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The effect of expanding Medicaid eligibility on Supplemental Security Income program participation

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ABSTRACT

Low-income adults without dependent children have historically had few paths to obtain public health insurance unless they qualified for Supplemental Security Income (SSI) cash benefits because of a disability. However, in states that expand their Medicaid programs, childless adults may obtain Medicaid without undergoing an intensive SSI disability review process and with substantially higher income and assets than the SSI program allows. This expanded availability of Medicaid coverage, independent of SSI participation, creates an opportunity to increase earnings and savings without jeopardizing health insurance coverage. In this paper, we use the natural experiments created by state decisions to expand Medicaid to nondisabled, nonelderly adults without dependent children to study the effect of decoupling Medicaid eligibility and cash assistance using a difference-in-differences study design. We collected data on the income eligibility limits, enrollment caps, and coverage characteristics of state Medicaid expansions to childless adults from 2001 to 2013. We combine these data with the nationally representative American Community Survey to estimate the effects of state expansion on SSI participation. We find relative declines in SSI participation of 0.17 percentage points on average after the introduction of Medicaid coverage for childless adults, a 7% relative decrease. This finding suggests the potential for small but important efficiency gains from separating SSI and Medicaid eligibility.

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1. Introduction

The federal Supplemental Security Income (SSI) program provides cash assistance to poor adults with work-limiting disabilities who have few assets. Qualification for SSI also typically conveys immediate eligibility for public health insurance through Medicaid. Nationwide, 4.9 million non-elderly adults with disabilities receive SSI benefits totaling $34 billion per year in federal cash payments (Social Security Administration, 2015a) and an average of $9250 per beneficiary per year in federal Medicaid expenditures (Congressional Budget Office, 2012). Historically, participation in the SSI program has served as the primary route to Medicaid coverage for adults with disabilities (Medicaid and CHIP Payment and Access Commission, 2012).

The Affordable Care Act (ACA) authorizes and incentivizes states to offer Medicaid coverage to adults with incomes at or below 138% of the federal poverty level (FPL), regardless of health, parental, or disability status. Prior to the ACA, coverage for non-disabled adults without dependent children required a special waiver from the federal government to use Medicaid funds or an independent fully state-funded initiative. Many states chose to implement some degree of expansion of public coverage for adults without dependent children under these mechanisms in the two decades prior to the ACA. In these states, low-income adults with disabilities could obtain Medicaid coverage without pursuing the federal disability application process and with relatively higher income and assets than the SSI program allows. The purpose of this paper is to study how the availability of such stand-alone Medicaid coverage affects enrollment in SSI.

Understanding the degree to which the availability of public insurance coverage not linked to disability status influences enrollment in disability programs is important because Medicaid recipients who qualify through the SSI program generally face stronger disincentives to earn income and accumulate assets than they would under non-SSI-linked Medicaid. Changes in the attributes of the disability program itself or those of related transfer programs may influence an individual's valuation of an SSI award and the decision to participate (Moffitt, 1992). If some current or potential SSI beneficiaries choose not to take up SSI because of the availability of outside health insurance, the result could be reduced net program costs and gains in social welfare from reductions in distortions to work and saving decisions.

Decoupling Medicaid eligibility from SSI eligibility may decrease SSI participation if it reduces the transaction costs associated with obtaining Medicaid and decreases the relative value of an SSI award. Alternatively, SSI participation may increase to the extent that the greater availability

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of Medicaid improves access to the health care needed for a disability determination, or increases awareness and take-up of other welfare programs. Although not uniform in their findings, the few empirical studies that have considered the interactions between health insurance and SSI adult participation provide stronger support for the hypothesis that they are net substitutes (Yelowitz, 1998; Yelowitz, 2000; Baicker et al., 2014; Maestas et al., 2014).

In this paper, we contribute to the literature on disability program participation by providing the first estimates of the effects of adult Medicaid expansions on SSI participation for a population we expect to be particularly affected by the separation of health insurance from cash benefits, nonelderly adults without dependent children ("childless adults"). We combine a new national dataset we developed that characterizes state Medicaid expansions with the nationally representative American Community Survey (U.S. Census Bureau, 2014; Ruggles et al., 2015). Using a difference-in-differences design, we compare the changes in SSI program participation for low-income childless adults who resided in states that implemented a Medicaid expansion for childless adults from 2001 to 2013 (prior to the implementation of ACA-incentivized expansions) to those in states without such expansions.

We find that the existence of a Medicaid program for childless adults decreases the proportion of non-elderly childless adults enrolled in SSI in the state by an average of 0.17 percentage points, a decline of 7% relative to not having a program. This finding is robust to several definitions of Medicaid coverage, adjustment for the presence of Medicaid enrollment caps or freezes, and a variety of alternative model specifications, including a triple-difference version of the estimator. We show that the effects are concentrated among childless adults who are lower-income, those with a health limitation, and those who are single, and that effects are driven by the states which we classify as having expanded their program during this period.

We perform several checks that support the plausibility of our empirical design. We show that estimated leads of the policy variable are zero. A placebo simulation indicates our result is a clear outlier relative to randomly assigned expansions. We find no evidence that interstate migration is responsive to these Medicaid expansions. We also find no response in populations whose SSI participation decisions are unlikely to be sensitive to the availability of separate Medicaid coverage for working age adults: elderly adults and adults with very high income.

Our findings offer a preview of the potential consequences of the ACA Medicaid expansions on participation in social welfare programs and provide insight into the relative value of health insurance coverage and cash benefits for low-income adults with disabilities.

2. Background

Supplemental Security Income is a means-tested program administered by the Social Security Administration (SSA) that provides income maintenance to several low-income populations including the elderly, children with disabilities, and the population of interest for this study, non-elderly adults with disabilities.[1] The SSA defines disability as the inability to engage in "substantial gainful activity" (SGA) because of a medical condition that is expected to result in death or last for at least 12 months.[2] In addition to a designation of disability, initial SSI eligibility requires that the applicant's earnings fall below the federal indicator of SGA (i.e., $1090/month in 2015),[3] and the applicant may possess no more than $2000 in assets net of several exclusions (e.g., a home, a car, personal effects). The maximum federal cash benefit for adult SSI beneficiaries corresponds to an income of 75% of the federal poverty level (FPL) or $733/month in 2015. However, the average monthly federal payment is substantially less, about $550 (SSA, 2014a). Many states supplement the SSI federal cash benefits. In the most generous state, that supplement results in a total maximum monthly SSI income of 90% FPL (SSA, 2014b). In addition to monthly cash payments, an SSI award typically confers immediate Medicaid eligibility.[4] The Medicaid coverage available to SSI beneficiaries includes the full benefits specified in each state's Medicaid plan.

2.1. Participation incentives

Although SSI program eligibility is limited to adults who are unable and unexpected to work, the SSI review process for disability is inherently subjective because the disabling effect of many medical conditions is not straightforward (Strand, 2002; Daly and Burkhauser, 2003; Keiser, 2010). The consequence of this partial subjectivity is that a prospective applicant faces uncertainty regarding an award. The uncertainty of an SSI award combined with the transaction costs of applying may reduce the desirability of SSI program participation and the incentive to apply for some individuals. An offer of Medicaid coverage independent of an SSI award may reduce SSI participation to the extent that Medicaid coverage alone is a substitute for Medicaid coverage plus a cash benefit for the marginal SSI applicant or beneficiary.

Non-SSI Medicaid is a plausible substitute for an SSI award for some applicants. There is some evidence that the Medicaid benefit may be more valuable than the cash benefit to a subset of potential or current SSI beneficiaries. The expected cumulative expenditures for a disabled adult from SSI program entry through the first six years of participation (or death) in 2012 dollars are just under $12,000 in cash benefits and $55,000 in Medicaid spending (Riley and Rupp, 2014). In addition, the transaction costs of obtaining/maintaining SSI eligibility may exceed the value of the cash award for some. At a minimum, the application process for disability-based benefits includes a review of medical records, an interview with the applicant, and substantial documentation of work history and education (Daly and Burkhauser, 2003). Throughout the application process, an applicant's income and assets may not exceed the SSI maximum thresholds without jeopardizing the possibility of an award.

The SSI program's stringent financial eligibility criteria create disincentives for prospective and current beneficiaries to work and accumulate assets (Daly and Burkhauser, 2003). Empirical evidence demonstrates that SSI induces some moral hazard for at least a subset of beneficiaries (Neumark and Powers, 1998, 2000; Powers and Neumark, 2005; Kaushal, 2010). A large body of work on SSDI provides additional support for the idea that disability benefit programs can have work and asset disincentive effects (Gruber and Kubik, 1997; Black et al., 2002; Autor and Duggan, 2003; Chen and van der Klauuw, 2008; Maestas et al., 2013; French and Song, 2014; Moore, 2015; Shu, 2015). These disincentives are relevant for the SSI beneficiaries that have (or regain) the capacity to earn or save income beyond the SSI eligibility criteria, and evidence indicates that some do. Approximately one-quarter of successful and unsuccessful SSI applicants had some positive earnings in the years preceding application to the program (Bound et al., 2003). According to the National Beneficiary Survey, about 19% of

[1] For an excellent and comprehensive description of the SSI program, see Duggan et al. (2015).

[2] The SSI program is distinct from the Social Security Disability Insurance (SSDI) program. Both are federal disability cash assistance programs and share the same medical eligibility criteria. However, SSDI is a social insurance program funded through payroll taxes and available to any individual with a sufficient work history regardless of financial need who meets the medical eligibility criteria, while SSI is a means-tested transfer program funded through general revenues and available regardless of work history to those who meet the financial and medical criteria. Thirty percent of nonelderly adult SSI beneficiaries also receive SSDI benefits (Social Security Administration, 2014a). These "concurrent beneficiaries" have a sufficient work history to receive SSDI payments, yet their income and assets fall below the SSI maximum thresholds.

