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# Contemporaneous and long-term effects of children's public health insurance expansions on Supplemental Security Income participation

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ABSTRACT

This study explores the interplay between two important public programs for vulnerable children: Medicaid and the Supplemental Security Income (SSI) program. Children's public health insurance eligibility increased dramatically during the late 1990s with the launch of the Children's Health Insurance Program along with concurrent Medicaid expansions. We use a measure of simulated eligibility as an exogenous source of variation in Medicaid generosity to identify the effects of the eligibility expansions on SSI outcomes. Though increases in eligibility for public health insurance did not affect contemporaneous youth SSI applications or awards on average, expansions in coverage significantly decreased both applications and awards in states where SSI recipients did not automatically receive Medicaid. We attribute the difference in findings to the higher transactions costs associated with entering Medicaid via SSI in such states. In the long-term, increased public insurance eligibility during childhood reduces young adult SSI applications to some extent, consistent with recent findings that Medicaid coverage in youth improves adult health and economic outcomes.


## 1. Introduction

There is broad interest in the interaction between social programs, specifically how changes in eligibility for one safety net program affect participation in others. The relationship between public health insurance coverage and participation in other programs is particularly relevant given continuing debates about the optimal level of coverage for both adults and children. Illustratively, implementing adult-focused Medicaid expansions through the Affordable Care Act (ACA) remains contentious across a number of states; among children, the relatively precarious nature of Children's Health Insurance Program (CHIP) funding—which includes budget caps and the need for ongoing congressional renewal—leaves many potentially vulnerable to losing eligibility.

Expansions in public health insurance eligibility can lead to substitution away from disability benefits programs. The Supplemental Security Income (SSI) program provides cash benefits to low-income households where a person, either an adult or a child, has a disability, and nearly always confers Medicaid coverage to the recipient. Therefore, alternative options for coverage could reduce participation in SSI if obtaining Medicaid coverage was an important factor in seeking benefits. Previous studies of the relationship between health insurance and disability benefit program participation have found evidence of substitution, though these studies focused on adults (Burns and Dague, 2017; Maestas et al., 2014; Yelowitz, 2000).

Changes in health insurance coverage, particularly during childhood, could also have longer-term impacts on adult program participation. Health insurance coverage acquired during childhood can improve health and economic well-being (Miller and Wherry, 2018; Brown et al., 2018), which in turn could reduce long-term participation in benefits programs. An extensive literature studies longer-term impacts of other attempts to alleviate poverty in childhood (e.g., Chetty et al., 2016; Hoynes et al., 2016). The economic factors driving contemporaneous and longer-term effects differ; contemporaneous participation is driven by whether the programs are substitutes or complements, whereas contemporaneous and medium-term changes in the underlying human capital factors—such as health, education, and understanding of the social safety net landscape—that contribute to disability program participation could drive longer-term participation.

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In this paper, we study the effect of expansions in public health insurance eligibility on children's contemporaneous SSI participation, and the long-run effects of greater eligibility during childhood on SSI participation as a young adult. Public health insurance eligibility increased in the late 1990s and early 2000s, both from the creation of CHIP, which was designed to help close coverage gaps for children from low-income families who cannot afford private coverage but whose household incomes are too high to qualify for Medicaid, and concurrent expansions in Medicaid. Hereafter, we refer to public health insurance, which includes both Medicaid and CHIP, and Medicaid interchangeably. Using counts of applications and awards to SSI from Social Security Administration (SSA) administrative data, we found evidence of substitution between public health insurance and SSI in states where there were additional criteria for SSI recipients to receive Medicaid; increases in eligibility reduced contemporaneous applications and awards. Families on the margin of submitting an application that became newly eligible for coverage might find the value of an SSI award lower because Medicaid enrollment is now available by other means. The decrease in the value of an SSI award could persuade some families not to apply. We also found some evidence that increased Medicaid eligibility during childhood reduced applications for SSI as young adults.

To isolate the plausibly causal effect of Medicaid and CHIP eligibility on SSI outcomes, we used the simulated eligibility approach first introduced by Currie and Gruber (1996a,b). Several recent, related studies have also followed their approach (for example, Brown et al., 2018; Miller and Wherry, 2018). This approach exploits variation in the generosity of coverage expansions that occurred in all states by taking advantage of the variation in the timing and extent of the expansions across states and across age groups within states.

On average, we found no evidence of a meaningful impact of the CHIP-era insurance expansions on contemporaneous SSI applications and awards among children. However, in the 18 states with additional criteria to receive Medicaid after an SSI award, increases in public insurance eligibility led to a large, statistically significant reduction in child SSI applications; a 10 percent increase in simulated eligibility was associated with a 5 percent decrease in SSI applications. In the remaining 33 states where an SSI recipient automatically receives Medicaid, there was no effect. We attribute the larger impact in the states with additional criteria to the fact that the expansion led to a larger reduction in the transaction costs of entering Medicaid in these states relative to others. Before the expansion, the primary transaction cost in states with additional criteria was having to file a separate application for Medicaid. Further, in some of these states the income criteria were more stringent to qualify, meaning that in some states SSI recipients might not qualify for Medicaid. Transaction costs therefore fell more in states with additional criteria, indicating that the availability of an alternative route to public insurance coverage might be particularly appealing to potential SSI applicants. Our results rule out a welcome mat effect—that is, that expanded access to public insurance increased children's participation in SSI.

As a check on the causality of these estimates, we verified that changes in Medicaid eligibility at income levels above the SSI income threshold had no detectable effect on SSI applications or awards. Similarly, we found no association between simulated eligibility and SSI applications among the elderly (ages 65 and older), for whom the CHIP-era expansions providing health insurance to children should have had no effect. The primary results were also consistent across a series of robustness tests assessing sensitivity of the regression specification.

In the long-term, increased public insurance eligibility during childhood appeared to reduce adult SSI applications to some extent. We found that one more year of eligibility during childhood reduced SSI applications by about 3 percent for those ages 20 to 28, though our estimates were sensitive to the model specification. The relative reduction in awards was of a similar magnitude, though statistically insignificant. These findings are consistent with recent findings from Miller and Wherry (2018) that increased Medicaid eligibility improved long-term health and education.

Our paper makes four key contributions. First, though several papers found that increased public health insurance coverage reduced adult participation in disability benefits programs, no studies have assessed the relationship specifically for children. Differential take-up rates of Medicaid expansions for children and parents (Sommers et al., 2012), and parental involvement in the decision-making process, could lead effects to differ for children. Second, because we have access to administrative data, we can measure impacts on applications and awards rather than just total participation. Any behavioral changes should be seen through changes in applications, which is the only prospective participation outcome individuals can directly control (as opposed to the application being accepted). Changes in applications are a key driver of overall participation, which numerous factors can affect. Third, to the best of our knowledge, no other papers have assessed the role of state policies regarding the interconnectedness of SSI and Medicaid. We found that SSI and public health insurance were substitutes, but only in states with no direct link between SSI and Medicaid. Finally, we tracked both the contemporaneous and longer-term patterns, distinguishing between the different forces that might drive the relationship between health insurance and program participation in the short and long run.

## 2. Institutional background and related literature

### 2.1. SSI

The SSI program serves as an important safety net program for poor families who have children with disabilities. In 2015, it provided benefits to about 1.3 million children (Social Security Administration, 2015). SSI benefits provide a cash payment to help low-income parents care for their qualifying children with disabilities. To be eligible for benefits, children must meet SSA's definition of disability and come from families with sufficiently low income and resources. The definition of disability means that a child must have a serious mental or physical impairment that has lasted or is expected to last a year or longer, or result in death.

Applying for SSI involves submitting paperwork and taking part in an interview at a local field office. This interview includes providing the local claims representative with information about every doctor, therapist, hospital, and clinic visited; medications; and names of schools attended along with teachers, psychologists, and therapists who have worked with the individual. Families must also provide information on income and resources in the form of pay stubs and bank account statements. The considerable effort required to submit an application might deter some families from applying (Deshpande and Li, 2018). After collecting all of this information, the field office forwards the case to the state's Disability Determination Service (DDS). The DDS first determines if an individual meets the income test and then conducts a medical review to assess eligibility for benefits. It sends its decision to SSA, which may review the decision and either award or deny benefits. Applicants often appeal denials, and a substantial share of appeals result in awards—usually after many months, or even years.

