our preferred specification. While the unemployment rate is a positive and significant predictor of applications and awards, the coefficients on the noncategorical income limit for both applications and awards remain close to zero and statistically insignificant.

Finally, we explore the impact of missing data on our analysis. In the SSA data, counties are excluded if they have fewer than ten applications or awards for the given disability program in a particular year. This could cause a bias if Medicaid expansions affected whether counties met that threshold, and could weaken generalizability of the findings if small counties were very different from other counties in their response to Medicaid. To check the sensitivity our results, in Column 4 we incorporate all counties with missing values and set the count of applications or awards equal to ten. The findings are not meaningfully affected. An alternative approach to

[13] These states include California, Connecticut, Delaware, District of Columbia, Massachusetts, Minnesota, New Jersey, New York, and Vermont.

dealing with missing data is to drop all counties that ever had population below a certain level. In Column 5 we drop all counties with population below the 25th percentile population in our sample (11,200). Again, our results are largely unchanged and continue to show no effect of the Medicaid expansion on disability applications or awards. In Column 6 we estimate unweighted regressions (allowing small counties to be weighted equally as larger counties), and continue to find no significant effects.

Finally, in Columns 7 and 8 we follow Maestas, Mullen and Strand (2014) and examine whether there are heterogeneous responses to the Medicaid expansion by the level of pre-ACA uninsurance coverage. They find that the total number of disability applications (SSDI and SSI combined) increased in counties with relatively high rates of health insurance coverage prior to the Massachusetts reform (consistent with the release of employment lock) while applications for SSI decreased in counties with low rates prior to the reform (consistent with a decrease in the relative value of SSI). However, our estimates for applications (in Table 7) and awards (in Table 8) show no evidence of significant differences between counties with high versus low uninsurance rates prior to the Medicaid expansion.

F. State-Level Analysis

For comparability to the previous literature, in Appendix Table 6 we show how results from our county-level analysis on SSI and SSDI applications compare to the state-level equivalents.[14] Columns 1 and 2 repeat the results from Table 3 using a standard county

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[14] We aggregate our county-level applications and awards data to the state level, setting counties with missing values to 10 before aggregating. State-level applications and awards data are available from the Social Security Administration for SSI, but not for SSDI. For SSI we compared our aggregated data to the published SSI counts, and while they differ slightly due to differences in the reporting time frame (our DRF estimates are reported in June of the following year, while the published SSI estimates are reported as of December of the given calendar year), discrepancies are generally 1% of the total or smaller.

differences-in-differences (Table 3, Column 1) and county-border pair design (Table 3, Column 3). The next two columns show analogous results using state-level data. Column 3 presents the standard state difference-in-difference estimates. Column 4 uses only variation in Medicaid income eligibility limits between contiguous state pairs, using the same idea as in the county border-pair design, although it exploits different variation than in the county version of the analysis. For applications, while the straight difference-in-differences in Column 1 (for the county data) and Column 3 (for the state data) tend to show positive estimated coefficients, coefficients turn negative when the border pair by year fixed effects are included. These are generally not statistically different from zero (but become marginally significant and negative for state-level SSDI applications). Appendix Table 7 presents the same exercise for SSI and SSDI awards and shows similar patterns.

VII. Discussion and Conclusion

In this paper, we use a contiguous county approach to examine whether the ACA Medicaid expansion affected disability program applications. Despite strong evidence of increases in insurance coverage due to the Medicaid expansion using the county border discontinuity identification strategy, there is no evidence supporting a relationship between Medicaid availability and the decision to apply for the SSI or SSDI disability programs. We also find no significant effects of higher noncategorical Medicaid income eligibility limits on SSI or SSDI awards. These null results are robust across a variety of specifications and models.

Theory predicts possible countervailing impacts of Medicaid availability on the decision to apply for Medicaid. Our estimates indicate that there was little or no net impact of the

Medicaid expansion portion of the Affordable Care Act on disability program applications, and consequently no effect on awards.

Despite the lack of a relationship with disability programs, there is potential for spillover effects across other safety net programs. For example, in other work (Schmidt, Shore-Sheppard, and Watson 2019), we examine the impacts of the ACA Medicaid expansion on participation in the Supplemental Nutrition Assistance Program (SNAP) and receipt of the Earned Income Tax Credit (EITC). Our results suggest that the Medicaid expansion increased SNAP and EITC participation in counties that expanded relative to nearby counties that did not expand. Considering such spillover effects may be important when assessing the full costs and benefits of the ACA Medicaid expansion.

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Figure 1: SSI Application Rates by Expansion Status