[3] The SGA earnings threshold is set in dollars in reference to an individual. It typically changes annually in accordance with changes in the national average wage index. The 2015 equivalent of the SGA in FPL terms is approximately 111%.

[4] All states must offer Medicaid coverage to poor adults with disabilities (Social Security Act Title XIX, 2016). The large majority of states satisfy this federal requirement by adopting the SSI eligibility criteria as their Medicaid criteria. In the remaining 11 states, the SSI award satisfies the disability eligibility criterion for Medicaid; however, the SSI beneficiary must also meet income and/or asset eligibility criteria that is typically lower than the federal SSI thresholds (Bruen et al., 2003).

working age SSI beneficiaries expect to earn enough to leave the SSI program within 5 years (Livermore, 2011). This expectation signals a widespread interest and orientation toward employment although SSI benefit suspension rates also suggest it is optimistic. Ben-Shalom and Stapleton (2015) find that SSI payments were suspended or terminated because of earnings that exceeded the maximum allowable amount during at least 1 month for almost 10% of working age SSI awardees from program entry through a seven-year follow-up period.

With a standard static consumption-leisure model in mind, there are two important theoretical channels for the potential effect of Medicaid expansion on SSI participation: substitution effects and income effects. The existence of non-SSI Medicaid shifts the location of the "notch" on the budget constraint caused by the threshold at which consumers qualify for Medicaid (Yelowitz, 1995) so that it is no longer coincident with that of SSI eligibility. Since Medicaid income eligibility thresholds under expansions are typically higher than SSI income eligibility thresholds, the incentives behind the substitution effect for marginal SSI applicants (those close to the SSI income threshold) are reduced. Because marginal applicants can now qualify for Medicaid regardless of SSI status, the income effect of SSI is reduced. As pointed out by Autor and Duggan (2007), each of these effects is important for policy, because the substitution effect implies first-order deadweight losses while the income effect does not. Therefore, to the extent that Medicaid availability reduces the substitution effect in this population, Medicaid expansion could actually increase efficiency.[5]

The SSI program includes several provisions to support employment that explicitly recognize the importance of Medicaid coverage to SSI beneficiaries. For example, an SSI beneficiary may continue to receive full Medicaid coverage after her earned income reaches the SGA threshold (roughly 111% FPL) if she continues to meet the asset and disability SSI eligibility criteria. The SSI cash benefit is reduced according to a marginal tax rate of 50% on earnings and 100% on other income after exclusion of a very modest amount. When her total income becomes too high to receive any SSI cash payment (approximately 150% FPL), she may retain Medicaid benefits if the disability persists, assets remain below the $2000 eligibility threshold, the Medicaid coverage is needed to work, and gross earned income does not exceed a state-determined threshold (SSA, 2015b). Just under 3% of working age SSI beneficiaries participate in these provisions (SSA, 2015a). The Balanced Budget Act (1997) and the Ticket to Work and Work Incentives Improvement Act (1999) gave states additional flexibility to offer Medicaid coverage to adults with disabilities who rejoin the labor force by creating Medicaid Buy-in programs. However, SSI enrollees represent only 4% of participants, or about 4000 adults (Gimm et al., 2009). The recent adult Medicaid expansions represent a significant departure from these existing strategies to incentivize work and savings because they wholly sever the decision to participate in the SSI program from the decision to obtain or retain public health insurance.

2.2. State Medicaid expansions for adults without dependent children

Historically, Medicaid coverage for adults without dependent children was contingent upon an SSA determination of disability, low income and limited assets.[6] The availability of Medicaid coverage for childless adults with or without disabilities began to significantly increase in the 2000's (Klein and Schwartz, 2008). As described in greater detail below, a total of 11 states introduced some type of Medicaid coverage to childless adults regardless of their disability status between 2001 and 2013. Because these Medicaid expansions focused on childless adults in general without regard to health status, no SSA disability award was required to enroll. Moreover, the maximum income thresholds were typically more generous than the income eligibility criterion for SSI participation (Dorn et al., 2004; Sommers et al., 2014; DeLeire et al., 2013). As such, in these states low-income childless adults could obtain Medicaid benefits without pursuing the SSI application process and with relatively higher income than the SSI program permits. In states without early adult Medicaid expansions, the paths to Medicaid coverage for childless adults who were not enrolled in the SSI program remained very limited.[7] It is important to note that these early childless adult Medicaid expansions were often less generous along one or more dimensions (e.g., enrollment caps, benefits, and/or asset tests) than the expansions that followed in 2014 as authorized by the Affordable Care Act. We return to this point in the concluding section of the paper.

2.3. Previous research on SSI and health insurance

A large literature examines economic, epidemiological, and demographic determinants of adult SSI participation (e.g., Rupp and Stapleton, 1995; Rupp, 2012; Schmidt, 2012; Black et al., 2002; Aizer et al., 2013), as well as the impact of welfare program attributes and changes on SSI participation among children and single mothers (Garrett and Glied, 2000; Schmidt and Sevak, 2004). However, the empirical research on the interactions between Medicaid and SSI program participation is relatively limited. Yelowitz (1998) found that the rising value of Medicaid coverage, defined as average Medicaid expenditures for blind SSI beneficiaries, explained 13–20% of the SSI caseload growth for adults with disabilities between 1987 and 1993. Coe and Rupp (2013) observed a positive association between the generosity of Medicaid availability in a state and earnings among SSI beneficiaries, a potential signal of transitioning out of the SSI program. However, because the study data included only SSI and SSDI beneficiaries, the authors were unable to evaluate the relationship between Medicaid availability and SSI participation at the extensive margin.

Only three studies directly consider the effect of expanded health insurance eligibility on SSI participation. Yelowitz (2000) evaluated the introduction of the Qualified Medicare Beneficiary (QMB) program in the early 1990's on SSI participation among elderly, non-disabled adults. The QMB program increased the income eligibility limit for Medicaid and offered this coverage to eligible seniors without the need to participate in the SSI program. SSI participation among elderly adults declined after the introduction of the Qualified Medicare Beneficiary (QMB) program. More recently, Baicker et al. (2014) assessed the effects of the Oregon Health Insurance Experiment on participation in a variety of social welfare programs including SSI. The Oregon Medicaid program randomly allocated a limited number of openings for an adult Medicaid expansion to low-income adults that were not already eligible for Medicaid. The authors did not anticipate an effect on SSI participation because individuals who were eligible for Medicaid through other eligibility categories such as SSI were excluded from the lottery-allocated spots. Consistent with their expectations, one-year after the lottery, there were no significant differences in SSI participation among adults who were and were not allocated to the Medicaid expansion.

Finally, in the study that most closely resembles our own, Maestas et al. (2014) evaluated the effects of the 2006 Massachusetts (MA) expansion of public and private health insurance on the SSI application rate

[5] While Medicaid coverage for childless adults may itself have labor supply disincentives (Dague et al., 2017; Garthwaite et al., 2014), the income thresholds are typically significantly higher than those for SSI, so the marginal individuals for whom the substitution effect is salient are unlikely to be the same.

[6] While the Medically Needy (MN) program is a pathway to Medicaid eligibility in 34 states, it is not available to adults without dependent children unless they also qualify under a federally mandated category of Medicaid eligibility (i.e., pregnancy, blind, disabled, or elderly) (Kaiser Commission on Medicaid and the Uninsured, 2012). Higher income adults who meet the criteria for one of these categories, gain coverage through the MN program when their income - net of incurred medical expenses - falls below the state's income eligibility threshold for MN participation (42 CFR 435.301). In the majority of states that offer a MN program, that threshold is not >50% of the FPL.

[7] A large body of work examines the effects of Medicaid expansions to children and adults on a variety of outcomes, including program take-up, crowd-out, health care utilization, health, labor supply, family structure, and financial outcomes. Buchmueller et al. (2015) provide a thorough review of this extensive literature.

among non-elderly adults, including concurrent applications to SSI and SSDI and applications to SSI alone. On average, they found no substantial change in SSI application rates between MA and the comparison states. However, in counties with low (high) insurance rates pre-expansion, the SSI application rate decreased (increased) following the insurance expansion. The decreased rate of SSI applications in low-insurance counties is consistent with a decline in the relative value of SSI as new paths to health insurance became available. The increased applications within high-insurance counties may reflect a release from job lock among those with greater attachment to the labor force, concurrent SSI/SSDI applicants.

We conclude from the previous research that the introduction of Medicaid coverage, independent of SSI eligibility, reduced age-related SSI participation among seniors and has had mixed effects on SSI participation among working age adults. The current study builds upon and extends this research. We estimate the effects on SSI participation of childless adult Medicaid expansions in nearly a dozen states over 13 years, increasing the generalizability of findings beyond a single state or time period. We focus exclusively on the childless adult population, the population that we expect to be most affected by the decoupling of Medicaid coverage from SSI eligibility because of their previously limited access to Medicaid coverage.

Finally, we examine Medicaid expansions that preceded the majority of the ACA-induced changes to the private health insurance market strengthening our capacity to identify the consequences of the Medicaid expansions on SSI participation apart from simultaneous changes in the private health insurance market.

3. Empirical Methods

3.1. Data

We combine nationally representative survey data, the American Community Survey (ACS) with a new comprehensive primary data source we have developed on state Medicaid programs for adults without dependent children, the Medicaid Waiver Dataset (MWD). We describe each in turn as well as how we construct the variables of interest and the sample for analysis.

The ACS is an annual cross-sectional national household survey that collects detailed housing and population characteristics (U.S. Census Bureau, 2014; Ruggles et al., 2015). Beginning in 2001, these data have supported yearly national and state estimates that are representative of the U.S. non-institutionalized population. The annual sample size from 2001 to 2005 ranged from approximately 513,000 to 602,000 housing units. In 2005, the U.S. Census Bureau substantially increased the ACS sample sizes and added individuals who resided in group quarters (i.e., nursing facilities, college residence halls, and correctional facilities). These modifications resulted in annual sample sizes of 1.9–2.3 million housing units, made possible sub-state area estimates, and the capacity to generalize survey results to the full U.S. population. The ACS is part of the decennial census, and response is mandatory. The annual response rate is well above 90% each year. For this study, we pool data from 2001 to 2013 and restrict our sample to the non-institutionalized population.