The maximum monthly SSI payment in 2018 was $750. Generally, for every $2 increase in income, the SSI payment is reduced by $1. For children, who do not have their own income, parental income is deemed onto children, with a proportion of the parents' income considered in determining the benefit payment. There is not a defined income threshold for benefit payments; rather, a person is considered to be ineligible if the monthly payment he or she would receive is $0. The rules for benefit offsets depend on the size of the household, the number of eligible children, and both earned and unearned income. Appendix A Table A1 shows the maximum income threshold to qualify for SSI as a function of the number of parents and children in the household. Assuming no unearned income, the threshold ranges from 177–235 percent of the FPL for most families. Assuming no earned income, the threshold to qualify for SSI is lower.

SSI eligibility almost always confers Medicaid eligibility to the recipient. Medicaid coverage can be particularly valuable for children with disabilities, because it covers a broad range of medical and supportive services at zero or minimal cost-sharing to families. In 32 states and the District of Columbia, child SSI recipients automatically receive Medicaid. In the remaining 18 states, SSI recipients must meet additional criteria to receive Medicaid benefits. For 7 states[1], the only additional criterion is filing a separate application that will be accepted with certainty. The remaining 11 states[2] have at least one additional eligibility criterion for recipients to also receive Medicaid benefits, such as less generous income thresholds for Medicaid; small shares of SSI recipients in these states are not eligible for Medicaid.

Child SSI applications and awards increased dramatically in the early 1990's due to the Supreme Court's *Sullivan v. Zebley* decision (493 U.S. 521), which eased disability criteria for children, particularly those with mental disorders, to qualify for SSI benefits (Levere, 2017). In response to this increase, Congress tightened children's eligibility criteria as part of the Personal Responsibility and Work Opportunity Reconciliation Act of 1996. That legislation was followed by a decrease in child SSI enrollment (Deshpande, 2016). Since 1997, no significant legislative changes have affected children's eligibility for SSI benefits, though the number of recipients has increased consistently over time. For a detailed overview on the consequences and determinants of children's SSI participation, see Duggan and Kearney (2007) and Duggan et al. (2016).

### 2.2. Medicaid and CHIP

Medicaid is a critically important support for low-income children with special health care needs, including but not limited to those receiving SSI. Federal law requires that all state Medicaid programs cover a comprehensive set of services under the Early and Periodic Screening, Diagnostic, and Treatment benefit. Included in this definition are home-based long-term care services—which private insurance policies typically do not cover—for children whose medical needs might otherwise necessitate institutionalization. In contrast to private insurance, state Medicaid programs typically require either zero or very minimal out-of-pocket expenditures by beneficiary families. This combination of generous service coverage and low out-of-pocket costs offered by both Medicaid and CHIP constitutes a valuable benefit for medically vulnerable children in low-income families, including those covered by SSI.

Historically, Medicaid was targeted to certain categories of very low-income individuals, with eligibility typically tied to receipt of cash welfare benefits. Beginning in the mid-1980s, Congress instituted a number of incremental changes to the Medicaid program, effectively expanding Medicaid eligibility to low-income pregnant women and children not tied to the welfare system, with considerable state flexibility in the timing and size of the expansions. Overall, the Medicaid expansions of the late 1980s and early 1990s substantially boosted the eligibility threshold for children.

The creation of CHIP in 1997 as Title XXI of the Social Security Act further increased public health insurance coverage for children. Enacted when the numbers of uninsured low-income children had been rising, the program sought to help close coverage gaps for low-income children whose families could not afford private coverage but whose incomes were too high to qualify for Medicaid. The roll-out of CHIP in the late 1990s through the early 2000s, along with concurrent Medicaid expansions to children ages 15–18 as a result of states' phasing in Medicaid eligibility to all children in poverty, led to a dramatic increase in public insurance eligibility for children (Leininger and Levy, 2015). Illustratively, before the expansions, only three states had set Medicaid eligibility levels at or exceeding 200 percent of the FPL for all children up through age 18; when CHIP was fully implemented, children in families with incomes up to 200 percent of the FPL were eligible for public insurance in nearly every state (Cohen-Ross et al., 2009).

Along with expanded eligibility to a new group of poor and near-poor families, a hallmark of the CHIP-era expansions was the easing of the administrative burden associated with Medicaid and CHIP applications for children. Many states eliminated or reduced complicated income disregards and reporting requirements, shortened their applications, and increased the time between recertification intervals for public coverage, making it easier for those eligible to take up coverage (Lewit, 2014).

A robust literature has emerged documenting the positive impacts of the expansions on children's coverage, access to care, and health outcomes (for example, LoSasso and Buchmueller, 2004; Currie et al., 2008). Less is known, however, about potential spillovers of the CHIP-era expansions on enrollment into other safety net programs serving similar populations. The overarching objective of our research is to help address this research gap.

### 2.3. Interaction between Medicaid and SSI

Public insurance expansions can, in theory, be expected to reduce SSI applications if health insurance is a particularly important component of an SSI award. For those who might have been eligible for SSI, Medicaid expansions reduced the relative value of an SSI award. A reduced value of a new award would likely lead people on the margin to no longer apply for benefits.

Substitution between the two programs should occur primarily where those eligible for Medicaid have sufficiently low income to potentially qualify for SSI.[3] SSI primarily serves poor and near-poor families. Excluding the income from SSI payments, about 58 percent of child recipients live in households with incomes under 100 percent of the FPL, and another 19 percent live in households with incomes from 100–150 percent of the FPL (Bailey and Hemmeter, 2015). Fig. 1 shows that the percentage of children estimated to be income-eligible for Medicaid increased substantially after 1997, particularly from 1997–2002. By 2002, nearly half of all children were estimated to be income-eligible for Medicaid. About 43 percent of all children (or nearly 90 percent of those eligible for Medicaid) were also estimated to be income-eligible for SSI. Only about 6 percent of children were income-eligible for Medicaid but not SSI.

[1] Alaska, Idaho, Kansas, Nebraska, Nevada, Oregon, and Utah.

[2] Connecticut, Hawaii, Illinois, Indiana, Minnesota, Missouri, New Hampshire, North Dakota, Ohio, Oklahoma, and Virginia. Indiana and Ohio no longer have additional criteria, though did for the studied time period.

[3] However, changes in Medicaid eligibility could also induce changes in labor supply, in which case those with incomes that are too high to qualify for SSI may no longer participate. For example, without the expansion of Medicaid, a parent with relatively higher income might have exited the labor force to both take care of their child with a disability and reduce income sufficiently to get health insurance and benefits through SSI. With the Medicaid expansion, the parent could continue working and the family may no longer apply for SSI, thus reducing participation where the household is not income-eligible for SSI.

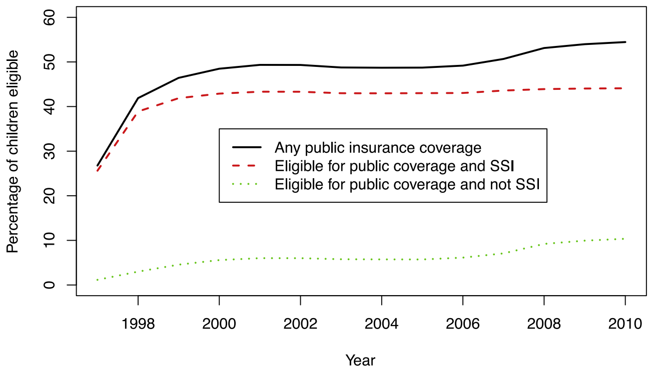


**Fig. 1.** Share of children ages 1–16 income-eligible for Medicaid and SSI.
Source: Authors' calculations using the March Annual Social and Economic Supplement to the Current Population Survey, Medicaid and CHIP eligibility thresholds, and SSI income deeming rules. These calculations assume households only have earned income.

Alternatively, increases in public insurance eligibility may have increased children's participation in SSI. The expansions likely brought some families into the social service safety net for the first time, potentially increasing awareness of social programs more broadly, including SSI. Moreover, as posited in a federal report (Government Accountability Office, 2012), greater access to medical care facilitated by newly available Medicaid coverage might have led to more opportunities to receive qualifying—and documented—diagnoses, which could particularly increase SSI participation in the longer term.

