CENTER *for* RETIREMENT RESEARCH *at* BOSTON COLLEGE

BENEFIT GENEROSITY, APPLICATION COSTS, AND MORAL HAZARD: EVIDENCE FROM SSI STATE SUPPLEMENTS

Riley Wilson

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Center for Retirement Research at Boston College
Haley House
140 Commonwealth Avenue
Chestnut Hill, MA 02467
Tel: 617-552-1762 Fax: 617-552-0191
https://crr.bc.edu

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Center for Retirement Research at Boston College
Haley House
140 Commonwealth Avenue
Chestnut Hill, MA 02467
phone: 617-552-1762 Fax: 617-552-0191
https://crr.bc.edu

Abstract

This paper examines how differences in Supplemental Security Income (SSI) generosity, driven by differences in state SSI supplements, affect people's interaction with the program. This paper uses county-level administrative data on SSI recipiency rates, as well as county-level data on SSI application rates, SSI award rates, group specific employment rates, earnings, and migration rates to understand how SSI benefit generosity affects participation in the program as well as flows into and out of the program. To identify the causal effect of SSI generosity on program participation, this paper uses a border discontinuity design and exploits differences over time in the maximum benefit levels between neighboring counties.

The paper found that:

- For a $100 increase in maximum SSI monthly benefits, SSI enrollment rates increase by 0.32 percentage points, or nearly 12 percent.
- The increase in enrollment is concentrated among all recipients 65 and older.
- The change in enrollment is not driven by changes in applications or awards, but seems to be driven by changes in eligibility due to changes in employment behavior.
- SSI enrollment responses are only observed after the large, salient decline in state SSI supplements in California between May 2009 and October 2009. Otherwise, there is no observed response to SSI generosity.

The policy implications of the findings are:

- Small changes in SSI generosity do not seem to significantly change SSI application or recipiency rates.
- It is possible that large, salient decreases in SSI benefits affect enrollment levels, but this could be something specific to the California setting.
- It is unlikely that the decline in SSI applications and enrollment since the early 2010s is driven by decreases in the real value of SSI benefits.

1 Introduction

Supplemental Security Income (SSI) is one of the largest safety net programs in the United States. In 2022, the federal government paid out nearly $56 billion in SSI benefits, with about 7.5 million individual recipients in December 2022 (Social Security Administration, 2023). This is close to the amount spent on the federal Earned Income Tax Credit (EITC). In 2022 the Internal Revenue Service (IRS) distributed $64 billion to nearly 31 million individuals through the EITC.[1] After several decades of rising SSI applications and caseloads, there has been a steady, precipitous drop in both since 2010 (Figure 1). These patterns suggest that there has been a real change in the population being served by SSI.

Given the federal standardization of SSI, we have little understanding of what goes into the SSI application decision let alone how it has contributed to this decline. For social insurance programs like SSI, application rates depend on both eligibility and program take-up. On the one hand, if applying and maintaining eligibility is too complicated or costly relative to the benefit of participation, individuals might forgo applying or leave the program. This would affect the take-up margin. On the other hand, if the benefit of participation is too generous, potential applicants might change their behavior to meet the eligibility criteria. For example, someone who has been working with a disability might decrease their labor supply to gain program eligibility. This would be a moral hazard response that affects the eligibility margin. A decline in applications due to a change in eligibility would have different welfare implications than a decline in applications due to a change in take-up. As with any social insurance or transfer program, the SSI benefit-level could create a potential equity versus efficiency trade-off. The benefit of providing transfers to low-income, elderly and disabled individuals without a sufficient work history might come at the cost of reduced efficiency, if individuals adjust their behaviors to gain or maintain eligibility.

[1] These program outlays are also similar going back in time. In 2013, the federal government paid out $56 billion in SSI benefits to 8.4 million individuals (Duggan et al., 2015) and through the EITC $63 billion to nearly 27 million individuals (Nichols and Rothstein, 2015).

Using administrative caseload data in a border discontinuity design, I explore how SSI generosity affects SSI enrollment and which groups are most responsive to the changes in generosity. By also exploring SSI application rates, SSI award rates, migration rates, and death rates, I am able to examine which flows into and out of SSI enrollment are adjusting when there is a change in SSI generosity. Finally, by exploring effects on employment rates, I can evaluate adjustments in eligibility and shed light on some of the relative benefits and efficiency costs of increasing the generosity of a targeted cash-transfer program like SSI.