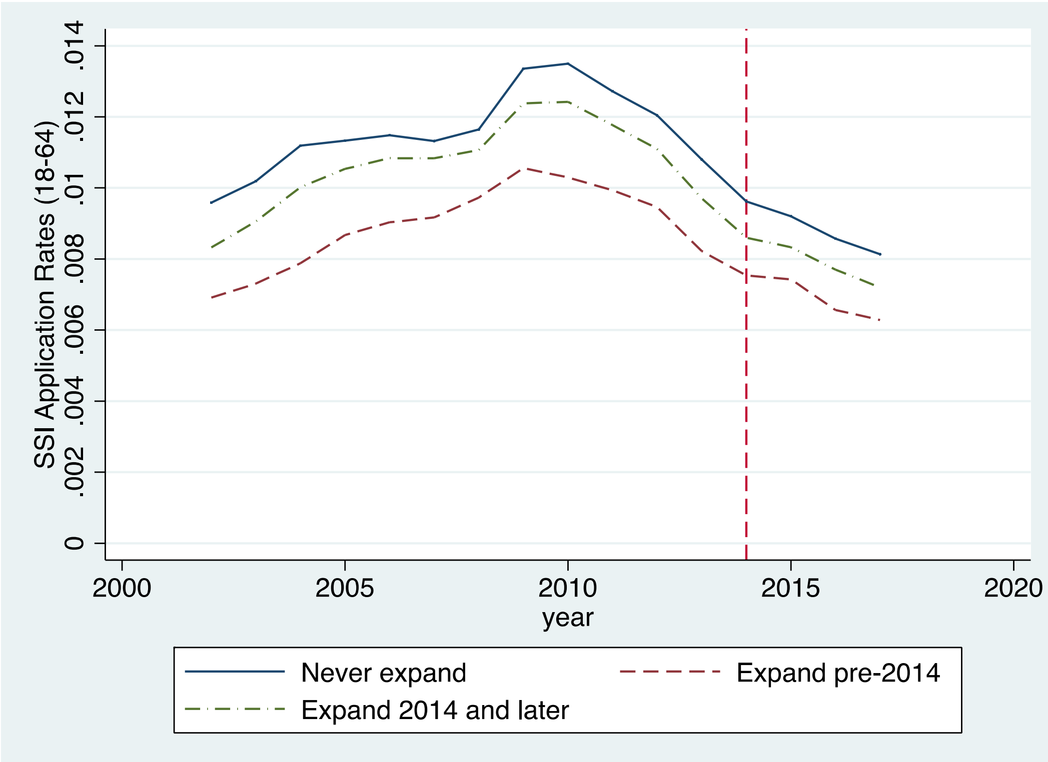
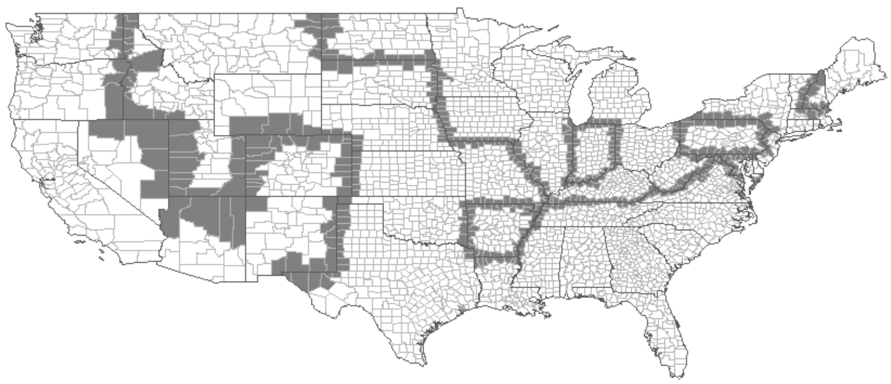
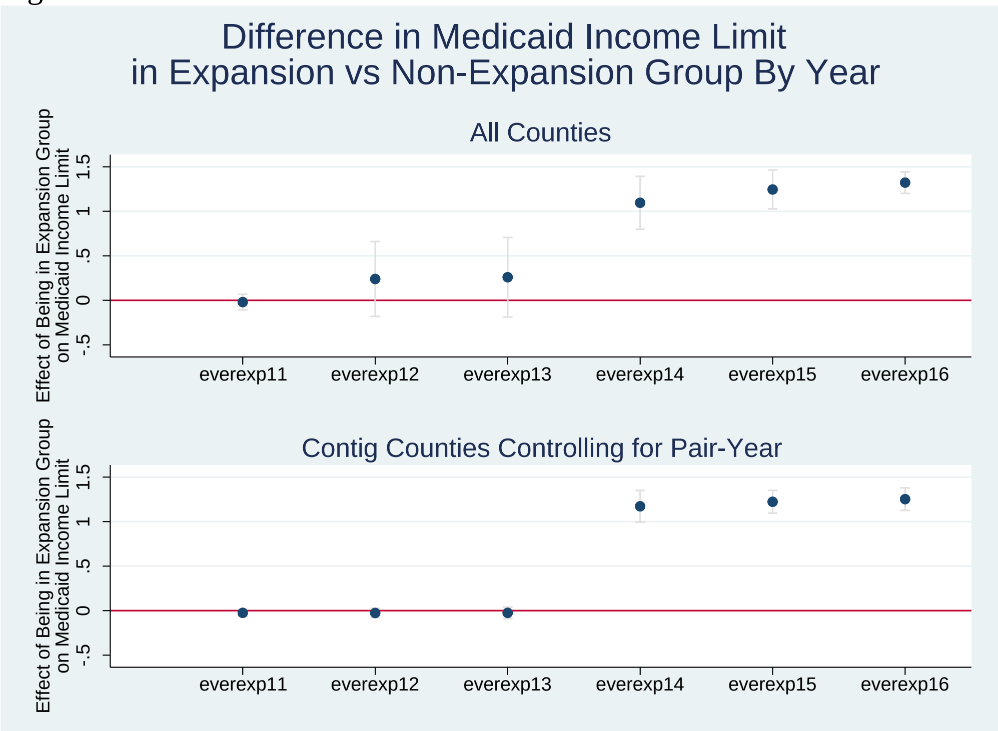


Figure 2: Contiguous Border County Pairs in the US with a Medicaid Expansion Differential, April 2014



Source: Medicaid expansion status determined from data on state actions collected by the Kaiser Family Foundation.