Previous studies have found evidence of substitution between alternative forms of health insurance coverage and SSI participation among adults, though these have typically focused on total beneficiaries rather than the number of applicants or awardees. Papers studying the effects of Medicaid expansions for childless adults in the early 2000s (Burns and Dague, 2017), the Massachusetts health insurance expansions (Maestas et al., 2014), and implementation of the Qualified Medicare Beneficiary program (Yelowitz, 2000) all found that increasing alternative forms of health insurance coverage reduced adult SSI participation. A notable exception is studies of Medicaid expansions stemming from the ACA, for which evidence of substitution is more mixed (Anand et al., 2019; Chatterji and Li, 2017; Gouskova, 2016; Soni et al., 2017).[4] Though many studies use the states that expanded Medicaid from the ACA as an exogenous increase in Medicaid coverage, we consider them to be an exception because similar methodologies result in substantially different findings. Part of the inconsistency in results may be related to the extent to which the studies can adequately control for endogeneity in the states that selected to adopt the Medicaid expansions.

Despite anecdotal reports that some low-income individuals with disabilities apply for federal disability benefits solely because of the accompanying Medicaid coverage (Joffe-Walt, 2013), little empirical research demonstrates how the dramatic increase in eligibility for public insurance coverage over the past 25 years has affected SSI applications and awards among children. The relationship between Medicaid and SSI may differ for children and adults for several reasons. First, Medicaid take-up rates tend to be higher for children than adults (Sommers et al., 2012). If eligible children are more likely to enroll in Medicaid coverage, substitution may be more pronounced for youth than adults. Low take-up rates mean few people actually acquire coverage through Medicaid, meaning that gaining coverage through participation in disability benefits could still be particularly appealing. Second, children's participation in both Medicaid and SSI is ultimately a decision of the parents. Parents may place different values on their own and their child's need for health insurance.

The expansions of the Medicaid program to children during the 1980s and 1990s could also have had meaningful long-run impacts on SSI participation. First, changes in contemporaneous SSI participation stemming from substituting from SSI to Medicaid could also reduce young adult SSI participation to the extent that those receiving benefits would continue to do so into adulthood. Second, even in the absence of contemporaneous enrollment impacts, human capital improvements resulting from health insurance exposure in childhood might reduce the likelihood of SSI receipt throughout the life course. A promising new literature documents that the health benefits associated with eligibility for public health insurance in early childhood emerge over time, yielding large health benefits throughout adolescence and young adulthood (Boudreaux et al., 2016; Goodman-Bacon, 2017; Miller and Wherry, 2018; Wherry and Meyer, 2016). On the other hand, additional interactions with the health care system due to Medicaid coverage could increase the likelihood that doctors diagnose conditions and recommend applying for SSI benefits, leading longer-term SSI participation to increase.

The only existing analysis of the impact of expansions of public coverage in childhood on participation in disability programs during adulthood is by Goodman-Bacon (2017), who estimated the long run impact of the introduction of the Medicaid program in 1966–1970 on health, labor market outcomes, and program participation. He found that Medicaid improved adult health outcomes, including improvements in functional capacity, and reduced disability benefit receipt during adulthood. Whereas Goodman-Bacon (2017) studied the initial introduction of Medicaid, we study the impact of expansions in children's Medicaid given that the program already existed. The children affected by these later public insurance expansions are from households with higher socioeconomic status. Expansions to different populations may be expected to have different impacts. We also study flows into benefit receipt using applications and awards rather than the stock of recipients.

## 3. Data

We drew data for this study from three main sources. First, we used SSA's Supplemental Security Record, which captures the complete application and award history for any person applying to SSI since 1974. Individual level data are restricted, so to conduct the analysis we aggregated data to age, state, and year cells to avoid disclosure risks. We obtained annual frequency counts of SSI applications and awards by age, state, and year covering the period 1997[5] through 2015. For awards, we define the age group as of the date of application, rather than the date of award, because the date of award depends on the length of the application process. Our analysis of awards therefore measures whether the relevant induced (or not-filed) applications are awarded. Our contemporaneous analysis covers the years 1997 through 2010 because simulated eligibility is only calculated through 2010 (see next paragraph). The long-term analysis includes data through 2015.

Second, we used Medicaid and CHIP eligibility income thresholds (as a share of FPL) for a given age-state-year combination from 1980 through 2010. Brown et al. (2018) put together these

[4] Baicker et al. (2014) also finds no effects using the Oregon Health Insurance Experiments. However, participants were screened for categorical Medicaid eligibility, which may mean few people with disabilities were included.

[5] We start with data in 1997 as this is the year that CHIP was created. In addition, SSI applications data before 1997 could still be affected by the post-*Zebley* easing of child SSI standards, as standards did not change until the Personal Responsibility and Work Opportunity Reconciliation Act of 1996.

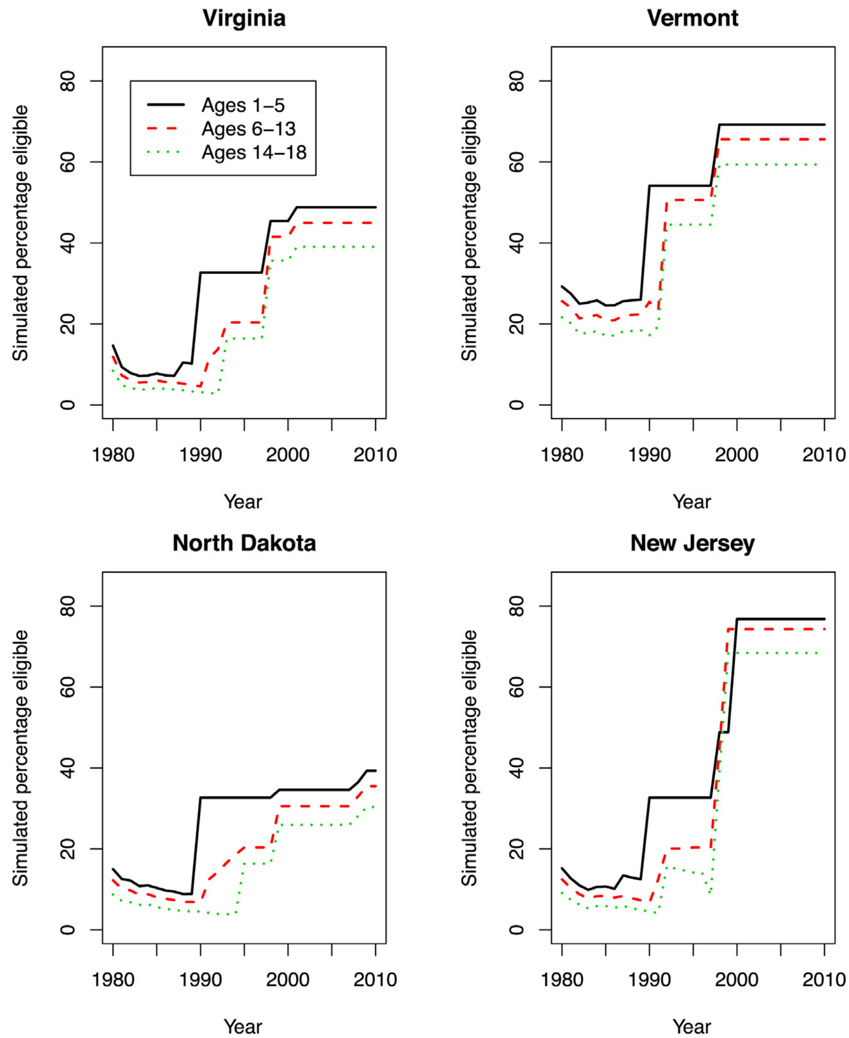


**Fig. 2.** Estimated yearly eligibility for Medicaid, by age group.
Note: Simulates the percentage of the 1996 national CPS sample that would be eligible for Medicaid coverage by age in each state and year.
Sources: Authors' calculations using CPS data. FPL thresholds come from Brown et al. (2018).

income thresholds at the age-state-year level in their analysis of the impacts of total childhood Medicaid exposure on adult labor market earnings and Earned Income Tax Credit payments. These data are publicly available through 2006 from one of the authors, and we updated the thresholds through 2010 using reports from the Kaiser Family Foundation (Ross et al., 2007, 2008, 2009; Ross and Marks, 2009). In constructing the thresholds starting in 2006, we first replicated the Brown et al. thresholds for 2005 and 2006 using similar reports to ensure our procedure was consistent (Ross and Cox, 2004, 2005).