There is currently no centralized and publicly available resource that synthesizes state Medicaid programs for childless adults. Our Medicaid Waiver Dataset (MWD) is intended to address that gap. The dataset characterizes the presence and attributes of childless adult Medicaid coverage for each state and the District of Columbia from 1996 through 2014. It includes coverage authorized and funded through state-only initiatives, Section 1115 waiver programs, and State Medicaid Plans. We constructed this dataset through a systematic review of multiple sources including state and federal Medicaid documents, research publications, state news, and onsite data collection at the Centers for Medicare and Medicaid Services. The documentation for this dataset including information regarding its public availability is included in Appendix A.

3.2. Defining Medicaid coverage

There is significant variation across states and years regarding the type and generosity of Medicaid benefits for non-disabled childless adults. Programs range from traditional Medicaid enrollment and health care coverage to assistance with private employer-sponsored insurance premiums to direct subsidies for specific health care providers. Because we are interested in identifying those states in which non-SSI Medicaid would be a true substitute for a marginal applicant, we considered a state to have childless adult Medicaid coverage for purposes of this paper if the program was similar in covered services and structure to the type of traditional Medicaid coverage available to SSI beneficiaries. In particular, we exclude programs that offered only premium assistance and programs in which the state funded select facilities to subsidize care delivery to poor adults. Within the state-years in which Medicaid coverage for childless adults was present according to our definition, we identified two program characteristics that may influence the relative costs and benefits to the individual of pursuing Medicaid coverage independent of SSI participation. These include the maximum income eligibility threshold for childless adult Medicaid coverage, and the presence of enrollment ceilings, wait lists, or freezes for childless adult Medicaid coverage.

After determining the childless adult Medicaid coverage status for each state-year in the dataset, we identified the treatment group for this study as those states that implemented and/or discontinued childless adult Medicaid coverage between 2001 and 2013. We refer to this group as our “change states.” These include the following: ten states that introduced and maintained Medicaid coverage for childless adults, CA, CO, CT, IN, IA, ME, MD, MI, UT, WI; one state that introduced and discontinued childless adult coverage, PA; and one state that discontinued Medicaid coverage for childless adults that had been introduced before 2001, TN. The comparison group includes eleven states that offered some Medicaid childless adult coverage throughout the study period (AZ, DE, DC HI, MA, MN, NJ, NY, OR, VT, WA) and twenty-eight states that never offered Medicaid coverage to childless adults during the study period (AL, AK, AR, FL, GA, ID, IL, KS, KY, LA, MS, MO, MT, NE, NV, NH, NM, NC, ND, OH, OK, RI, SC, SD, TX, VA, WV, WY). Fig. 1 illustrates the timing of Medicaid coverage changes for childless adults by state. The maximum income eligibility threshold in most states and years was at or below 200% FPL while the use of enrollment caps or freezes became increasingly common over the study period as summarized in Fig. 2. In 2013, half of states with Medicaid coverage for childless adults had an enrollment cap or ceiling.

3.3. Defining SSI participation

The study's outcome of interest is SSI participation. In the ACS, respondents are asked to report annual income from a variety of sources including the SSI program. We define SSI participation as a binary variable in which 1 indicates receipt of any SSI income during the past 12 months (Schmidt and Sevak, 2004). More specifically, the look-back period is 12 months relative to the month in which the household is surveyed. Because the ACS is administered to 1/12 of the annual sample in each calendar month, this measure captures income received in the current calendar year for the vast majority of subjects. The relationship between survey administration, the look-back period, and a hypothetical Medicaid expansion is illustrated in Appendix Fig. B1. At the population-level, this outcome thus captures mean SSI prevalence over a 12-month period, a useful metric with which to gauge program scale and expenditures.

There are several considerations that follow from our choice of SSI participation as the outcome. First, because SSI participation does not distinguish between new, continuing, and former SSI beneficiaries we

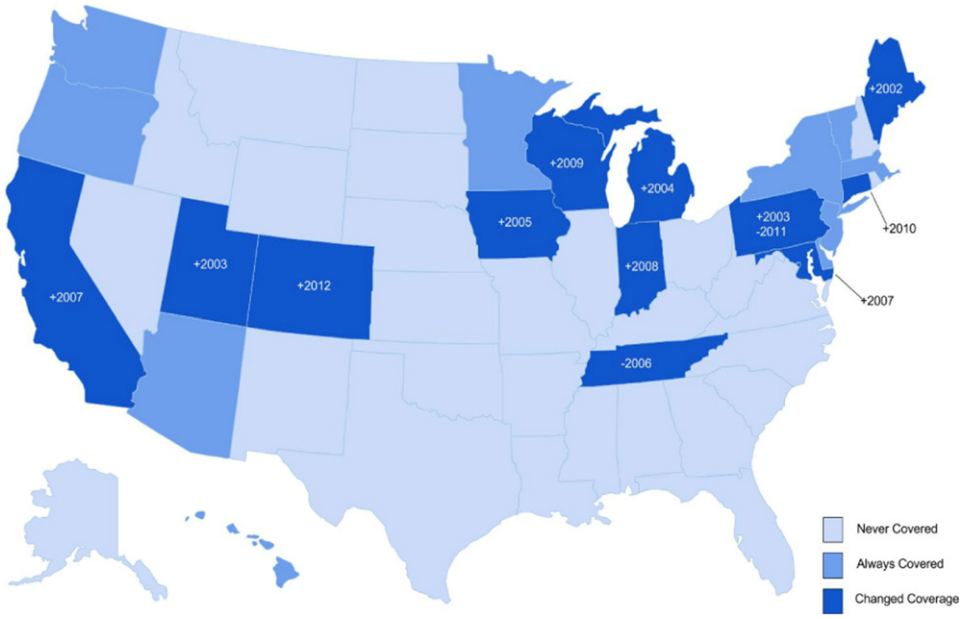


Fig. 1. Summary map of Medicaid coverage for childless adults, 2001–2013. Notes: Authors' calculations using the Medicaid Waiver Dataset. "Always covered" states provided continuous Medicaid coverage for some childless adults between 2001 and 2013. "Changed coverage" states expanded or eliminated Medicaid coverage for childless adults between 2001 and 2013. "Never covered" states did not offer Medicaid coverage for childless adults from 2001 to 2013.

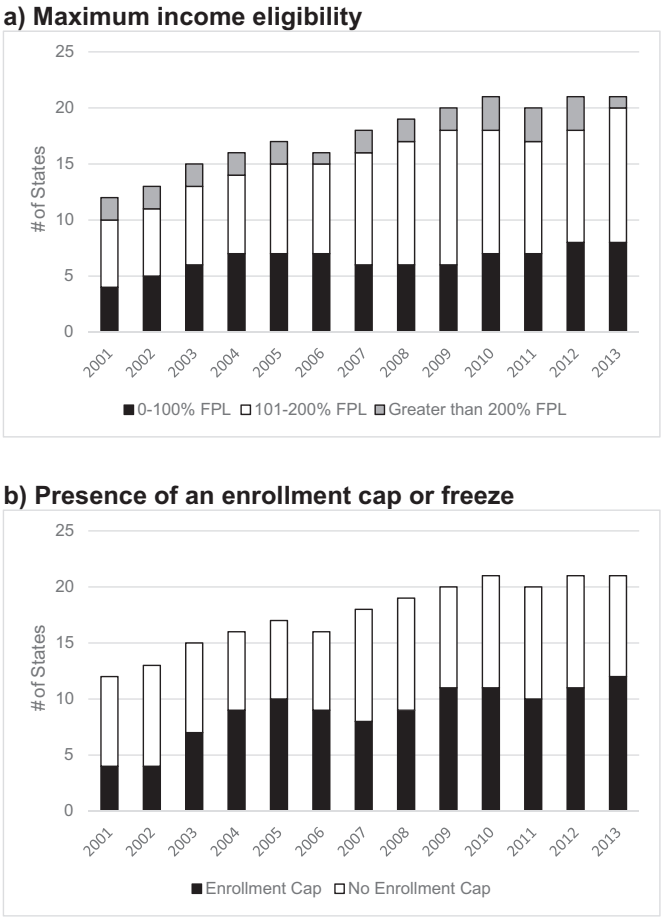


Fig. 2. Characteristics of Medicaid coverage for childless adults among states that offered coverage between 2001 and 2003. Notes: Authors' calculations using the Medicaid Waiver Dataset. See Appendix A for documentation.

cannot isolate the channel through which Medicaid expansions may affect SSI participation. Prospective applicants may choose not to initiate an application. Current applicants may withdraw pending applications, and stand-alone Medicaid coverage may prompt some SSI beneficiaries to exit the program to retain Medicaid coverage without having to satisfy SSI asset and disability criteria. We suspect that exits play a secondary role relative to applications in explaining any potential change in SSI participation because earnings capacity is likely to further decline with extended absence from the labor force. However, we cannot formally test this hypothesis with the study data and outcome measure. Second, because the SSI income measure reflects a 12-month look-back period, it is crucial to guard against the possibility of mistaking a lagged decline in SSI applications for post-expansion SSI participation effects. We take several steps in our empirical analyses to minimize this possibility including our choice of study design and the use of a Granger causality test as discussed below.

In Fig. 3, we illustrate the trend in SSI participation among working age, non-institutionalized childless adults from 2001 to 2013. We plot this trend for three mutually exclusive groups of states: states that never offered Medicaid coverage to childless adults during this time period; states that changed Medicaid coverage for childless adults during this time period; and states that provided Medicaid coverage to some childless adults continuously from 2001 to 2013. Additionally, we indicate the number of states (if any) that introduced or eliminated coverage for childless adults by year. Overall the proportion of working age adults with SSI benefits is low at 2–3.5% and rising over time in each of the state groups similar to published estimates for the working-age SSI population more generally during this time period (Duggan et al., 2015). Consistent with the notion that offering Medicaid coverage apart from an SSI award reduces the relative value of the SSI award, we see relatively lower rates of SSI participation in states with childless adult Medicaid coverage.