Figure 3



Note: Coefficients from regressions on 2010-2016 data that includes county fixed effects and controls for fraction black, fraction Hispanic, and fraction ages 50 to 64. The top panel includes year fixed effects and the bottom panel includes county pair by year fixed effects.

Figure 4a

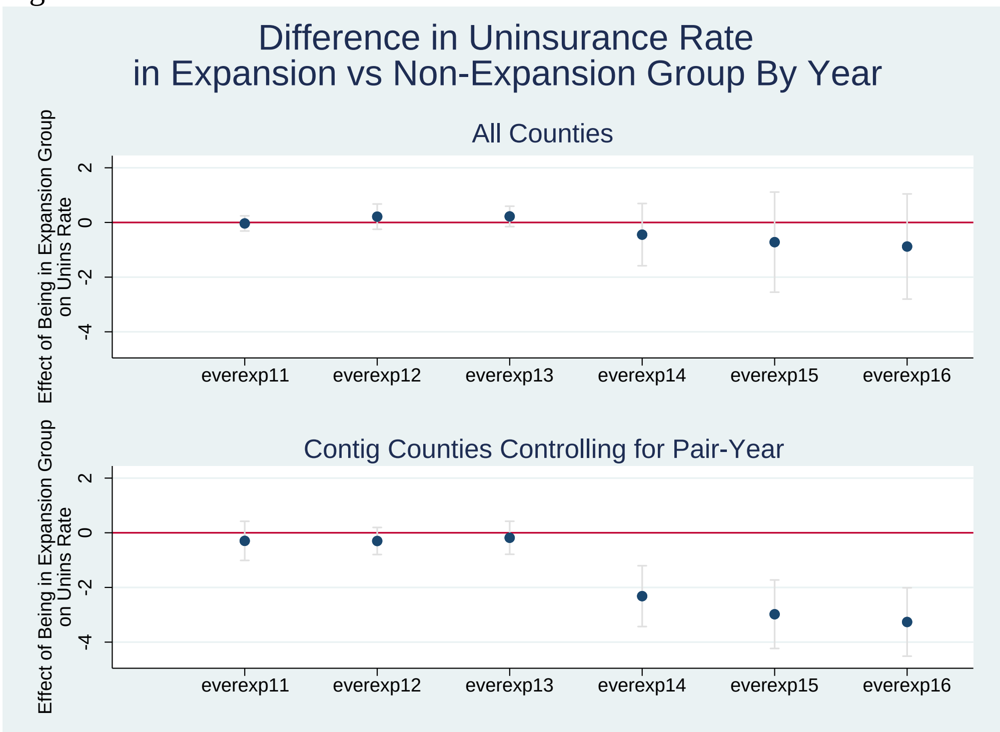
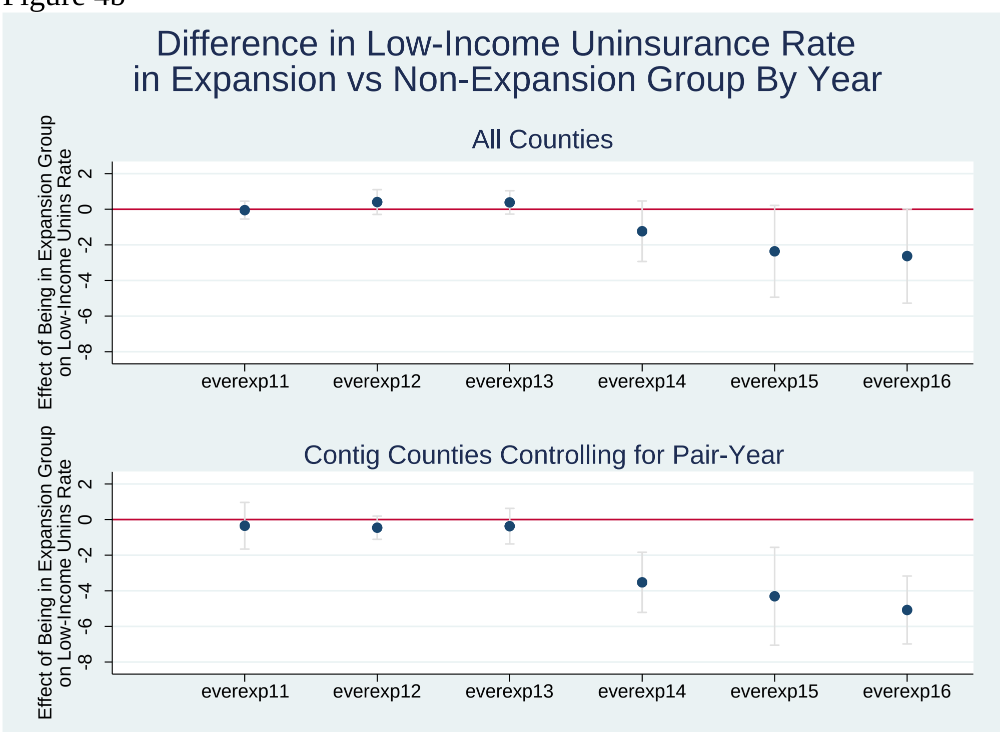


Figure 4b



Note: Coefficients from regressions on 2010-2016 data that includes county fixed effects and controls for fraction black, fraction Hispanic, and fraction ages 50 to 64. In each graph the top panel includes year fixed effects and the bottom panel includes county pair by year fixed effects.