Third, we used data from the March supplement of the Current Population Survey (CPS) for two primary purposes. First, we calculated simulated eligibility for Medicaid between 1980 and 2010 using the income thresholds, consistent with the methods developed by Cutler and Gruber (1996) and Currie and Gruber (1996a,b). Simulated Medicaid eligibility measures the percentage of children who would be eligible for Medicaid based on the income thresholds for a given age-state-year eligibility regime. Second, we used CPS data to construct various control variables that we incorporated into our regressions, such as the percentage of youth who are black for a given age-year-state.

To calculate simulated eligibility, we used the complete population of children in the 1996 March CPS along with their level of household income, and took the following steps. For the full national sample of children who are less than 1 year old, we calculated the percentage who were eligible for Medicaid in each state in 1980 given the income threshold for children who are less than 1 year old. We then repeat the analysis for cohorts of children who are 1 year old, 2 years old, and so on until 18 years old. Next, using the same full national sample of children in the 1996 March CPS who are less than 1 year old, we calculate the percentage eligible for Medicaid in each state in 1981, and repeat this for all children ages 1 through 18 in 1981. We then repeat this process for the years 1982 through 2010. By using a national sample, we isolate variation in state legislative policies, avoiding any potentially endogenous population composition differences that might bias associations between observed eligibility and SSI receipt. By using a constant base year, we avoid confounding changes in eligibility due to rules changes with changes due to the strength of the economy. As discussed below, the choice of base year does not affect our results. Fig. 2 demonstrates how simulated eligibility varies over time by age group across four example states.

Using these data, we also calculated the cumulative eligibility from ages 0–18 for cohorts born in 1980–1992 for all states by summing the simulated eligibility for the corresponding cohort over their childhood. For example, the cumulative eligibility for the 1980 birth cohort sums the estimated percentages of children eligible for Medicaid in the state who are 0 years old in 1980, 1 year old in 1981,

**Table 1**
Summary statistics for children ages 1–16 from 1997–2010.

| Outcome (percentage points) | All states | Automatic qualification states | Additional criteria states |
|---|---|---|---|
| SSI applications | 0.53 | 0.61 | 0.38 |
| SSI awards | 0.20 | 0.23 | 0.15 |
| Simulated share eligible for Medicaid | 46.71 | 47.00 | 46.19 |
| Children in poverty | 17.98 | 19.42 | 15.33 |
| Children in single-parent households | 27.29 | 28.76 | 24.58 |
| Male | 51.13 | 51.11 | 51.16 |
| Black | 13.99 | 17.18 | 8.16 |
| State unemployment rate | 5.42 | 5.59 | 5.11 |
| Population | 100.00 | 74.62 | 25.38 |
| Observations | 11,424 | 7,392 | 4,032 |

*Note:* Table presents the mean across all age-state-year cells (16 age groups, 51 states, and 14 years) for each variable. The first two rows come from SSA's Supplemental Security Record data. Most other rows are estimates from the CPS. The final row expresses the percentage of the population across all age groups in 1997 in the accompanying state grouping.

2 years old in 1982, and so on through those who are 18 years old in 1998. All calculations use the same underlying base year sample, with differences across birth year cohorts stemming only from the state-specific eligibility thresholds. Cumulative eligibility is the primary explanatory variable for the long-term analysis.

Table 1 presents some basic summary statistics. Averaged across ages 1 through 16,[6] years 1997 through 2010, and all states, approximately 0.53 percent of the child population applies for SSI in a given year, though the rate is more than 50 percent higher in automatic qualification states than additional criteria states. The additional effort needed to get Medicaid coverage may discourage some people from applying for benefits in additional criteria states, suggesting the importance of health insurance in application decisions. Application trends also vary by age, increasing nearly linearly until age 7 and then decreasing linearly after that. On average, 47 percent of the population is eligible for Medicaid. About one-fourth of the population resides in the 18 states where SSI recipients must satisfy additional criteria to receive Medicaid.

Our contemporaneous and long-term analyses focus on two main outcome measures: SSI applications and SSI awards for a given age-state-year cohort. Long-term outcomes are calculated annually from 1998–2015 for a given birth year-state cohort for people born from 1980–1987 for when they are at least 18 years old. All outcomes are expressed as a percentage of the population in that age-state-year cell (from the U.S. Census Bureau), so that states with higher populations do not mechanically have higher application counts. For simplicity, in our discussion of the results, we refer to the percentage of the population with an application or award as applications and awards. We do not analyze the raw counts.

Among these outcome measures, we hypothesized that changes in Medicaid eligibility most likely affected SSI applications. Filing an application incurs substantial costs, including but not limited to considerable time cost in navigating administrative requirements. If a family was on the margin of submitting an application but became newly eligible for Medicaid due to an expansion, the value of an SSI award would decline because Medicaid enrollment is now available by other means. The decreased value of an SSI award could persuade some families not to apply. If the children who do not apply would have qualified for SSI benefits, then we might also find a reduction in awards. We hypothesized a smaller impact on awards than applications because SSI cash benefits for the child are likely to be a relatively important source of income for potential SSI beneficiaries, who must have sufficiently low-incomes, leading those likely to be awarded to still apply.

## 4. Empirical strategy

To isolate the plausibly causal effect of Medicaid and CHIP eligibility on SSI applications, we use the simulated eligibility approach first introduced in Currie and Gruber (1996a,b) that remains in frequent use in related studies. Our primary regression specification is as follows:

$$y_{ast} = \alpha + \beta_s + \beta_t + \beta_a + \delta_1 SIM_{ast} + \beta_1 X_{ast} + e_{ast} \tag{1}$$

The outcome, $y_{ast}$, measures the relevant SSI outcome (for example, the percentage of people submitting applications) for a given age $a$, state $s$, and year $t$. We control for state fixed effects ($\beta_s$), year fixed effects ($\beta_t$), and age fixed effects ($\beta_a$). As a robustness check, we also add state-by-year fixed effects to account for state-specific factors that vary over time, a preferred robustness check adopted in the literature (Currie and Gruber, 1996b). Because our data are aggregated, meaning that there is only one observation per age-state-year cell, including only one-way fixed effects is the preferred specification. Simulated eligibility varies across ages, states, and years, leading a specification including two-way fixed effects to leave little variation in the main regressor of interest. The regression also controls for basic demographic variables $X_{ast}$ from the March CPS averaged across a given age-state-year, including simple race and gender demographics, the percentage with single-parent households, and the educational breakdown of the primary parent (percentage with no education, less than high school, high school, some college, or college and above).

The key explanatory variable is the simulated eligibility measure $SIM_{ast}$, the probability that an individual is eligible for Medicaid. This variable represents the generosity of Medicaid and CHIP eligibility for each age group in a given state in a given year. Differences across states, years, and age groups in Medicaid income thresholds drive the changes in this variable. Consistent with Cutler and Gruber (1996), Currie and Gruber (1996a,b), and Brown et al. (2018), we interpret variation in eligibility for public coverage as plausibly exogenous, enabling us to estimate the causal impact of changes in Medicaid and CHIP eligibility on SSI outcomes.

The key coefficient of interest is $\delta_1$, which can be interpreted as the impact of a 1 percentage point increase in Medicaid eligibility on the SSI outcome variable (where the simulated eligibility is measured as a percentage). Including state and time fixed effects controls for any state-specific characteristics that are constant over time and any secular trends common to all states, respectively. Including age fixed effects also controls flexibly for any patterns in outcomes by age. The source of identifying variation in SSI outcomes is therefore deviations from the general age pattern in SSI

[6] All analyses exclude newborn children because low birthweight rules substantially increase application rates. Children aged 17 are also excluded because applications increase in anticipation of the change in SSI eligibility rules at age 18, when disability status is determined according to the adult standard and parental deeming rules no longer apply.