3.4. Analytic sample

We select all non-institutionalized adults ages 21–64 without dependent children from the ACS. We include subjects with self-reported or imputed values of SSI income in the analytic sample. Note that because both income and self-reported disability status are likely

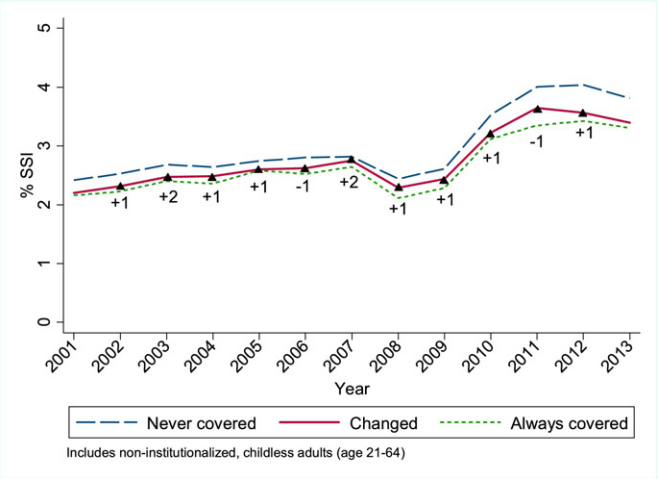


Fig. 3. Annual SSI participation rates by state Medicaid coverage status for childless adults. Notes: Authors' calculations using the American Community Survey for SSI participation data. Analyses are weighted to represent the non-institutionalized working age population of the United States. The Medicaid Waiver Dataset was used to identify state Medicaid coverage status for childless adults. The number of states that introduced or eliminated childless adult coverage in each year (if any) is indicated.

endogenous to Medicaid expansion, we do not condition on either of these characteristics to define our primary sample or include controls for them in the main results. In a cross-sectional survey we cannot distinguish whether these variables reflect the propensity to participate in SSI or a consequence of participation. We explore and discuss some other ways of limiting the sample under "Alternative sample definitions and subsample analyses" below.

Table 1 shows the weighted means and standard errors calculated across states for several relevant sample demographic characteristics. Standard errors are clustered at the state-level. Table 1 uses only data from the 2001 ACS in order to capture any differences at the baseline period. The table groups states together according to the same 3 categories described above: states that introduced or stopped covering childless adults at some point during the study period; states that never covered childless adults during the study period; and states that covered childless adults throughout the study period. The table also includes the results of separate F-tests for the difference in means for always - and never - covered states relative to states that changed coverage status. For the most part, average state characteristics at baseline are very similar regardless of childless adult coverage status. Just over half of the sample is male for all three state groupings, and 15–18% are of non-white race across the three types. The average age of a person in the sample is just over 40 years old. The vast majority report speaking English well and were born in the United States. The F-test results show that the education levels are slightly lower (86% with at least a high school diploma or GED) in states that never had a childless adult program than those that changed status (88%), and slightly higher in states that always had a childless adult program (90%). None of these differences are particularly large or concerning, but as discussed below our preferred specification includes controls for all of these observable characteristics.

Table 1
State population characteristics in 2001 by change in Medicaid coverage status for childless adults.

	Change states	Comparison states	
		Never	Always
SSI participation rate (%)	2.204	2.419	2.160
	(0.134)	(0.195)	(0.153)
Male (%)	51.33	51.03	51.07
	(0.298)	(0.104)	(0.232)
Non-white (%)	15.33	15.23	18.24
	(3.669)	(1.439)	(3.202)
Age	42.89	43.83	42.41
	(0.580)	(0.219)	(0.276)
Speaks Eng. well (%)	97.09	97.96	97.13
	(1.262)	(0.464)	(0.450)
Born in US (%)	88.05	92.16	86.03
	(4.675)	(1.400)	(2.068)
Married (%)	46.85	50.94	43.25
	(2.151)	(0.744)	(1.746)
HS Dip. or GED (%)	88.32	86.10*	90.22*
	(0.675)	(0.684)	(0.687)
Sample (N)	110,806	181,098	74,228
State (N)	12	28	11

Notes: Table reports the 2001 mean and standard error for each of the listed characteristics for non-institutionalized childless adults ages 21–64 in the American Community Survey. Each column represents a group of states defined by the availability of Medicaid childless adult coverage between 2001 and 2013: "Change" refers to states that expanded and/or eliminated Medicaid childless adult coverage; "Never" refers to states that never had childless adult Medicaid coverage; and "Always" refers to states that had Medicaid childless adult coverage throughout the study period. The reference group for F-test comparisons of means is the "Change".
* p-Value <0.05.

We additionally compared the average state unemployment rate for adults aged 16 and older across the 3 groups of states (data not shown). These 2001 rates were similar across states that changed coverage status (3.47%), never offered coverage (3.56%), and always offered some coverage to childless adults (3.48%). We constructed this state-level measure from the ACS based on respondents' employment status in order to describe the macroeconomic conditions in the state. We excluded childless adult respondents (i.e., our analytic sample) in the construction of this measure because SSI participation is a determinant of employment status.

3.5. Empirical model

We use a difference-in-differences design in order to estimate the effect of Medicaid coverage expansions for childless adults on SSI participation rates. In particular, we compare SSI participation in states that changed Medicaid coverage for adults without dependent children relative to those that did not, before and after the change occurred. In most cases these changes were expansions as described above. The following equation describes the basic model:

$$y_{ist} = \alpha_t + \delta_s + \boldsymbol{M_{st}}\boldsymbol{\beta} + \boldsymbol{Z_{st}}\boldsymbol{\sigma} + \boldsymbol{X_{ist}}\boldsymbol{\theta} + \mu_{ist} \quad (1)$$

In this equation, i indexes individual, s state, and t year. Recall that the data are a repeated cross-section of individual observations, effectively creating a panel of states. The outcome of interest, SSI participation, is represented by y_{ist}. A full set of year effects (α_t) that control for differences over time common to all states and state effects (δ_s) that control for differences across states that are constant over time are included. The vector $\boldsymbol{M_{st}}$ is a set of one or more Medicaid policy variables (described further below) that are defined for the states and years during which the relevant policies were in place, making $\boldsymbol{\beta}$ the coefficient(s) of interest. The vector $\boldsymbol{Z_{st}}$ is a set of state-specific covariates that vary over time and may affect SSI participation. We recognize that fluctuations in state economies may be important determinants of SSI participation and so include the change in state unemployment rates and the level of the lagged unemployment rate. As described above, state unemployment variables represent unemployment among adults aged 16 years and older excluding childless adults. The vector $\boldsymbol{X_{ist}}$ is a set of individual-specific covariates that may affect SSI participation including sex, race, age, marital status, born in the U.S., English proficiency, and educational achievement. However, since the policy variables vary only at state-year level, the inclusion or exclusion of these covariates should generally not affect the estimated treatment effect. Unobserved individual-specific errors are represented by μ_{ist}.

Our main Medicaid policy variable ($\boldsymbol{M_{st}}$) of interest is $CACov_{st}$, a dummy variable that is equal to one if a state has childless adult

coverage in a particular year and zero otherwise. The coefficient of interest under this treatment variable measures how the average Medicaid expansion influences SSI participation. As previously noted, expansions varied along several dimensions including the maximum income eligibility and use of enrollment ceilings or caps. We exploit this variability to estimate how SSI participation responds to more and less far-reaching Medicaid expansions. Specifically, we estimate specifications that include only $Threshold_{st}$, a continuous variable that represents the size of the income threshold in %FPL for a state in a particular year in $\boldsymbol{M_{st}}$. Higher income thresholds, as pointed out by Hamersma and Kim (2013), are an important lever for policymakers and may be of independent interest. To provide an additional continuous measure of the size of a Medicaid policy change, we include specifications that feature just $SimElig_{st}$ as the independent variable of interest. The coefficient of interest when using this particular treatment variable measures how SSI participation responds to a change in the fraction of the population income-eligible for Medicaid.[8]

The maximum income threshold for a Medicaid expansion and the fraction of the population that is income-eligible will overstate the potential reach of an expansion to the extent that a state imposes enrollment caps or freezes. Thus, we also examine specifications that include both $CACov_{st}$ and Cap_{st} in $\boldsymbol{M_{st}}$ to understand the role that limiting enrollment in Medicaid conditional on having an expansion may have on interactions with SSI. We define Cap_{st} as a continuous measure that represents the fraction of income eligible childless adults who may enroll when an enrollment cap or freeze is in place. For example, a 10% cap indicates Medicaid coverage is available to approximately 10% of the income-eligible childless adult population in the state.

We estimate the model using Ordinary Least Squares regression techniques. Since we are interested in the causal effect of Medicaid coverage changes and the data are not oversampled in a way that might bias the results, we follow the recommendation of Solon et al. (2015) and estimate our preferred models without the ACS sample weights.[9] Because of the possibility of serial correlation within states, we estimate cluster-robust standard errors at the state level (Bertrand et al., 2004). All estimation was performed in Stata 14 (StataCorp, College Station, TX).

Our main results include all states in the analysis including those that never implement a policy change, those that had some childless adult coverage in place throughout, and those that introduced or discontinued childless adult coverage at some point during the study period. Identification in this model comes from both the within-state, over time variation and the across-state, within-year variation introduced by the Medicaid coverage changes for childless adults. We also provide estimates that limit the analysis to those 12 states that introduced or eliminated coverage for childless adults. In these specifications, the source of identification across states is only among those states that changed childless adult coverage, as they may serve as a more precise set of controls for one another. The downside of using this set of states is a loss of sample size. If the assumptions of the model are satisfied, we would expect similar results across these two sets of states.