Figure 5a

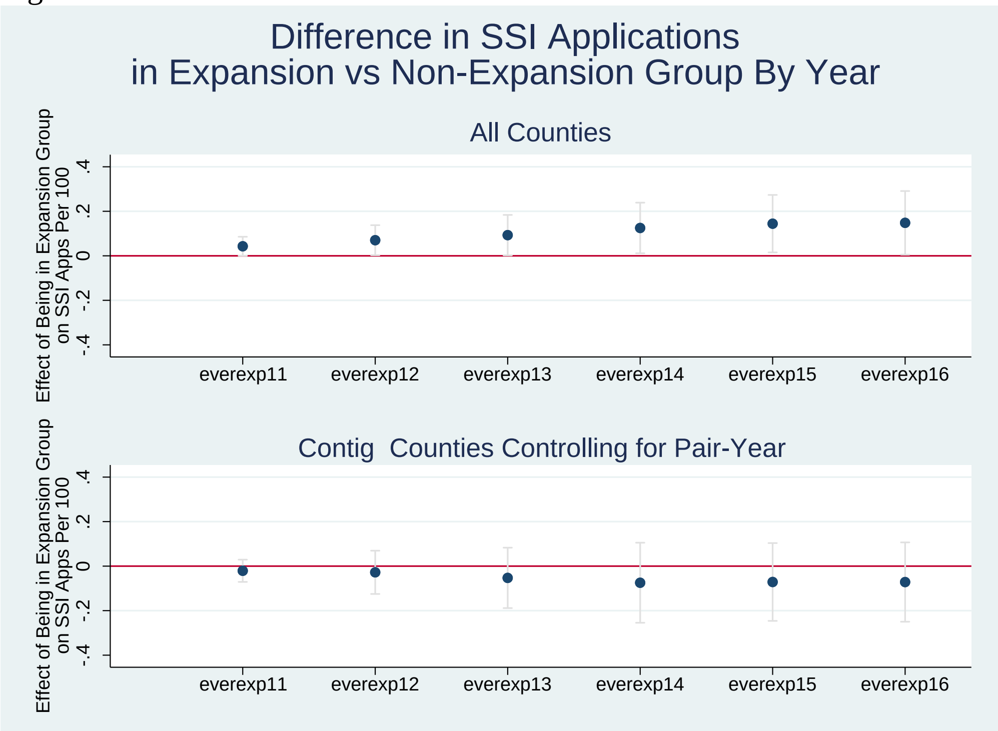
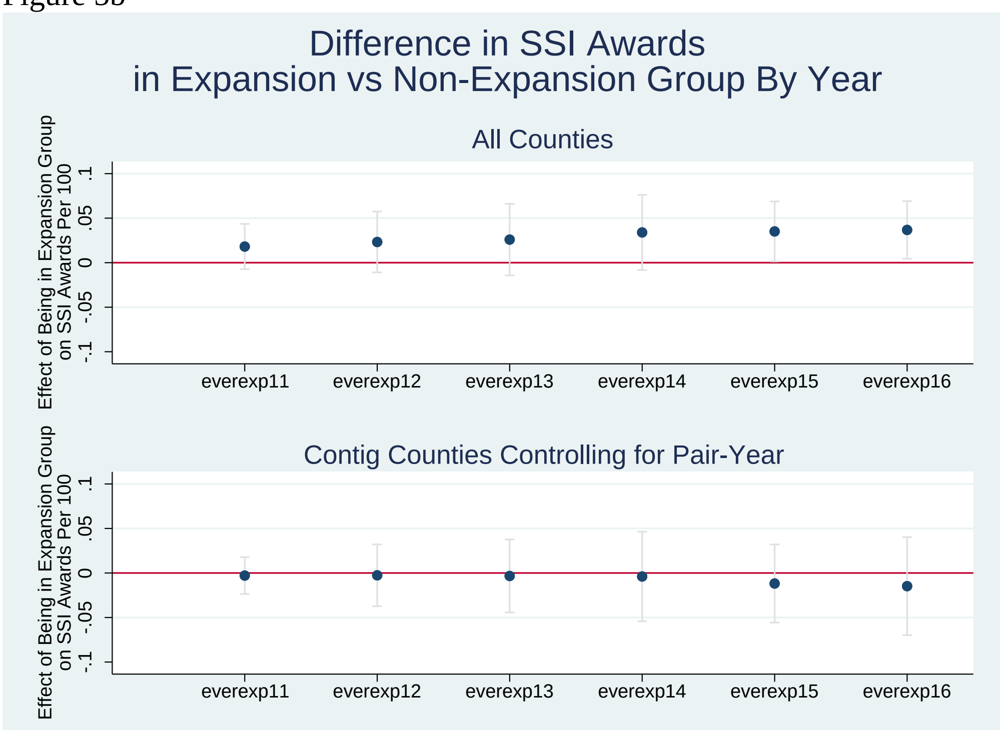


Figure 5b



Note: Coefficients from regressions on 2010-2016 data that includes county fixed effects and controls for fraction black, fraction Hispanic, and fraction ages 50 to 64. In each graph the top panel includes year fixed effects and the bottom panel includes county pair by year fixed effects.