**Table 2**
Impact estimates overall and by state for SSI outcomes.

| | Applications | Awards |
|---|---|---|
| **Overall** | | |
| Simulated eligibility | −0.0003 [0.0008] | 0.0003 [0.0004] |
| **State heterogeneity** | | |
| Automatic Medicaid award with SSI qualification states | 0.0006 [0.0009] | 0.0006 [0.0004] |
| Additional criteria to get Medicaid after SSI qualification states | −0.0041* [0.0013] | −0.0008^ [0.0004] |
| Observations | 11,424 | 11,411 |

*Note:* Table presents estimates of the effect of a 1 percentage point increase in simulated eligibility on the percentage of people who apply for SSI or receive an award, or an estimate of $\delta_1$ from Eq. (1). SSI applications and awards are measured at the age-state-year level from 1997 to 2010 for all states and children ages 1 to 16. All specifications include basic demographic controls and age, state, and year fixed effects. Standard errors are shown in brackets and are clustered by state.
*/^ Indicates significance at the 5/10 percent level, respectively.

outcomes within a given state and year. Standard errors are clustered by state.

As discussed earlier, in most states, receipt of SSI benefits also confers automatic receipt of Medicaid. However, some states require an additional application for Medicaid (despite the fact that one would automatically qualify if receiving SSI benefits) and some states have more stringent income requirements than SSI to qualify for Medicaid so that an SSI recipient might not be eligible for Medicaid. We test for differences in the impact of the Medicaid and CHIP expansions across these two groups of states by reestimating Eq. (1) for our main outcome variables, including an interaction between a binary variable *Additional Criteria*$_s$ and the simulated eligibility variable.

## 5. Contemporaneous results

The top panel of Table 2 shows the estimated impact of a 1 percentage point increase in the simulated share of a given age-state-year cohort that is eligible for Medicaid on the percentage of people filing SSI applications. On average, increased Medicaid eligibility has no effect on SSI applications. The results in Table 2 imply that a 10 percent increase in the share eligible for Medicaid (or 4.7 percentage points, see Table 1), would decrease SSI applications by 0.0013 percentage points, or a 0.2 percent decrease relative to the mean. The estimates are fairly precise, as the 95 percent confidence interval rules out an increase or decrease in applications larger than 1.5 percent from a 10 percent increase in the simulated share eligible.

Although the aggregate results suggest no effect of Medicaid eligibility on SSI applications, there is substantial state heterogeneity in this relationship. We classify states by whether they automatically confer Medicaid after an SSI award.[7] The bottom panel of Table 2 shows the estimates for each group of states. There is a significant, negative relationship in the states that have additional criteria to receive Medicaid, and a small, insignificant relationship in the states that automatically enroll SSI awardees. The magnitude of the impacts in the additional criteria states are large—a 10 percent increase in the share eligible leads to an 5 percent reduction in SSI applications, whereas the same 10 percent increase leads to a 0.5 percent increase in SSI applications in states where children automatically qualify for Medicaid after an SSI award.

A plausible explanation of the results concerns the higher transaction costs in states with additional Medicaid criteria of enrolling in Medicaid via obtaining SSI eligibility—on top of the transaction cost of obtaining SSI, which exists in all states. For those considering filing an SSI application primarily motivated by health insurance, the CHIP-era expansions reduced the transaction costs to gain Medicaid coverage by more in states with an additional criteria. In states without additional criteria, the new public insurance enrollment option replaced the transaction costs of applying for SSI with the transaction costs of applying for Medicaid, but in states with additional criteria the new option replaced the transaction costs of applying for SSI and subsequently separately applying for Medicaid with transaction costs of applying for Medicaid only. Our finding of a differential impact in substitution away from SSI application into public insurance coverage in states with additional criteria to qualify for Medicaid is therefore consistent with health insurance motivating some SSI applications.

The rest of Table 2 shows both the overall and state heterogeneity impacts of increased Medicaid eligibility on SSI awards. We estimate no overall effect of Medicaid eligibility on awards. However, similar to the findings on applications, this average effect masks heterogeneity by state; we find a large statistically significant reduction in SSI awards resulting from increases in Medicaid eligibility in additional criteria states.

Taken together, these findings imply that the people in additional criteria states who substitute away from SSI and instead rely on Medicaid eligibility for health insurance coverage include some who are eligible for SSI benefits. The relative size of the decrease in applications from a 10 percent increase in the share eligible (5 percent) is larger than the comparable reduction in awards (3 percent). After adjusting for the prevalence of outcomes, the estimated impacts on applications and awards are statistically significantly different. A disproportionate share of those induced not to apply for SSI would have been found ineligible had they applied.

### *5.1. Robustness checks*

We implement several checks to demonstrate the robustness of our results. First, we show that increases in the share eligible for both Medicaid and SSI drove reductions in applications and awards found in additional criteria states, with no impact for increases in the share eligible for Medicaid but not SSI. As described in Section 2, we expect to find that any changes in application behavior due to expansions in Medicaid should occur primarily where the expansions in Medicaid and CHIP affected those who might also be eligible for SSI. For example, the marginal impact on SSI applications of a one percentage point expansion in eligibility at an income threshold of 400 percent of the FPL should likely be smaller than the marginal impact of a similar change at an income threshold of 250 percent of the FPL – those with income above 250 percent of the FPL have incomes that are too high to qualify for SSI, so changes in program participation would also require changes in labor supply (Appendix A Table A1).

In Table 3, we modify Eq. (1) by dividing the simulated Medicaid eligibility measure into two categories: the share eligible for both Medicaid and SSI and the share eligible for Medicaid only, based on the SSI thresholds for families with only earned income. In state het-

[7] As seen in Table 1, SSI application rates were significantly lower in states with an additional criteria required to qualify for Medicaid. Acceptance rates are comparable across the two types of states, indicating that the disability severity of applicants is likely similar. State fixed effects account for differences in applications across states.

**Table 3**
Impact estimates by overlapping Medicaid and SSI income eligibility.

| | Applications | Awards |
|---|---|---|
| **Overall** | | |
| Share eligible for both Medicaid and SSI | 0.0000 [0.0013] | 0.0001 [0.0005] |
| Share eligible for Medicaid only | −0.0005 [0.0010] | 0.0005 [0.0005] |
| **State heterogeneity** | | |
| *Automatic Medicaid award with SSI qualification states* | | |
| Share eligible for both Medicaid and SSI | 0.0015 [0.0015] | 0.0005 [0.0005] |
| Share eligible for Medicaid only | −0.0006 [0.0012] | 0.0007 [0.0006] |
| *Additional criteria to get Medicaid after SSI qualification states* | | |
| Share eligible for both Medicaid and SSI | −0.0052* [0.0018] | −0.0011^ [0.0006] |
| Share eligible for Medicaid only | −0.0009 [0.0009] | −0.0005 [0.0004] |
| Observations | 11,424 | 11,411 |

*Note:* Table presents estimates of the effect of a 1 percentage point increase in simulated eligibility for both Medicaid and SSI and simulated eligibility for Medicaid and no SSI on the percentage of people who apply for SSI or receive an award. SSI applications and awards are measured at the age-state-year level from 1997–2010 for all states and children ages 1–16. All specifications include basic demographic controls and age, state, and year fixed effects. Standard errors are shown in brackets and are clustered by state.
*/^ Indicates significance at the 5/10 percent level, respectively.

erogeneity specifications, we also include the interaction between each of these separate simulated eligibility measures with an indicator for additional criteria states. Increases in the share eligible for Medicaid and SSI lead to reductions in applications and awards in additional criteria states, whereas increases in the share eligible for Medicaid only have no effect. Our primary result of a reduction in additional criteria states is thus driven only by changes in eligibility at income levels at which one is likely eligible for both Medicaid and SSI. This finding reinforces the interpretation of the impact of the Medicaid expansion as the causal effect on SSI outcomes.

As a placebo test, we confirmed that there is no effect of child eligibility on old age SSI outcomes. People older than 65 can qualify for SSI, with eligibility determined entirely by income rather than any disability status. There should be no relationship between states' expansions of Medicaid to children and SSI outcomes for people ages 65 and older. We reestimate Eq. (1) using applications at age $a + 65$ rather than age $a$ as the outcome variable. Table 4 shows there is no significant relationship between simulated eligibility for children and the corresponding old age SSI applications and awards in additional criteria states.[8] However, there is a small positive impact of simulated eligibility for children on old age SSI awards overall and in automatic qualification states; though the analogous results for child awards were not significant, the results from this test suggest some caution is warranted when considering our main results.