3.6. Identification

The key identifying assumption behind the difference-in-differences analysis is that of parallel trends: we assume states that did not expand (or had not yet expanded) Medicaid would have had similar trends in SSI participation, conditional on observables included in the model, as those that did expand, so that those states and years provide a good counterfactual. The main potential violation of this assumption is policy endogeneity: the idea that states that expanded Medicaid for childless adults were doing so in response to a perceived need in their population which may have independently affected SSI participation as well.[10] While the parallel trends assumption is not directly testable, we provide several checks to assess the plausibility of our research design.

We first implement a "Granger causality" test following Autor (2003), adding leads of the treatment variable $CACov_{st}$, to the model in order to test whether the effects of childless adult Medicaid coverage appear prior to actual implementation of a change. If the leads are not statistically different from zero, it suggests that SSI participation is only responsive to actual Medicaid program changes, as one would expect, supporting our design. The Granger test also provides a more general test of the impact of secular changes in treatment states related to SSI participation – whether or not these changes actually prompted Medicaid expansions. For example, if for any reason SSI applications were decreasing among treatment states in the years preceding an expansion we might expect to observe SSI participation decline even before the implementation of the Medicaid expansion. If, however, the leads are not statistically different from zero, it reduces the plausibility that lagged applications or prior state trends would explain a change in SSI participation.

Second, we provide results from a "placebo" treatment simulation adapted for the multi-state, multi-year context, in which we randomly assign one of the years from a state's untreated pre-change period as the implementation year and estimate the model on only the pre-treatment data. Garthwaite et al. (2014) perform a similar exercise. We perform this random assignment of dates 1000 times and report the average coefficient for $CACov_{st}$ and standard error. If our design is valid, the value of this average coefficient should be zero. Third, we examine whether we find an effect in two populations who are unlikely to be affected by the expansions, individuals with very high personal income and those over age 65. The results of each of these analyses are supportive of our design and reported in the next section. We also implement a triple-difference specification using those over age 65 as a within-state comparison group.

Finally, we note that interstate migration in response to the coverage expansions could also be a form of policy endogeneity. Although generally unlikely to be a cause of serious bias (Gelbach, 2004), among the SSI-eligible population incentives to move may be significantly stronger. We examine the possibility in two ways. First, we investigate the probability of moving from one state to another as an outcome. We would expect our DD estimate to be zero if Medicaid expansions do not cause migration. Second, we limit the sample to only those who have not moved from one state to another in the last year. Results of these analyses are reported below.

[8] We note that the use of a simulated eligibility measure is common in analyses studying the effects of Medicaid eligibility, dating from Currie and Gruber (1996). In this study, however, the independent variable is a Medicaid policy, the state's introduction/elimination of coverage for childless adults, rather than an individual's eligibility for Medicaid. As such, there is no concern about the endogeneity of the independent variable and individual characteristics as there would be in an analysis that tries to link an individual's Medicaid eligibility to SSI participation. The variable takes on a value of 0 for all state-years that Medicaid coverage is not available to childless adults. For the years in which such coverage is available, we derived the state-specific value of SimElig by applying each state's income eligibility criteria for childless adult coverage to all 2001 ACS respondents who were working age, non-institutionalized adults without dependent children not resident in that particular state (the "leave-one-out" method of Ham and Shore-Sheppard (2005)).

[9] Weighted results are very similar to our main results and are available by request.

[10] It is unlikely states were expanding their Medicaid programs to purposefully decrease SSI enrollment. During this time period, from the state's perspective, they are no better off if a person enrolled in non-SSI Medicaid over SSI Medicaid as they would receive the same Federal Medical Assistance Percentage (FMAP). The only savings would be state supplementary SSI payments, but these are tiny relative to the new expenditures from new Medicaid enrollees who would never have been eligible for SSI. States could receive an enhanced FMAP for populations that counted as "newly eligible" under the ACA, but those FMAPs did not begin until 2014, and final rules regarding these were not announced until 2012. Although we are not able to directly answer why these particular states decided to expand their Medicaid programs to adults without dependent children in these particular years, existing research on the political economy of state Medicaid policy points to political ideology, racial differences in population, and the benefit levels of neighboring states as explanatory factors (Grogan, 1994; Baicker, 2001). Relative to the ACA Medicaid expansions, these early expansions appear to be much less influenced by political ideology.

Table 2
Difference-in-differences estimates of the effect of Medicaid coverage for childless adults on SSI Participation, 2001–2013.

Treatment variable	(1)	(2)	(3)
Childless adult coverage (*CACov*)	−0.00131**	−0.00137**	−0.00165***
	(0.000583)	(0.000553)	(0.000549)
Maximum income threshold (*Threshold*)	−0.000440	−0.000424	−0.000579*
	(0.000303)	(0.000284)	(0.000293)
Simulated Eligibility (*SimElig*)	−0.000372	−0.000358	−0.000493*
	(0.000269)	(0.000251)	(0.000263)
N (individuals)	9,804,358	9,438,226	9,438,226
N (states)	51	51	51
Individual characteristics			X
Lagged unemployment		X	X
Absolute change in unemployment		X	X
State fixed effects	X	X	X
Year fixed effects	X	X	X

Notes: Table reports the coefficients of interest and standard errors (in parentheses) from unweighted Ordinary Least Squares regression analyses of different versions of the model using American Community Survey data and the Medicaid Waiver Dataset. Each treatment variable (row) and specification (column) combination represents a separate regression. Standard errors clustered at state level.
*** Indicates statistical significance at 1% level.
** At 5% level.
* At 10% level.

4. Results

Table 2 shows strong evidence that when states introduce Medicaid for childless adults, SSI participation rates decrease. The table reports the results from several specifications of the difference-in-differences model in Eq. (1), including data from all 50 states and the District of Columbia. Each specification includes only one of the independent Medicaid policy variables as the variable of interest, and the table reports the estimated coefficient and standard error. Column (1) is a base model that includes only state and year fixed effects in addition to the policy variable of interest. Column (2) includes state unemployment variables in addition to state and year fixed effects. We focus on Column (3), which adds individual characteristics to the Column (2) model, as the main specification. Regardless of the particular policy variable, the results are overwhelmingly negative and statistically different from zero, supporting the hypothesis that separating Medicaid eligibility from SSI eligibility reduces the fraction of people who use SSI benefits.

For our main policy variable of interest, $CACov_{st}$, the simplest model, Column (1), indicates that going from no childless adult Medicaid program to having one causes a 0.13 percentage point decrease in SSI participation. Adding state unemployment variables results in a similar coefficient. Our preferred specification in Column (3), which incorporates individual characteristics in addition to the controls in Columns (1) and (2), shows that a childless adult Medicaid program results in a 0.17 percentage point decrease in SSI participation. Relative to a baseline of 2.42% in states that were never covered (Table 1), this is a 7% decrease.

The policy variable $Threshold_{st}$ is scaled so that the coefficient represents the change in SSI participation resulting from a 100-percentage point increase in the maximum FPL eligibility limit. The values of the variable range from 0 to 4 with an average of 1.6 in the change states. Results from our preferred specification in Column (3) show that increasing the income threshold in a childless adult Medicaid program, for example from 0 to 100% FPL, results in a 0.06 percentage point decline in SSI participation. This estimate is statistically significant at the 10% level. Relative to baseline SSI participation of 2.42, this is a 2.5% decrease.

The Simulated Eligibility measure, $SimElig_{st}$ is scaled so that the estimated coefficient represents the change in SSI participation resulting from a 10 percentage point increase in the fraction of childless adults eligible for Medicaid coverage. This measure ranges from 0 to 5.0 where 5.0 reflects a state in which 50% of the working age, non-institutionalized childless adult sample was eligible for Medicaid coverage. Results from our preferred specification in Column (3) indicate that a 10 percentage point increase in the proportion of childless adults eligible for Medicaid coverage, for example from 0 to 10% of the population, results in a 0.05 percentage point decline in SSI participation; this is a 2.1% decrease which is statistically significant at the 10% level. Although not directly comparable, this result is consistent with the result from the $Threshold_{st}$ variable. Specifically, roughly 10% of the non-institutionalized childless adult sample is at or below 100% FPL suggesting that we should observe similar effect sizes for a Medicaid policy change that increases the proportion of childless adults affected from 0 to 10%.

In Fig. 4 we present results that capture the influence of an enrollment cap or freeze on SSI participation. This analysis includes only the subset of our treatment states for which we had sufficient detail regarding the presence and magnitude of enrollment caps or closures: CO, CT, IN, IA, ME, MD, MI, UT, and WI. We would expect that when caps are present or relatively more binding, the effect of a Medicaid expansion for childless adults on SSI participation would be diminished because the cap reduces the likelihood of obtaining coverage outside of SSI participation. The enrollment caps effectively prevent people from substituting to the extent that they might want to, so to some extent the true behavioral response is that from an expansion with no cap, recognizing that the expansions still vary in generosity. We re-estimated our preferred specification including the independent variable for the presence of childless adult coverage (*CACov*), and a second independent variable that reflects the presence and magnitude of a cap (*Cap*) as described above. Using these regression estimates, we predicted the SSI participation rate for non-institutionalized childless adults under several scenarios ranging from no childless adult coverage to childless adult coverage with no enrollment cap or freeze. The intermediate possibilities range from a 10% to a 75% cap. For example, in a state with childless adult coverage and a 50% enrollment cap, 50% of the income-eligible population may enroll before the enrollment cap is met. The visual trend supports the idea of a dose-response relationship in which greater Medicaid availability leads to larger reductions in SSI participation. With no coverage available, approximately 2.84% of the childless adult population participates in the SSI program. As anticipated, that estimate declines when coverage is made available and enrollment caps become less restrictive: 2.68% of the childless adult population participates in SSI with a 10% cap in place; 2.53% of the childless adult participates in SSI with a 75% cap; and 2.47% participates in SSI with childless adult coverage and no cap present. The difference between the predicted participation rates under no coverage relative to 50% and 75% caps as well as no cap were statistically significant at the 5% level. There were no statistically significant differences between having no childless adult coverage and the presence of more restrictive caps.