Figure 6a

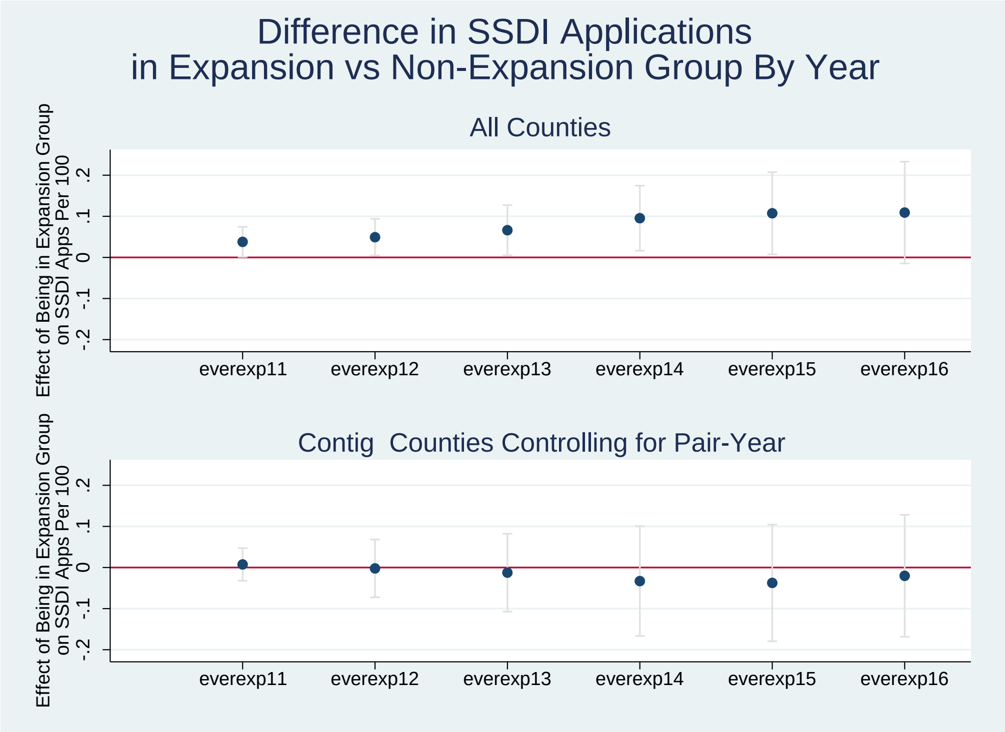
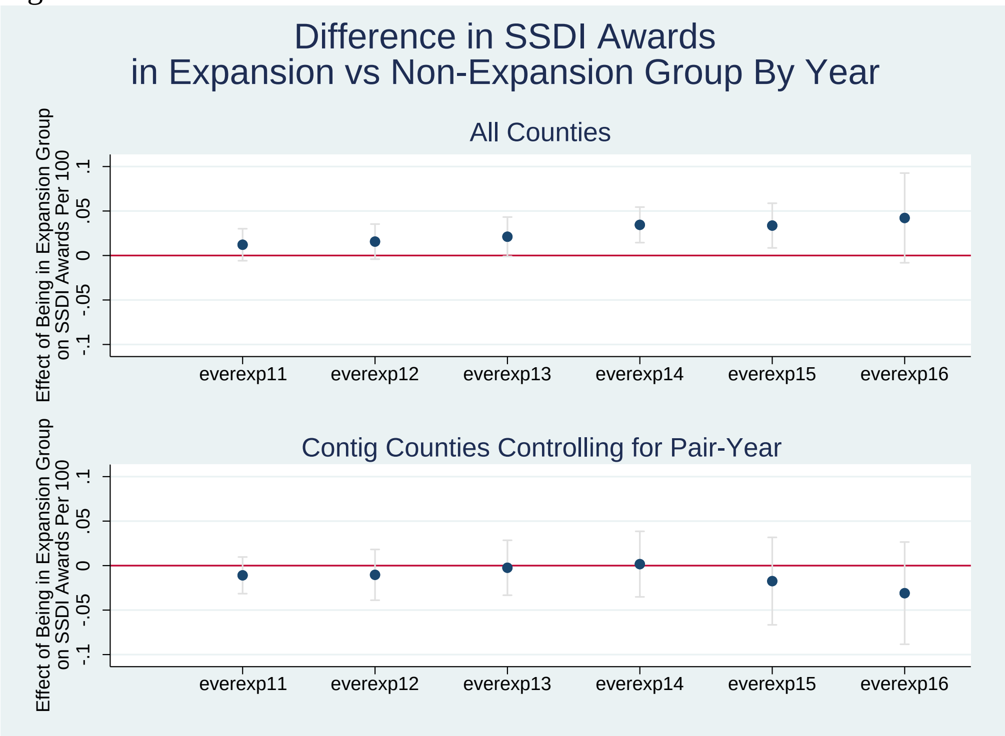


Figure 6b



Note: Coefficients from regressions on 2010-2016 data that includes county fixed effects and controls for fraction black, fraction Hispanic, and fraction ages 50 to 64. In each graph the top panel includes year fixed effects and the bottom panel includes county pair by year fixed effects.