Table 5 shows that adjusting our regression model by adding state-by-year fixed effects does not substantially change our results. Columns (1) and (3) replicate the main results presented in Table 2, while columns (2) and (4) add state-by-year fixed effects. As discussed in Section 4, the aggregated nature of our data likely makes the state-by-year results less reliable because of the limited number of observations contributing to estimation of the interacted state-by-year fixed effects. Nonetheless, in Appendix A Tables A2 and A3, we present results from the robustness checks associated with Tables 3 and 4 adding state-by-year fixed effects. The robustness checks are less conclusive with state-by-year fixed effects, which would threaten the validity of our findings.

As an additional placebo test, we implement a randomization inference test by randomly re-assigning states to be additional criteria states or automatic qualification states, taking arbitrary groupings of 18 states to be additional criteria states. We then re-estimate our primary regression using the falsified assignment of states. The estimated impacts on applications and awards in additional criteria states fall outside of the 95 percent confidence interval of the placebo distribution, indicating that the results are likely not driven by chance (Appendix A Fig. A1).

We also vary how we calculate the simulated eligibility measure. The primary specification uses a fixed national cohort from the 1996 CPS to calculate the percentage eligible by age, state, and year. The fixed cohort ensures that simulated eligibility varies only due to changes in state policies over time, rather than from changes in broader macroeconomic conditions or decisions on where to locate. As a robustness check, we separately simulate eligibility using each year of the CPS from 1994–2010 to produce separate estimates for the impacts of the share eligible on SSI outcomes. Appendix A Table A4 shows that using 1996 as the base year was not important, as results for both applications and awards are similar regardless of the base year chosen.

Finally, we test the importance of changing the control variables included in our regression. Appendix A Table A5 shows the results when we include basic demographic controls (our primary specification), no controls, or add in socioeconomic controls. The socioeconomic controls include the percentage of households in the age-state-year cell in poverty, the percentage receiving Supplemental Nutrition Assistance Program benefits, and the percentage with any person receiving Temporary Assistance for Needy Families benefits. We also include measures of the state-year unemployment rate from the Bureau of Labor Statistics and an estimate of the annual state counterpart of real gross domestic product per capita from the Bureau of Economic Analysis. These socioeconomic controls are likely correlated with both the percent eligible for Medicaid and the likelihood of filing an SSI application, and thus could introduce bias if not appropriately accounted for. However, it is also possible that changes in Medicaid eligibility might cause changes in these socioeconomic measures, in which case including them would also bias our estimates. The results do not differ under any of the specifications, suggesting that such potential bias is not a concern.[9]

[8] There are no Medicaid eligibility changes for the elderly. Because there are changes to Medicaid eligibility during this period for working-age adults, such as expansions to childless adults in some states, we do not conduct a comparable placebo test for working-age adults.

[9] We also estimate results focusing only on the period from 1997–2002 when the main eligibility expansions through CHIP occurred, and only on the period from 1997–2006 using only the thresholds provided by Brown et al. (2018). Neither restriction materially affects the results (not shown). In addition, we estimated regressions taking the log of the outcome variables to control for outliers, which also does not affect the results (not shown); we prefer the unlogged specification because the outcome variable has already been scaled by the population to account for any potential outliers. Finally, we weight our regressions by the population in that age-state-year cell so that estimated effects are for the average person, rather than for the average state as in our unweighted specification. The results are qualitatively similar.

**Table 4**
Impact estimates overall and by state for old age SSI outcomes (robustness).

| | Applications | Awards |
|---|---|---|
| **Overall** | | |
| Simulated eligibility | 0.0007 [0.0009] | 0.0006^ [0.0004] |
| **State heterogeneity** | | |
| Automatic Medicaid award with SSI qualification states | 0.0011 [0.0010] | 0.0009* [0.0004] |
| Additional criteria to get Medicaid after SSI qualification states | −0.0013 [0.0015] | −0.0006 [0.0007] |
| Observations | 11,243 | 11,123 |

*Note:* Table presents estimates of the effect of a 1 percentage point increase in simulated eligibility on the percentage of people who apply for SSI or receive an award, or an estimate of $\delta_1$ from Eq. (1). SSI applications and awards are measured at the age-state-year level from 1997–2010 for all states and individuals ages 66–81. All other independent variables are exactly as specified in the primary estimates using the corresponding age group that is exactly 65 years younger. All specifications include basic demographic controls and age, state, and year fixed effects. Standard errors are shown in brackets and are clustered by state.
*/^ Indicates significance at the 5/10 percent level, respectively.

**Table 5**
Impact estimates overall and by state for SSI outcomes, by fixed effects model.

| | Applications | | Awards | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| **Overall** | | | | |
| Simulated eligibility | −0.0003 [0.0008] | 0.0008 [0.0010] | 0.0003 [0.0004] | −0.0003 [0.0003] |
| **State heterogeneity** | | | | |
| Automatic Medicaid award with SSI qualification states | 0.0006 [0.0009] | 0.0029^ [0.0016] | 0.0006 [0.0004] | 0.0000 [0.0003] |
| Additional criteria to get Medicaid after SSI qualification states | −0.0041* [0.0013] | −0.0080* [0.0029] | −0.0008^ [0.0004] | −0.0016* [0.0007] |
| State-by-year fixed effects | No | Yes | No | Yes |
| Observations | 11,424 | 11,424 | 11,411 | 11,411 |

*Note:* Table presents estimates of the effect of a 1 percentage point increase in simulated eligibility on the percentage of people who apply for SSI or receive an award, or an estimate of $\delta_1$ from Eq. (1). SSI applications and awards are measured at the age-state-year level from 1997–2010 for all states and children ages 1–16. All specifications include basic demographic controls and age, state, and year fixed effects. Standard errors are shown in brackets and are clustered by state.
*/^ Indicates significance at the 5/10 percent level, respectively.

## 6. Long-term analysis

We also assess the impact of exposure to public insurance coverage as a child on adult SSI participation. To do so, we use a cohort approach modeled after recent work by Miller and Wherry (2018) and Boudreaux et al. (2016); both studies examined the effects of parental and child Medicaid expansions on adult health outcomes. This approach leverages variation in cumulative childhood exposure to Medicaid and CHIP eligibility due to differences in the timing and magnitude of states' Medicaid and CHIP expansions. Because we track Medicaid eligibility for cohorts by birth year going back to 1980, variation in the cumulative childhood exposure to Medicaid is driven not only by changes as part of the CHIP-era expansions, but also by expansions during the 1980s and 1990s that expanded Medicaid to low-income pregnant women and children outside of the welfare system. As discussed in the introduction, the economic factors driving contemporaneous and longer-term effects are different.

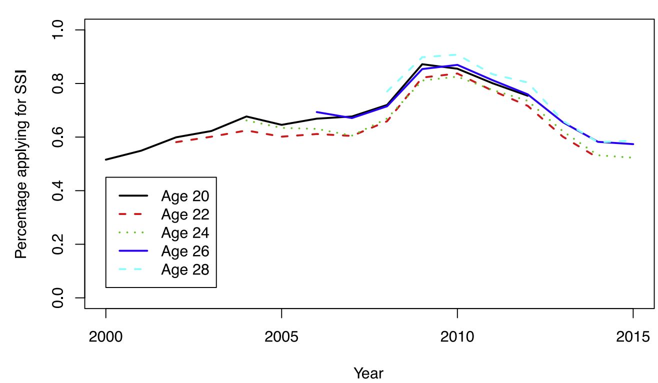


**Fig. 3.** Adult application trends in SSI over time, by age.
Note: Shows the percentage of people at a given age that apply in a given year. In the analysis, we group by birth year cohort. As an example, the 1980 birth year cohort was 20 in 2000, 22 in 2002, 24 in 2004, and so on.
Source: Authors' calculations using SSA administrative data.

### 6.1. Regression specification

Our primary regression specification is as follows:

$$y_{bst} = \alpha + \beta_{st} + \gamma_b + \gamma_s b + \delta_1 SIM_{bs} + \beta_1 X_{bs} + e_{bst} \quad (2)$$

The regression specification is fairly similar to the contemporaneous analysis regression (Eq. (1)) in that it regresses an SSI outcome on a simulated share eligible, but it differs in two crucial ways. First, the contemporaneous analysis measures outcomes at the age-state-year level, but the long-term analysis measures outcomes annually at the birth year-state level (outcomes $y$ observed in year $t$ for a cohort born in a given birth year $b$ in a given state $s$). Second, the simulated share eligible indicates the number of years in childhood that people born in a given state and year were expected to be eligible for Medicaid, calculated by summing the probability of qualifying for Medicaid at each age of childhood (the contemporaneous measure). This eligibility measure varies only at the birth year-state level, and is thus constant for a particular birth year cohort across all years of outcomes.