Overall we find that the introduction of Medicaid coverage for childless adults results in an average reduction in SSI participation of 5.4%–7%

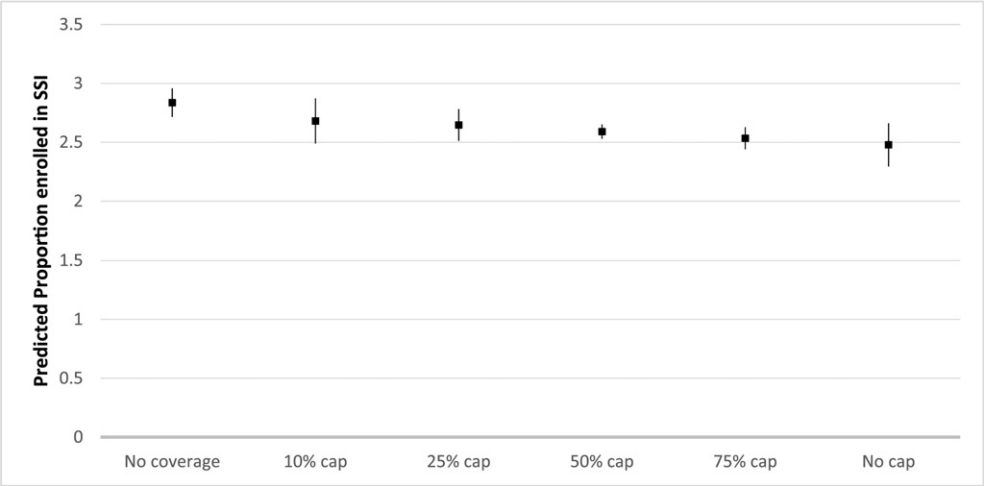


Fig. 4. Predicted proportion of childless adults enrolled in SSI according to the presence and magnitude of Medicaid enrollment caps or freezes. Point estimates and 95% confidence intervals. Notes: The predicted proportion of SSI enrollment is estimated from regression results that include individual characteristics, the absolute change in unemployment, lagged unemployment, state and year fixed effects. The sample includes the 9 states that changed Medicaid coverage between 2001 and 2013 for which detailed information was available regarding the presence and magnitude of the enrollment caps or freezes: CO, CT, IN, IA, ME, MD, MI, UT, and WI. The "no coverage" point estimate reflects the predicted proportion of childless adults enrolled in SSI when there is no Medicaid coverage specific to childless adults. The 10% cap estimate is the predicted proportion of childless adults enrolled in SSI when Medicaid coverage is available to 10% of the income eligible childless adults. The "no cap" point estimate represents the predicted proportion of childless adults enrolled in SSI when Medicaid coverage is available to 100% of the income eligible childless adults.

relative to no such coverage. These effect sizes are broadly consistent with available previous estimates for a working age population. Specifically, among counties with low rates of health insurance at baseline Maestas et al. (2014) observed decreases of 3.8%–6% in SSI application rates after the Massachusetts expansion of private and public health insurance.

4.1. Alternative sample definitions and subsample analyses

Table 3 focuses attention on only those 12 states that either implemented new childless adult programs or eliminated their programs. These states are the main source of identifying variation for the estimates, and so we would expect similar results as found in Table 2. The estimated coefficients are always negative and nearly identical to those in Table 3, with slightly smaller magnitudes for some estimates and slightly larger magnitudes for others. In no case are the differences between the Table 2 and Table 3 coefficients statistically different from one another. The results in Table 3 should also ameliorate concerns about our classification of states. If, for example, we wrongly classified states as never having coverage when in fact they had expanded childless adult coverage (as defined above) we would expect to observe larger effect sizes in Table 3 relative to Table 2. However, the Table 3 results show that our estimates are nearly identical to those presented in Table 2 when we restrict the analysis to states that we identified as having expansions that are likely to be true substitutes for the version of Medicaid an SSI recipient would receive.

We next explore how changes to our sample of individuals might affect the results obtained. First, we limit the analysis to the parts of the income distribution which are most likely to be affected by the policy: low income adults with family incomes below 400% FPL. We might expect the results to be even more pronounced if this group is the main population that responds to the policy. Table 4 shows the results of this analysis for regressions featuring each of the three independent policy variables in the main specification. We find in Column (1) that the magnitudes for subjects with income below 400% FPL are even larger in absolute value than for the estimates that include individuals of all

Table 3
Difference-in-differences estimates of the effect of Medicaid coverage for childless adults on SSI Participation among states that changed coverage status, 2001–2013.

Treatment Variable	(1)	(2)	(3)
Childless adult coverage (*CACov*)	−0.00129**	−0.00116**	−0.00147***
	(0.000478)	(0.000466)	(0.000406)
Maximum income threshold (*Threshold*)	−0.000519*	−0.000446*	−0.000598**
	(0.000287)	(0.000244)	(0.000232)
Simulated Eligibility (*SimElig*)	−0.000440	−0.000381	−0.000516**
	(0.000257)	(0.000217)	(0.000210)
N (individuals)	3,121,300	3,010,494	3,010,494
N (states)	12	12	12
Individual characteristics			X
Lagged unemployment		X	X
Absolute change in unemployment		X	X
State fixed effects	X	X	X
Year fixed effects	X	X	X

Notes: Table reports the coefficients of interest and standard errors (in parentheses) from unweighted Ordinary Least Squares regression analyses of different versions of the model using American Community Survey data and the Medicaid Waiver Dataset. Each treatment variable (row) and specification (column) combination represents a separate regression. Only states that changed (implemented or eliminated) their childless adult programs are included. Standard errors clustered at state level.

*** Indicates statistical significance at 1% level.

** At 5% level.

* At 10% level.

Table 4
Difference-in-differences estimates of the effect of Medicaid coverage for childless adults on SSI participation, 2001–2013: subsample analyses.

Treatment variable	By individual income		By health limitation		By marital status	
	(1) Income < 400% FPL	(2) High income	(3) No health limitation	(4) Health limitation	(5) Married	(6) Single
CA Coverage (*CACov*)	−0.00278***	−0.0000384	−0.00137***	−0.00605***	−0.000659**	−0.00218***
	(0.000985)	(0.000165)	(0.000342)	(0.00146)	(0.000298)	(0.000741)
Max Income Threshold (*Threshold*)	−0.00100*	0.0000566	−0.000440**	−0.00216***	−0.000236*	−0.000771*
	(0.000576)	(0.0000786)	(0.000200)	(0.000654)	(0.000132)	(0.000420)
Simulated Eligibility (*SimElig*)	−0.000826	0.0000512	−0.000459**	−0.00195***	−0.000207*	−0.000652*
	(0.000528)	(0.0000695)	(0.000173)	(0.000619)	(0.000114)	(0.000377)
N (individuals)	4,991,180	1,909,255	4,923,535	733,897	4,294,846	5,143,380
N (states)	51	51	51	51	51	51
Individual characteristics	X	X	X	X	X	X
Lagged unemployment	X	X	X	X	X	X
Absolute change in unemploy.	X	X	X	X	X	X
State fixed effects	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X

Notes: Table reports the coefficients of interest and standard errors (in parentheses) from Ordinary Least Squares regression analyses using American Community Survey data and the Medicaid Waiver Dataset. Each treatment variable (row) and specification (column) combination represents a separate regression. Standard errors clustered at state level.
*** Indicates statistical significance at 1% level.
** At 5% level.
* At 10% level.

income levels. For $CACov_{st}$, results remain statistically significant at the 1% level and suggest that in this subpopulation, implementing a childless adult Medicaid program results in a 0.3 percentage point decline in SSI participation. This effect is nearly twice as large as the result estimated for the full population. The results for $Threshold_{st}$ and $SimElig_{st}$ are also nearly twice as large as the full population results, although the $SimElig_{st}$ estimate is not statistically different from zero.

We next explore whether the effects of introducing a childless adult Medicaid program differ according to self-reported health limitations because only those who can claim a severe health problem should view Medicaid as a substitute for SSI. Although the ACS does not include measures of severe health problems, it does include six health-related measures that assess difficulty with an activity or functional domain: hearing, vision, cognition, ambulation, self-care, and independent living. We restrict this analysis to 2008–2013 because these measures are not comparable to the set of ACS health-related measures available in earlier years.[11] We estimate our preferred specification for adults with and without at least one limitation. Consistent with the idea that adults with health problems are relatively more likely to view Medicaid as a substitute for SSI than healthy adults, the reduction in SSI participation following the introduction of childless adult Medicaid coverage is larger among those who report a limitation compared to those who do not. Both estimates are statistically significant at the 1% level (Table 4, Columns (3) and (4)). An important caveat to these results, however, is that self-reported limitations may themselves be sensitive to Medicaid expansions as noted earlier. We tested for differential changes following the introduction of Medicaid coverage for childless adults in the mean characteristics of adults who report a limitation across treatment and comparison states and found no meaningful differences (Appendix Table B1). We then implemented our preferred models with "any limitation" rather than "any SSI income" as the outcome to investigate potential changes in the likelihood of reporting a limitation. Here too we found no evidence that this measure was sensitive to the new childless adult Medicaid programs in these years (Appendix Table B2). Nonetheless, it is plausible that the new Medicaid programs changed the characteristics of adults who report limitations in unobserved ways that are related to SSI participations, so we consider the findings related to health limitations in Table 4 to be suggestive.