Table 1: Summary Statistics – Weighted Means by Sample and by Year

Variable	All Counties Sample 2010	Contiguous Counties Sample 2010	All Counties Sample 2016	Contiguous Counties Sample 2016
SSI Applications per 100 working age adults	1.569	1.629	0.787	0.823
SSDI Applications per 100 working age adults	1.547	1.618	0.987	1.048
SSI Awards per 100 working age adults	0.453	0.475	0.271	0.289
SSDI Awards per 100 working age adults	0.540	0.579	0.311	0.340
Medicaid Noncategorical Income Limit >0 (Y/N)	0.125	0.175	0.618	0.708
Medicaid Noncategorical Income Limit (% of FPL)	0.128	0.188	0.902	1.025
Percent Nonhispanic Black	13.281	14.114	13.616	14.509
Percent Hispanic	16.455	12.171	18.002	13.690
Percent population aged 50-64	19.077	19.568	19.550	20.064
Unemployment rate	9.729	9.614	4.938	5.036
Observations	3088	2394	3088	2394
Unique Counties	3088	1140	3088	1140

Table 2: Effects of ACA Medicaid Income Limits on Percent Uninsured and Percent Low Income Uninsured, 2010-2016

	(1) All Counties Sample	(2) Contig Counties Sample	(3) Contig Counties Sample	(4) All Counties Sample	(5) Contig Counties Sample	(6) Contig Counties Sample
	Percent Uninsured	Percent Uninsured	Percent Uninsured	Percent Low-Income Uninsured	Percent Low-Income Uninsured	Percent Low-Income Uninsured
Noncategorical income	-0.365	-0.844*	-1.270***	-1.167**	-1.717***	-2.053***
Limit	(0.290)	(0.440)	(0.290)	(0.465)	(0.608)	(0.438)
% Non-Hispanic black	0.913*	0.609	0.331**	0.545	0.164	-0.378
	(0.488)	(0.440)	(0.145)	(0.704)	(0.543)	(0.310)
% Hispanic	-0.447	-0.373	-0.113	-0.301	-0.416	0.203
	(0.359)	(0.763)	(0.365)	(0.499)	(0.885)	(0.641)
% ages 50-64	0.037	1.008***	0.086	-0.191	0.819*	-0.126
	(0.516)	(0.320)	(0.235)	(0.629)	(0.427)	(0.439)
Observations	21,630	16,758	16,758	21,630	16,758	16,758
County FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	NO	YES	YES	NO
County Pair*Year FE	NO	NO	YES	NO	NO	YES

Dependent variable is the percent of individuals uninsured in a county or the percent of individuals with family incomes under 250% of poverty uninsured in a county from the Small Area Health Insurance Estimates 2010-2016. Estimates are weighted by prime-age population. Robust standard errors clustered on state in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Effects of ACA Medicaid Income Limits on SSI and SSDI Applications per 100 Working Age Adults, 2010-2016

	(1) All Counties Sample	(2) Contig Counties Sample	(3) Contig Counties Sample
Panel A. SSI Applications			
Noncategorical income	0.031	0.019	0.003
limit	(0.025)	(0.035)	(0.025)
% Nonhispanic black	0.043*	0.062	0.137***
	(0.024)	(0.039)	(0.043)
% Hispanic	0.011	0.051	-0.076*
	(0.030)	(0.047)	(0.042)
% ages 50-64	0.073***	0.095***	0.074
	(0.023)	(0.029)	(0.046)
Observations	20,651	16,109	16,109
Panel B. SSDI Applications			
Noncategorical income	0.017	0.016	-0.000
limit	(0.021)	(0.026)	(0.020)
% Nonhispanic black	0.037**	0.065***	0.104***
	(0.017)	(0.023)	(0.028)
% Hispanic	0.014	0.058*	-0.037
	(0.027)	(0.029)	(0.030)
% ages 50-64	0.052***	0.052***	0.048
	(0.017)	(0.019)	(0.032)
Observations	20,977	16,340	16,340
County FE	YES	YES	YES
Year FE	YES	YES	NO
County Pair*Year FE	NO	NO	YES

Notes: Estimates are weighted by population. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Effects of the ACA Medicaid Income Limits on SSI and SSDI Awards per 100 Working Age Adults, 2011-2017

	(1) All Counties Sample	(2) All Counties Sample	(3) Contig Counties Sample	(4) Contig Counties Sample	(5) Contig Counties Sample	(6) Contig Counties Sample
Panel A: SSI Awards						
Noncategorical income	0.006	0.002	0.007	0.001	0.002	0.001
Limit	(0.006)	(0.005)	(0.009)	(0.006)	(0.007)	(0.006)
Noncategorical income		0.007		0.010		0.003
limit (lagged)		(0.004)		(0.006)		(0.005)
% Non-Hispanic black	0.019***	0.019***	0.029**	0.028**	0.047***	0.047***
	(0.006)	(0.006)	(0.012)	(0.012)	(0.013)	(0.013)
% Hispanic	0.000	0.001	0.007	0.006	-0.013	-0.014
	(0.007)	(0.007)	(0.010)	(0.010)	(0.012)	(0.012)
% ages 50-64	0.012**	0.012**	0.020**	0.020**	0.027**	0.027**
	(0.005)	(0.005)	(0.008)	(0.008)	(0.012)	(0.012)
Observations	18,742	18,742	14,491	14,491	14,491	14,491
Panel B: SSDI Awards						
Noncategorical income	0.006	0.001	0.012	0.006	-0.003	-0.002
Limit	(0.012)	(0.007)	(0.012)	(0.007)	(0.008)	(0.006)
Noncategorical income		0.009		0.010		-0.002
limit (lagged)		(0.008)		(0.009)		(0.006)
% Non-Hispanic black	-0.006	-0.006	0.010	0.010	0.022***	0.022***
	(0.008)	(0.008)	(0.011)	(0.011)	(0.004)	(0.004)
% Hispanic	0.004	0.004	0.026***	0.025***	-0.009	-0.009
	(0.012)	(0.011)	(0.009)	(0.009)	(0.010)	(0.010)
% ages 50-64	0.021**	0.021**	0.012	0.012	0.011	0.011
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Observations	19,785	19,785	15,463	15,463	15,463	15,463
County FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	NO	NO
County Pair*Year FE	NO	NO	NO	NO	YES	YES