For each outcome, we pool observations across years for the birth year and state cohorts in the sample, controlling for the year of observation with state, year, and state-by-year fixed effects ($\beta_{st}$). We also run specifications only including separate state and year fixed effects. The year fixed effects in each specification control for trends in applications over time; as shown in Fig. 3, applications exhibit a clear countercyclical pattern, increasing during the Great Recession and decreasing thereafter. We include birth year fixed effects ($\gamma_b$) to account for any differences in outcomes by birth year, such as differences in age at the start of the Great Recession. We also include state-specific linear trends ($\gamma_s b$) to allow for general linear patterns in outcome variables across birth cohorts within each state, following the preferred approach adopted by Miller and

**Table 6**
Long-term impact estimates overall and by state for adult SSI outcomes.

| | Applications | | Awards | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| **Overall** | | | | |
| Simulated eligibility | −0.0111 [0.0126] | −0.0182* [0.0083] | 0.0005 [0.0043] | −0.0037 [0.0033] |
| **State heterogeneity** | | | | |
| Automatic Medicaid award with SSI qualification states | −0.0137 [0.0132] | −0.0228* [0.0085] | −0.0001 [0.0046] | −0.0038 [0.0036] |
| Additional criteria to get Medicaid after SSI qualification states | −0.0044 [0.0213] | −0.0062 [0.0192] | 0.0023 [0.0070] | −0.0008 [0.0061] |
| State-by-year fixed effects | No | Yes | No | Yes |
| Observations | 3,672 | 3,672 | 3,671 | 3,671 |

*Note:* Table presents estimates of the effect of a one-year increase in simulated eligibility during childhood on the percentage of people who apply for SSI or receive an award, or an estimate of $\delta_1$ from Eq. (2). SSI applications and awards are measured at the birth year-state-year level for cohorts born from 1980–1987 for adults ages 20–28 (covering years 2000–2015) for all states. All specifications include basic controls, state-specific linear trends in birth year, and birth year, state, and year fixed effects. Standard errors are shown in brackets and are clustered by state.
*/^ Indicates significance at the 5/10 percent level, respectively.

Wherry (2018), though we show results excluding these trends as well.

The structure of the data lead us to prefer the specifications including state-by-year fixed effects in the long-term analysis. In the contemporaneous analysis, simulated eligibility and SSI outcomes both vary at the age-state-year level. Therefore, the level of simulated eligibility for the age-state-year group uniquely corresponds to the outcome. In the long-term analysis, simulated eligibility varies at the birth year-state level while SSI outcomes are measured at the year-birth year-state level. The same birth year-state groups are observed in multiple years. Therefore, the level of simulated eligibility of the birth year-state group corresponds to multiple observations of the outcome variable, leading to more variation in the outcome variable that can be used to identify the impacts in the long-term. However, we present results from both types of specifications.

The sample used to estimate Eq. (2) consists of cohorts born from 1980–1987, for whom we observe outcomes from age 20 through age 28 for all cohorts (as SSI data go through 2015). This preserves a balanced panel, ensuring that each birth year cohort has an equal number of observations in the regression. If we included all birth-years and all ages, then younger ages (or older cohorts) would receive a greater weight in the regression,[10] which would make interpreting the impact estimate challenging.

The key coefficient of interest is $\delta_1$, which can be interpreted as the impact of a one–year increase in Medicaid eligibility during childhood on the SSI outcome variable. We also control in the regression for demographic characteristics and overall education in the state in a cohort's year of birth. All variables are calculated across the complete population in the state in a given year. The complete list of control variables includes the percentage of the population that is black; the percentage that is another non-white race; the percentage that is married; the percentage with less than a high school education, the percentage who have completed high school; and the percentage ages 0–4, 5–17, 18–24, 25–44, 45–64, and 65 and older.

For our results to be the causal impact of changes in Medicaid eligibility in childhood, increases in eligibility must be exogenous after controlling for all variables included in the model. This assumption is consistent with the literature. Policy differences in relative eligibility throughout childhood and timing of expansions are the sole drivers of changes in simulated eligibility. However, one drawback is that this strategy essentially assumes that people do not move across states; it assigns the years of Medicaid eligibility during childhood based on the state where SSI applications are filed. To the extent that moving is random and uncorrelated with relative eligibility for Medicaid, this introduces measurement error, which attenuates the results. If moving is not random, it might impart some bias to our results; though there is evidence that people may move to seek higher benefits, some papers explicitly note that there is little reason for concern in using cross-state variation in benefit generosity to identify impacts (e.g. Gelbach, 2004; McKinnish, 2005).

### 6.2. Results

Table 6 presents the main results of the long-term analysis, showing the impacts of additional eligibility for Medicaid on applications and awards. The coefficient on simulated eligibility of −0.0182 in Column (2) means that a one-year increase in Medicaid eligibility (or a 23 percent increase relative to the mean) during the course of childhood reduces annual applications to SSI by 0.0182 percentage points (or a 3 percent decrease relative to the mean). Results for SSI awards are generally insignificant; they are of a similar relative magnitude to the effects on SSI applications, but have low precision.

These results should be taken cautiously, however, as they are sensitive to the choice of model specification. Results are generally similar with or without state-by-year fixed effects, though these results are significant only when they are included. Additionally, we vary the birth-year cohorts included in the regression and whether or not we include state-specific linear trends. The choice of birth-year cohorts in particular has implications for the ages at which people are observed given the need to preserve a balanced panel – for example, adding the 1988 birth year cohort would require only observing people through age 27, whereas dropping the 1987 cohort would allow observing people through age 29. Appendix A Table A6 shows that the results are sensitive to these model specification choices. The sensitivity of our results suggests that the patterns observed are likely not consistent for all ages or birth year cohorts, implying these results may not be broadly generalizable. Regardless of specification, we can generally rule out a large impact. For example, the estimates in Table 6 rule out decreases of greater than 5 percent in either specification from a 23 percent change in the share eligible. Increases larger than 3 percent also fall outside the 95 percent confidence interval in any of the models considered in Appendix A Table A6, ruling out a substantial welcome mat effect of increased Medicaid eligibility.

The estimated impact on applications is not statistically different between automatic qualification and additional criteria states,

[10] Our dataset includes information for birth-year cohorts from 1980–1992 through the year 2015. If we used an unbalanced panel, the 1980 birth cohort would have data for ages 20–35, while the 1992 birth cohort would only have data for ages 20–23, which would disproportionately weight the 1980 cohort. Looked at differently, we would have 13 observations for ages 20–23 (all birth year cohorts from 1980–1992), while only having a single observation for age 35 (the 1980 cohort), which would disproportionately weight observations at younger ages.

**Table 7**
Long-term impact estimates with differing years of eligibility.

| | Applications | | Awards | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Years of eligibility at | | | | |
| Less than age 1 | −0.0853 [0.0686] | 0.0044 [0.0433] | −0.0520* [0.0233] | −0.0359* [0.0178] |
| Age 1–4 | 0.0086 [0.0289] | 0.0026 [0.0215] | 0.0014 [0.0077] | 0.0003 [0.0059] |
| Age 5–9 | −0.0116 [0.0184] | −0.0172 [0.0158] | −0.0013 [0.0078] | −0.0045 [0.0068] |
| Age 10–14 | −0.0105 [0.0144] | −0.0184^ [0.0106] | 0.0005 [0.0051] | −0.0036 [0.0046] |
| Age 15–18 | −0.0180 [0.0209] | −0.0310* [0.0133] | 0.0038 [0.0064] | −0.0013 [0.0043] |
| State-by-year fixed effects | No | Yes | No | Yes |
| Observations | 3,672 | 3,672 | 3,671 | 3,671 |

*Note:* Table presents estimates of the effect of a 1 year increase in simulated eligibility during the range of years indicated in the row on the percentage of people who apply for SSI or receive an award, or an estimate of $\delta_1$ from Eq. (2) with multiple measures of simulated eligibility. SSI applications and awards are measured at the birth year-state-year level for cohorts born from 1980–1987 for adults ages 20–28 (covering years 2000–2015) for all states. All specifications include basic controls, state-specific linear trends in birth year, and birth year, state, and year fixed effects. Standard errors are shown in brackets and are clustered by state.
*/^ Indicates significance at the 5/10 percent level, respectively.