We also look at whether results vary by marital status. We might expect the effect to be larger for adults who are single than those who are married, since those who are married are more likely to have access to employer-sponsored health insurance through their spouse and are less likely to need to rely on public insurance. Consistent with this idea, we find that implementing Medicaid coverage for childless adults reduces SSI participation by 0.07 percentage points among those who are married and by 0.22 percentage points among those who are single. Both estimates are statistically significant at the 5% level (Table 4, Columns (5) and (6)). Finally, we exclude subjects for whom the SSI income variable is imputed. The results are very similar in magnitude and statistical significance to our main findings (results not shown). Together, these results support our research design by suggesting that the populations we would expect to be driving the results indeed appear to be doing so.

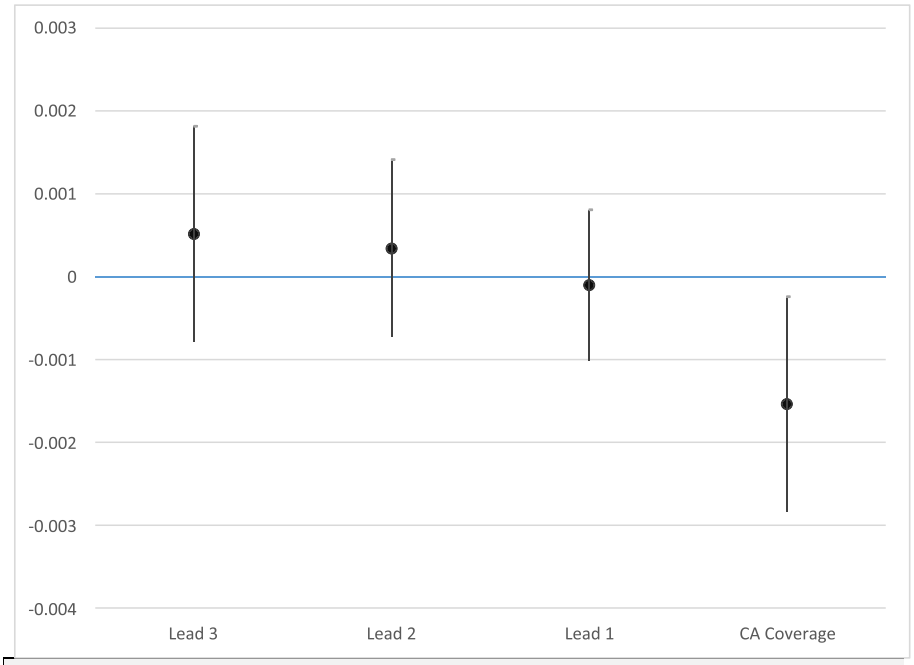
4.2. Design checks and placebo analyses

As discussed above, in response to the concern that unobserved trends in SSI participation at the state level are driving state decisions to expand Medicaid, we perform several checks on our design. Fig. 5 illustrates the results of a "Granger causality" test, which includes leads of the policy variable in the regression. The graph shows the point estimates and 95% confidence intervals resulting from a regression including three leads in addition to the $CACov_{st}$ variable and the table below showing the exact point estimates and standard errors. None of the leads are statistically different from zero, while $CACov_{st}$ has a nearly identical magnitude as we find in the main results. An F-test for joint significance of the leads indicates that in addition to lacking individual statistical significance, they are not jointly statistically different from zero either. This test suggests that pre-existing state trends are unlikely to be driving the results.

We did not find evidence of expansion-induced interstate migration. The DD coefficient on the relative change in probability of moving from one state to another failed to reject the null hypothesis of a zero effect, at 0.00115 with a standard error of 0.000782. Additionally, when we limit the sample to subjects who have not moved from one state to another in the last year, the resulting coefficient and standard error are nearly identical to our main results, −0.00169*** and 0.000560 respectively.

Fig. 6 shows the results of assigning placebo treatments to our states that changed coverage status. The figure is a histogram of 1000 placebo simulations of the estimated effect of childless adult coverage with a vertical line indicating the estimated coefficient from Table 2, Column (3) (−0.00165). As described above, each simulation assigns states that changed their coverage status a random false program implementation year prior to the actual change and estimates the main regression

[11] See Burkhauser et al., 2014 for a careful empirical assessment of the validity of these measures relative to alternative survey-based measures of disability.



	Lead 3	Lead 2	Lead 1	$CACov_{st}$
Coefficient	0.00051	0.00034	-0.00010	-0.00154**
Standard Error	(0.00065)	(0.00053)	(0.00045)	(0.00065)

Fig. 5. Point estimates and 95% confidence intervals, leads of childless adult coverage. Notes: Figure shows the point estimates and 95% confidence interval bars resulting from a regression analysis that adds three leads of the Childless Adult Coverage variable. The model is otherwise identical to the preferred specification and includes state and year fixed effects, state unemployment variables and individual characteristics. The table reports coefficients and standard errors from this regression, **indicates statistical significance at 5% level; *at 10% level.

on this subset of states that changed coverage status in years they did not actually have a program in place. The average resulting coefficient is 0.0001607 with an average standard error of 0.000608, very close to zero, and our main result is a clear outlier. This suggests that the new Medicaid programs are the factor driving the change in SSI participation.

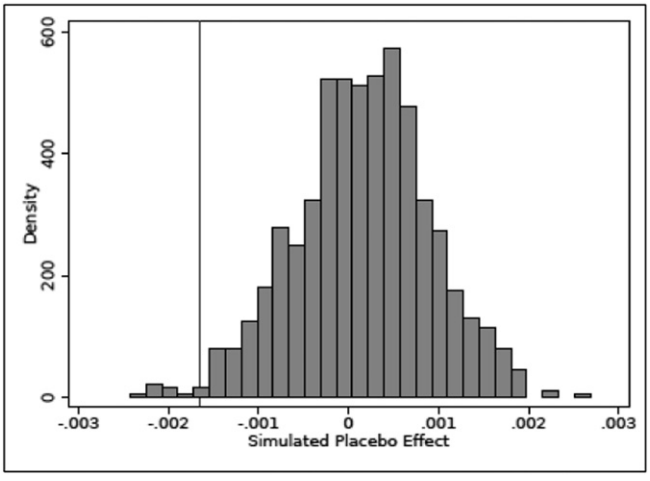


Fig. 6. Histogram of simulated placebo effects. Notes: Figure shows a histogram of 1000 placebo simulations of the estimated effect of childless adult coverage. The vertical line on the graph shows the actual coefficient from Table 2 (−0.00165). Each simulation assigns states that changed their coverage status a random false program implementation year prior to the actual change and estimates the main regression on this subset of states that changed coverage status in years they did not actually have a program in place. The average resulting coefficient is 0.0001607 with an average standard error of 0.000608.

We implement a placebo test in which the sample is restricted to high-income childless adults, a population for whom newly available Medicaid is unlikely to influence the SSI participation decision. We define high income as total personal income at or above the 80th percentile for the sample-year.[12] The resulting DD coefficient, shown in Column (2) of Table 4, is small and not statistically different from zero as anticipated.

We also study the elderly as a placebo unlikely to be influenced by new Medicaid coverage for non-elderly, childless adults. We first limit the sample to those 65–70, the vast majority of whom are able to obtain health insurance through Medicare and for whom Medicaid eligibility is also available if they are low-income. These results, shown in Table 5, Columns (1)–(3), show no effect of the Medicaid expansions for the elderly population, ages 65–70. We also perform a triple-difference analysis using the elderly as a within-state control group. Labor market forces are likely to operate differently on the elderly and non-elderly, so to make the two groups as comparable as possible we limit the sample to the near-elderly (55–64) and the elderly (65–70). We run our main specifications interacted with the near-elderly indicator and adding group-year, group-state, and state-year fixed effects, a major advantage of a triple-difference analysis. The results of this analysis, shown in Columns (4)–(6) of Table 5, are very similar to the main results, with a coefficient of −0.00198 which is statistically significant at the 5% level.

We also provide estimates in Appendix Table B3 that explore the sensitivity of our estimates to general and state-specific time trends. Estimates are not at all sensitive to the inclusion of a general quadratic time trend, as shown in Column (2). For state trends, the main concern

[12] We do not use FPL because it is capped and roughly 35% of observations are above the cap.

Table 5
Triple difference estimates of the effect of Medicaid coverage for childless adults on SSI Participation, 2001–2013.

Independent variable	Elderly only (placebo)			DDD estimate		
	(1)	(2)	(3)	(4)	(5)	(6)
CA Coverage (*CACov*)	0.000715	0.000278	−0.000517	−0.00205**	−0.00200**	−0.00198**
	(0.000670)	(0.000733)	(0.000913)	(0.000807)	(0.000896)	(0.000764)
N (individuals)	1,479,274	1,431,127	1,431,127	4,566,822	4,424,027	4,424,027
N (states)	51	51	51	51	51	51
Individual characteristics			X			X
Lagged unemployment		X	X		X	X
Absolute change in unemployment		X	X		X	X
State fixed effects	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X

Notes: Table reports the coefficients of interest and standard errors (in parentheses) from unweighted Ordinary Least Squares regression analyses of different versions of the model using American Community Survey data and the Medicaid Waiver Dataset. Each treatment variable (row) and specification (column) combination represents a separate regression. Standard errors clustered at state level.
** At 5% level.

is essentially the omission of time-varying unobservable characteristics that may influence SSI participation at the state level. Linear state time trends provide one particular parameterization of these characteristics. However, Wolfers (2006) points out that including state-specific time trends can attenuate the treatment effect if treatment operates on the trend in the dependent variable, which is plausible in our setting. Meer and West (2016) provide additional context. Evidence from column 3 suggests this may be the case, since the treatment effect is attenuated when state time trends are included. We take the approach suggested by Wolfers (2006) and specify a version of our DD estimator that addresses this concern. In particular, we specify treatment as a series of indicator variables for "expansion has been in effect for *t* periods". With treatment modeled in this way, the results are not sensitive to the inclusion of state time trends; the resulting coefficients in Column (5) are consistently negative, statistically significant, and similar in magnitude to the main result.