Notes: Estimates are weighted by population. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 1: Mean Absolute Difference Between Counties in Contiguous Pairs and Noncontiguous Pairs Pre-ACA

	Mean Absolute Difference Between Counties	
	Contiguous pairs	Noncontiguous pairs
SSI applications per 100 working age adults	0.6264***	0.9924***
	(0.0254)	(0.0156)
SSDI applications per 100 working age adults	0.5514***	0.8482***
	(0.0208)	(0.0116)
SSI awards per 100 working age adults	0.1859***	0.2756***
	(0.0069)	(0.0040)
SSDI awards per 100 working age adults	0.2016***	0.2803***
	(0.0095)	(0.0041)
Noncategorical income limit	0.0998***	0.1082***
	(0.0163)	(0.0077)
Unemployment rate	1.8417***	3.4619***
	(0.0669)	(0.0465)
Percent in poverty	4.3600***	7.0222***
	(0.1634)	(0.1059)
Percent non-Hispanic black	4.9843***	12.9056***
	(0.3438)	(0.3445)
Percent Hispanic	4.1791***	9.7866***
	(0.2987)	(0.3082)
Percent aged 50-64	2.1945***	3.0226***
	(0.0797)	(0.0478)

Notes: The first column shows the mean absolute difference in the values of the variables between counties in a contiguous pair in the 2010-2011 data. The second column shows the mean absolute difference between pairs formed by matching each county in the contiguous county sample with all possible other counties not in the same state. (***) indicates mean is different from 0 at p<0.01.

Appendix Table 2: Robustness Tests Effects of the ACA Medicaid Expansion on SSI and SSDI Applications per 100 Working Age Adults, 2010-2016

	(1) All Counties Sample	(2) Contig Counties Sample	(3) Contig Counties Sample
Panel A. SSI Applications			
Expansion	0.018	-0.004	0.002
	(0.037)	(0.044)	(0.026)
Observations	20,651	16,109	16,109
Panel B. SSDI Applications			
Expansion	0.004	-0.000	0.004
	(0.029)	(0.031)	(0.021)
Observations	20,977	16,340	16,340
County FE	YES	YES	YES
Year FE	YES	YES	NO
County Pair*Year FE	NO	NO	YES

Notes: Dependent variable is an indicator for whether a state had a nonzero noncategorical Medicaid income limit. Estimates are weighted by population. Regressions control for percent of population that is non-Hispanic Black, percent of population that is Hispanic, and percent of population aged 50-64. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 3: Effects of the ACA Medicaid Expansion on SSI and SSDI Awards per 100 Working Age Adults, 2011-2017

	(1) All Counties Sample	(2) All Counties Sample	(3) Contig Counties Sample	(4) Contig Counties Sample	(5) Contig Counties Sample	(6) Contig Counties Sample
Panel A: SSI Awards						
Expansion	0.005	-0.000	0.001	-0.005	0.001	-0.005
	(0.008)	(0.006)	(0.011)	(0.008)	(0.008)	(0.009)
Expansion		0.009		0.010		0.010
(lagged)		(0.005)		(0.007)		(0.009)
Observations	18,742	18,742	14,491	14,491	14,491	14,491
Panel B: SSDI Awards						
Expansion	0.004	-0.001	0.005	0.002	-0.001	-0.002
	(0.013)	(0.009)	(0.014)	(0.009)	(0.008)	(0.006)
Expansion		0.009		0.005		0.001
(lagged)		(0.010)		(0.010)		(0.007)
Observations	19,785	19,785	15,463	15,463	15,463	15,463
County FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	NO	NO
County Pair*Year FE	NO	NO	NO	NO	YES	YES

Notes: Dependent variable is an indicator for whether a state had a nonzero noncategorical Medicaid income limit. Estimates are weighted by population. Regressions control for percent of population that is non-Hispanic Black, percent of population that is Hispanic, and percent of population aged 50-64. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 4: Effects of the ACA Medicaid Income Limits on SSI and SSDI Applications per 100 Working Age Adults, 2010-2016, Robustness Tests

	(1) Main Spec (Table 3 Col 3)	(2) No early expanders	(3) Control for Unemp Rate	(4) Missings set to 10	(5) Dropping lowest 25th pctile pop	(6) Unweighted	(7) Below median uninsurance	(8) Above Median uninsurance
Panel A. SSI Applications								
Noncategorical income	0.003	-0.041	0.005	0.003	0.004	-0.018	-0.024	-0.006
Limit	(0.025)	(0.033)	(0.024)	(0.025)	(0.026)	(0.044)	(0.040)	(0.036)
Unemployment rate			0.030					
			(0.020)					
Observations	16,109	14,549	16,109	16,758	12,411	16,109	9,013	7,096
Panel B: SSDI Applications								
Noncategorical income	-0.000	-0.027	0.002	-0.001	0.000	-0.023	-0.025	-0.004
Limit	(0.020)	(0.030)	(0.019)	(0.019)	(0.021)	(0.038)	(0.031)	(0.030)
Unemployment rate			0.033**					
			(0.012)					
Observations	16,340	14,776	16,340	16,758	12,411	16,340	9,064	7,276
County FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	NO	NO	NO	NO	NO	NO	NO	NO
County Pair*Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Dependent variable is the Medicaid noncategorical income limit as a percent of the federal poverty line. Estimates are weighted by population, except where otherwise noted. Regressions control for percent of population that is non-Hispanic Black, percent of population that is Hispanic, and percent of population aged 50-64. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 5: Effects of the ACA Medicaid Income Limits on SSI and SSDI Awards per 100 Working Age Adults, 2011-2017, Robustness Tests