**Table 8**
Long-term impact estimates overall and by state for old age SSI outcomes (robustness).

| | Applications | | Awards | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| **Overall** | | | | |
| Simulated eligibility | 0.0106 [0.0140] | −0.0054 [0.0097] | −0.0093 [0.0098] | −0.0110 [0.0099] |
| **State heterogeneity** | | | | |
| Automatic Medicaid award with SSI qualification states | 0.0039 [0.0141] | −0.0089 [0.0106] | −0.0059 [0.0094] | −0.0079 [0.0097] |
| Additional criteria to get Medicaid after SSI qualification states | 0.0281 [0.0178] | 0.0039 [0.0164] | −0.0184* [0.0071] | −0.0189* [0.0067] |
| State-by-year fixed effects | No | Yes | No | Yes |
| Observations | 3,657 | 3,657 | 3,624 | 3,624 |

*Note:* Table presents estimates of the effect of a one-year increase in simulated eligibility during childhood on the percentage of people who apply for SSI or receive an award, or an estimate of $\delta_1$ from Eq. (2). SSI applications and awards are measured at the birth year-state-year level for cohorts born from 1933–1940 for adults ages 67–75 (covering years 2000–2015) for all states. All other independent variables are exactly as specified in the primary long-term estimates using the corresponding birth cohort that is born exactly 47 years later. All specifications include basic controls, state-specific linear trends in birth year, and birth year, state, and year fixed effects. Standard errors are shown in brackets and are clustered by state.
*/^ Indicates significance at the 5/10 percent level, respectively.

which differs from the contemporaneous analysis. The underlying economic factors affecting both the contemporaneous and long-term analyses are likely different. In the contemporaneous analysis, the differential change in transactions costs in additional criteria states affected substitution between the two programs. In the long-term, the underlying changes in human capital stemming from increased Medicaid eligibility plays an important role. Because the long-term results are statistically indistinguishable across state types, factors other than the contemporaneous change in SSI outcomes must be responsible for the long-term findings. Increased Medicaid exposure during childhood may improve health and economic outcomes for children at risk of SSI entry as young adults, leading to reduced SSI applications later. Estimated Medicaid exposure during childhood was similar across both types of states, which could lead the impacts to be similar. Such a result would be consistent with findings from Miller and Wherry (2018) and Goodman-Bacon (2017), who found improved health, educational, and economic outcomes from increased Medicaid exposure in childhood.

The largest increases in Medicaid eligibility as a result of the most recent (post-1990) expansions were for older children. Before the CHIP expansions, income thresholds for teenagers to qualify for Medicaid were very low. The teenage years could also be particularly important to long-term applications because interactions with SSI during the years closest to becoming an adult might be especially correlated with adult SSI behavior simply given the proximity to adulthood. To allow for nonlinearities in the impacts by age group of exposure to Medicaid eligibility, we estimate the impacts of eligibility over various ages on SSI outcomes, rather than cumulative eligibility over the entire childhood (Table 7). Increased eligibility at older ages drove the significant negative impact in applications we find in Column (2) of Table 6. The corresponding relationship in Column (2) of Table 7 is nearly monotonic, with one year of eligibility at each successive older age leading to generally larger negative impacts on SSI applications. This result is sensitive to the inclusion of state-by-year fixed effects, however, so should be considered cautiously.

Higher Medicaid eligibility in the first year of life reduces long-term SSI awards, despite total Medicaid eligibility during childhood not affecting awards. The fetal origin hypothesis speculates that the gestational period and infancy can have profound long-term impacts on health and economic well-being (Almond and Currie, 2011). These results are consistent with Miller and Wherry (2018), which finds long-term improvements in health and human capital from Medicaid expansions occurring in utero and during the first year of an infant's life; see their paper for a thorough discussion of the mechanisms that could drive such changes.

Though the results are somewhat mixed, a decrease in long-term SSI applications from increased Medicaid eligibility, particularly at older ages, rules out complementarity between government benefits programs. Such an effect might occur if participation in one government benefits program, and the accompanying deeper understanding of the social safety net landscape, led to increased participation in other similar programs. Those who become eligible only in the teenage years might be the ones most likely to understand the complexities of eligibility, so if the programs were complementary, positive impacts would be most likely for eligibility expansions in the teenage years. We find the opposite.

### 6.3. Robustness checks

We implement two main robustness checks that are similar to the contemporaneous specifications. First, we vary the base year used to calculate the simulated eligibility. Regardless of the base year chosen, the results are similar (Appendix A Table A7). Second, we use old age SSI outcomes as a placebo test. We estimate the exact same regressions, but use an outcome for the birth cohort that is exactly 47 years older. We use this birth cohort so that rather than estimate the effect on outcomes as children reach adulthood at age 18, we estimate the effect on outcomes as adults reach old age eligibility at age 65. Table 8 shows that overall there is no significant relationship between the falsified measure of eligibility during a different birth cohort's childhood years and the old age applications and awards from ages 67–75.

We also test our results by weighting our regressions by population in the age-state-year cell, so that estimated effects are reflective for the average person rather than for the average state. The weighted results for SSI applicants are no longer significant, though are still estimated to be negative. Because the policy variation in Medicaid eligibility is at the state level, we prefer the unweighted results. We also test whether including only data through 2010, before the ACA became law, affects the long-term results. Changes in other health insurance availability, particularly for young adults who could get coverage through their parents, could affect participation in SSI. Using fewer years of data reduces the precision of our estimates, particularly if focusing on results using a balanced panel. Nonetheless, the results are broadly similar. The weighted results and results only through 2010 are available on request.

## 7. Conclusion

We find no overall impact of increases in Medicaid eligibility on applications and awards to SSI, though there is a significant negative reduction in states where there were additional criteria for SSI recipients to receive Medicaid. Substitution away from SSI when children were able to obtain Medicaid coverage elsewhere in states with higher transaction costs for Medicaid enrollment is consistent with health insurance playing an important role in the application decision. Our results are generally consistent with the literature finding evidence of substitution between health insurance coverage expansions and adult participation in disability benefit programs (Burns and Dague, 2017; Maestas et al., 2014; Yelowitz, 2000).

We also find that increased Medicaid eligibility during childhood likely affects SSI participation for young adults, though our estimates are sensitive to modeling decisions so should be considered cautiously. Notably, we find evidence that higher Medicaid eligibility in the first year of life reduces long-term SSI awards, a finding consistent with Miller and Wherry (2018). Increased Medicaid exposure during childhood can improve health and economic outcomes, leading to reduced SSI participation. These results are also consistent with a recent study finding that the creation of Medicaid, and the accompanying increase in insurance, reduced adult disability benefit participation (Goodman-Bacon, 2017). This also rules out complementarity between the two programs, whereby Medicaid beneficiaries learn about and eventually apply for SSI through their Medicaid coverage, either by further understanding the social safety net landscape or by recommendations to apply from health professionals.

There could be significant fiscal savings to SSI when there is another way for low-income youth to obtain Medicaid. First, fewer applications to SSI could reduce SSA's administrative costs of screening and processing applications. Second, fewer awards to children who would otherwise apply and qualify would reduce SSI cash benefit outlays. Taken together, this implies that expanding Medicaid could induce cost savings in the SSI program.

These results are therefore important to consider when determining the appropriate level of public health insurance coverage. Despite the recent extension of the CHIP program, questions about the future of Medicaid and CHIP programs remain. Congress recently considered substantial cuts to Medicaid as part of efforts to repeal the ACA, and considered plans to change the financing structure of Medicaid, moving to a block grant model like CHIP. Such changes could result in eligibility rollbacks and funding shortfalls, jeopardizing coverage for low-income families. If proposals to reduce Medicaid eligibility or funding go into effect, some of the cost savings associated with the cuts could be offset by increases in SSI program participation in states where the two programs appear to be substitutes. Similarly, any expansion in Medicaid might not be as costly to the federal government as initially expected because it might be accompanied by reductions in SSI participation. As such, understanding the potential spillover effects on childhood SSI receipt is an important input for the full accounting of potential benefits and costs of Medicaid and CHIP eligibility.

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## Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.jhealeco.2019.02.003.

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