5. Conclusion

The Affordable Care Act authorized states to offer Medicaid coverage to adults with incomes at or below 138% of the FPL regardless of disability or parental status. Previously, childless adults had few paths to obtain Medicaid coverage unless they qualified for Supplemental Security Income (SSI) benefits because of a disability. In Medicaid expansion states, childless adults may obtain Medicaid coverage without undergoing an intensive federal disability review process and with relatively higher income and assets than the SSI program allows. The expanded availability of Medicaid for this population — independent of SSI participation — creates an opportunity to increase earnings and savings without jeopardizing health insurance coverage. To the extent that individuals act on this opportunity, we would expect SSI participation rates to decrease. Using historical state Medicaid expansions for childless adults, this study's results offer the first estimates of the effects of changes in public health insurance eligibility for adults without dependent children on SSI participation.

We show that the implementation of Medicaid coverage for childless adults results in an average annual reduction in SSI participation among working age childless adults of 5%–7%. Our results are remarkably consistent across model specifications and alternative measures of childless adult coverage. The results of multiple checks on our identification strategy, including a test for policy endogeneity and a placebo treatment test, strongly support the validity of our study design.

The delinking of Medicaid and SSI eligibility is reminiscent of the severing of Medicaid and the Aid to Families with Dependent Children program (AFDC) eligibility in the late 1980's and early 1990's as states raised Medicaid maximum income thresholds for children and pregnant women above AFDC criteria (Hakim et al., 2000). Concurrent changes during that period in AFDC eligibility, welfare benefit generosity, and the U.S. tax code have made it challenging to isolate the effect of the expanded Medicaid eligibility on participation in the AFDC cash assistance program. Early estimates reported a marked decrease in AFDC participation among single mothers (Yelowitz, 1995); however, this finding has not been demonstrated in subsequent research (Ham and Shore-Sheppard, 2005; Meyer and Rosenbaum, 2001). One interpretation that follows from these null findings is that an offer of Medicaid coverage – apart from AFDC eligibility – was an insufficient incentive to alter AFDC participation. That our results suggest a different response to a Medicaid expansion is not altogether surprising as SSI beneficiaries and applicants have significant health impairments that may increase the value that they place on health insurance coverage relative to cash benefits.

A few caveats to our study should be considered. Our definition of Medicaid coverage for childless adults excludes programs that offer only premium assistance or very limited benefits in order to evaluate the effect of providing coverage that is equivalent to the Medicaid benefits available to SSI beneficiaries. However, some programs in state-years that we designate as having childless adult coverage are not exact substitutes – most obviously those that imposed enrollment caps. Likewise, in the state-years that we identify as having "no childless adult coverage" some potential or current SSI beneficiaries may have used limited public health benefits that we do not recognize in our classification as childless adult coverage. Both types of measurement error are likely to bias our results toward the null.

A decrease of 5%–7% in SSI participation among non-institutionalized adults without dependent children may seem like a small change. However, using the proverbial back of the envelope we estimate that a reduction of this size translates into a reduction in beneficiaries of 31,600 to 44,280 and a decrease of $6.6 to $9.3 million in federal SSI payments for each enrollment month within the 12 affected states.[13] While these dollar amounts may be imprecise, this stylized estimate conveys the magnitude of the program-level effects following the new Medicaid coverage for childless adults in the study states on SSI participation. Additionally, we may expect gains in efficiency to the extent that the higher income and asset thresholds for Medicaid expansions (relative to SSI) reduce labor supply distortions. This study's findings signal the importance of evaluating the cross-program effects of the ACA expansions to capture the full implications of increased Medicaid availability on public welfare spending and labor force participation among low-income adults.

The current study results are likely a lower bound estimate of the effects of the ACA Medicaid expansions on SSI participation among

[13] To arrive at this estimate, we multiplied a range of potential reductions in SSI participation, from 5% to 7%, to the total monthly federal payments for childless adult SSI beneficiaries in the 12 states that changed Medicaid coverage between 2001 and 2013. We estimated the number of childless adults who participated in the SSI program within the 12 change states from the ACS in our baseline year (2001). We assumed that each beneficiary received 1/3 of the maximum monthly SSI federal cash benefit in 2008, mid-way through the study period, because we surmised that the individuals most likely to forego or exit SSI for Medicaid coverage are likely to have relatively low cash benefits due to earnings capacity.

childless adults for several reasons. States are required to provide a comprehensive set of "essential health benefits" to individuals eligibile for Medicaid through the ACA expansions (U.S. DHHS, 2012). Among early Medicaid expansions, the generosity of benefits varied by state (Silow-Carrol et al., 2000; Holohan and Pohl, 2002; Dorn et al., 2004). It is probable that the ACA related benefits are more generous than those offered under early expansions in at least some states. Early expansion states frequently used enrollment caps and freezes to manage the size and expense of their programs (Dorn et al., 2004; Klein and Schwartz, 2008). These mechanisms limited access to coverage as evidenced by large and persistent waitlists (Klein and Schwartz, 2008; Burns et al., 2014). By constrast, ACA expansions may not impose enrollment caps or freezes. Finally, state Medicaid programs may not consider assets or resources in their determination of individual eligibility for the ACA-related expansions in contrast to the early expansions (U.S. DHHS, 2014). This attribute of the ACA Medicaid expansions may be particularly salient for individuals considering SSI participation because the SSI asset limit is not inflation adjusted and has been fixed at $2000 since the program's implementation in 1974. Together these differences in benefit generosity, coverage accessibility, and eligibility criteria suggest that Medicaid coverage for childless adults through ACA expansions may be of even higher value to a potential beneficiary relative to the early expansion Medicaid coverage.

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Appendix A. Medicaid Waiver Dataset

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.jpubeco.2017.03.004.

Appendix B. Appendices

	Pre-Expansion Year T_0						Post-Expansion Year T_1					
							Month that ACS is administered					
Subject ID	JA/FE	MR/AP	MY/JU	JL/AU	SE/OC	NV/DE	JA/FE	MR/AP	MY/JU	JL/AU	SE/OC	NV/DE
A							X					
B								X				
C									X			
D										X		
E											X	

Fig. B1. Months included in look back period for SSI income measure according to month of ACS administration.

Table B1
Difference-in-differences estimates of the impact of Medicaid coverage for childless adults on mean individual characteristics among childless adults who report a health limitation, 2008–2013.

Dependent variable	(1) Baseline mean (se), 2008	(2) DD coefficient (se)
Male	0.5165 (0.0022)	−0.00715* (0.00426)
Non-white	0.1997 (0.0149)	−0.00106 (0.00743)
Age	50.27 (0.12)	0.014044 (0.09292)
English	0.9740 (0.0056)	0.000821 (0.00148)
Married	0.4206 (0.0080)	0.000577 (0.00692)
Education	0.7778 (0.0077)	−0.000928 (0.00401)
Born in USA	0.9385 (0.0104)	0.0000448 (0.00141)
N		733,897

Notes: Column 1 reports the average value of select characteristics for non-elderly childless adults who report a health limitation in the comparison states in 2008, the baseline year for this analysis. Column 2 reports the coefficients of interest and standard errors (in parentheses) from unweighted Ordinary Least Squares regression analyses using American Community Survey data and the Medicaid Waiver Dataset. In addition to the CaCov treatment variable, each model includes state and year fixed effects. Standard errors clustered at state level. * at 10% level.

Table B2
Difference-in-differences estimates of the impact of Medicaid coverage for childless adults on the probability of reporting a health limitation, 2008–2013.

Dependent variable	(1) Baseline mean (se), 2008	(2) DD coefficient (se)
Any health limitation	0.1313 (0.0049)	−0.000901 (0.00134)
N		5,657,432

Notes: Column 1 reports the average value of select characteristics for non-elderly childless adults in the comparison states in 2008, the baseline year for this analysis. Column 2 reports the coefficients of interest and standard errors (in parentheses) from unweighted Ordinary Least Squares regression analyses using American Community Survey data and the Medicaid Waiver Dataset. In addition to the CaCov treatment variable, each model includes individual characteristics, lagged unemployment, the absolute change in unemployment, state and year fixed effects. Standard errors clustered at state level. ***Indicates statistical significance at 1% level; **at 5% level; *at 10% level.

Table B3
Time trend sensitivity analysis.

Treatment variable	(1)	(2)	(3)	(4)	(5)
Childless adult coverage (*CACov*)	−0.00165***	−0.00165***	−0.000290	−0.00184***	
	(0.000549)	(0.000549)	(0.000684)	(0.000416)	
In effect 1 year					−0.000798
					(0.000649)
In effect 2 years					−0.00198**
					(0.000755)
In effect 3 years					−0.00235**
					(0.00110)
In effect 4 years					−0.00329***
					(0.00117)
In effect 5 years					−0.00374***
					(0.00137)
In effect 6 years					−0.00516***
					(0.00159)
In effect 7 years					−0.00573***
					(0.00191)
In effect 8 years					−0.00647***
					(0.00239)
In effect 9 years					−0.00732**
					(0.00275)
In effect 10 years					−0.00823**
					(0.00315)
In effect 11 years					−0.0103***
					(0.00372)
In effect 12 years					−0.0106**
					(0.00407)
In effect 13 years					−0.0106**
					(0.00453)
N (individuals)	9,438,226	9,438,226	9,438,226	9,804,358	9,438,226
N (states)	51	51	51	51	51
Individual characteristics	X	X	X	X	X
Lagged unemployment	X	X	X		X
Absolute change in unemploy.	X	X	X		X
State fixed effects	X	X	X	X	X
Year fixed effects	X	X	X		X
Quadratic time trend		X	X	X	X
State linear time trend			X	X	X

Notes: Columns 1–4 report the coefficient on CACov and standard error (in parentheses) from unweighted Ordinary Least Squares regression analyses of different versions of the model using American Community Survey data and the Medicaid Waiver Dataset. Column 5 reports the results of a specification modeling treatment as indicators for the number of years the expansion has been in place. Standard errors clustered at state level. ***Indicates statistical significance at 1% level; ** at 5% level.

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