	(1) Main Spec	(2) No early expand	(3) Ctrl for Unemp rate	(4) Set missing to 10	(5) Drop bottom 25th pctile	(6) No weights	(7) Below median uninsurance	(8) Above median uninsurance
Panel A: SSI Awards								
Noncategorical income	0.001	-0.001	0.001	0.000	0.000	0.002	0.002	-0.006
Limit	(0.006)	(0.009)	(0.006)	(0.006)	(0.006)	(0.007)	(0.009)	(0.010)
Noncategorical income	0.003	-0.005	0.004	0.003	0.003	-0.003	0.003	-0.008
limit (lagged)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.008)	(0.007)	(0.017)
Unemployment rate			0.010**					
			(0.005)					
Observations	14,491	13,056	14,491	16,758	12,288	14,491	8,397	6,094
Panel B: SSDI Awards								
Noncategorical income	-0.002	-0.002	-0.001	-0.002	-0.002	-0.004	0.004	-0.011
Limit	(0.006)	(0.010)	(0.006)	(0.006)	(0.006)	(0.012)	(0.010)	(0.011)
Noncategorical income	-0.002	-0.007	-0.001	-0.002	-0.001	-0.012	0.002	-0.021
limit (lagged)	(0.006)	(0.008)	(0.006)	(0.006)	(0.006)	(0.011)	(0.008)	(0.013)
Unemployment rate			0.017***					
			(0.004)					
Observations	15,463	13,923	15,463	16,758	12,407	15,463	8,843	6,620
County FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	NO	NO	NO	NO	NO	NO	NO	NO
County Pair*Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Dependent variable is the Medicaid noncategorical income limit as a percent of the federal poverty line. Estimates are weighted by population, except where otherwise noted. Regressions control for percent of population that is non-Hispanic Black, percent of population that is Hispanic, and percent of population aged 50-64. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 6: State-Level vs County-Level Analyses of SSI and SSDI Applications, 2010-2016

	(1)	(2)	(3)	(4)
	All Counties Sample	Contig Counties Sample	All States Sample	Contig States Sample
Panel A. SSI Applications				
Noncategorical income Limit	0.031	0.003	0.041	-0.043
	(0.025)	(0.025)	(0.028)	(0.030)
Observations	20,651	16,109	343	1,498
Panel B. SSDI Applications				
Noncategorical income Limit	0.017	-0.000	0.024	-0.029*
	(0.021)	(0.020)	(0.023)	(0.017)
Observations	20,977	16,340	343	1,498
County or State FE	YES	YES	YES	YES
Year FE	YES	NO	YES	NO
Pair*Year FE	NO	YES	NO	YES

Each cell represents the coefficient on the noncategorical Medicaid income limit from a separate regression. Dependent variable is the number of SSI applications per 100 working age adults. State regressions include contiguous 48 states plus the District of Columbia; some state-years are missing. Estimates are weighted by prime-age population. Robust standard errors clustered on state in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 7: State-Level and County-Level Analyses of SSI and SSDI Awards, 2011-2017

	(1) All Counties Sample	(2) All Counties Sample	(3) Contig Counties Sample	(4) Contig Counties Sample	(5) All States Sample	(6) All States Sample	(7) Contig States Sample	(8) Contig States Sample
Panel A: SSI Awards								
Noncategorical income limit	0.006	0.002	0.002	0.001	0.008	0.003	-0.011*	-0.008
	(0.006)	(0.005)	(0.007)	(0.006)	(0.007)	(0.005)	(0.006)	(0.005)
Noncategorical income limit (lagged)		0.007		0.003		0.008		-0.007
		(0.004)		(0.005)		(0.005)		(0.005)
Observations	18,742	18,742	14,491	14,491	343	343	1,498	1,498
Panel B: SSDI Awards								
Noncategorical income limit	0.006	0.001	-0.003	-0.002	0.010	0.003	-0.013**	-0.008*
	(0.012)	(0.007)	(0.008)	(0.006)	(0.012)	(0.008)	(0.006)	(0.005)
Noncategorical income limit (lagged)		0.009		-0.002		0.011		-0.009
		(0.008)		(0.006)		(0.009)		(0.007)
Observations	19,785	19,785	15,463	15,463	343	343	1,498	1,498
County or State FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	NO	NO	YES	YES	NO	NO
Pair*Year FE	NO	NO	YES	YES	NO	NO	YES	YES

Each cell represents the coefficient on the noncategorical Medicaid income limit from a separate regression. Dependent variable is the number of SSI awards per 100 working age adults. State regressions include contiguous 48 states plus the District of Columbia; some state-years are missing. Estimates are weighted by prime-age population. Robust standard errors clustered on state in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$