To estimate the causal effect of benefit generosity on SSI enrollment and other outcomes, I rely on a border discontinuity design (Dube et al., 2010). When the federal government adopted SSI, it replaced a patchwork of state-level programs. To ensure individuals would not experience a decrease in benefits, states that originally provided more generous benefits were required to supplement the federal level. Over time, some states have changed the generosity of their monthly supplements to federal SSI recipients. Many of these changes have been to reduce generosity, which would be consistent with the decline in SSI enrollment. To date, there has not been a comprehensive collection of these state-level policies over time. Using SSA reports and Ways and Means Committee reports, I collect this information to construct a state-by-year panel of state SSI supplement generosity. As seen in Figure 2, the generosity of these supplemental benefits has increased and decreased from time to time, and there is considerable variation in the generosity, even between neighboring states (Figure A1). To understand the identifying variation, consider the following example. During my sample, Massachusetts has maintained a supplemental benefit at \$114. Meanwhile, neighboring Connecticut had a much larger supplemental benefit of \$235 in 2000: that declined to \$168 by 2005. By comparing counties on either side of the Massachusetts/Connecticut border I can see how outcomes evolve before and after the gap in generosity changed.

I find that when a state's SSI supplement becomes more generous, SSI enrollment rates increase in counties in that state relative to neighboring counties in a different state. For an additional \$100 a month in SSI benefits (approximately 15 percent), the SSI recipiency rate increases by 0.32 recipients per 100 individuals. This would represent a 12 percent increase in enrollment at the mean. The increase is concentrated among aged recipients, where an extra $100 a month increases enrollment by 1-1.4 percentage points.

Given this response, I next explore flows into and out of SSI to better understand mechanisms. To see if this behavior is potentially driven by moral hazard I next explore effects on local employment rates. Using the Quarterly Census of Employment and Wages (QCEW), I find that for a $100 increase in SSI generosity, employment rates fall by 2.88 percent. This is a very large effect, and can potentially explain the change in SSI participation. Unfortunately, the QCEW does not include age specific employment counts. However, using the LODES I can construct age-group specific employment rates based on place of residence. For the full population, I estimate similarly sized decreases in employment rates, although the standard errors are significantly larger. When looking across age groups I estimate large decreases in employment for the 30-54 year olds and for older workers over 54 that are not statistically distinguishable and not statistically significant. In absolute terms, the effect is larger for 30-54 year olds (5.0 percentage point or 7.6 percent drop) but in relative terms the effect for older workers is large (3.6 percentage point or 13.2 percent drop). These patterns suggest a substitution between SSI program participation and employment might exist.

When considering other inflows or outflows from SSI enrollment rates I do not find compelling evidence of changes along these margins. I do not find significant changes in application rates (except for one group 40-54-year-olds) and award rates, suggesting that the change in enrollment is not driven by a change in people trying to access the program. I do not detect significant or larger changes in migration rates into the county from out-of-state or out of the county to another state. It does not appear to be driven by people moving in response to the benefit generosity or welfare migration. When the State SSI supplement is larger, I do find significant differences in the death rate for individuals 65 and older, but surprisingly, this is an increase in the death rate. None of these behaviors explain the increase in SSI rates following an increase in SSI generosity.

Cross-border county pairs are observably similar whether they experienced the change in benefit generosity or not. Event study evidence also shows parallel pre-trends, followed by a clear trend break to a higher level when the state supplement is changed, suggesting that neighboring border counties provide a reasonable counterfactual. Estimates are also robust to controls, weights, and measurement. However, the estimates are largely driven by effects in California. California has historically had one of the largest SSI state-supplements. However, starting in May 2009, the state monthly benefit was cut drastically falling \$62 (27 percent) by October 2009. There is a corresponding large, discrete fall in SSI enrollment starting precisely in the December 2009 data. This can help explain the observed patterns. When SSI benefit generosity falls, a smaller fraction of the population participates. Since the drop occurs immediately, this cannot be explained by changes in applications or awards (which do not change), but rather by people leaving the program. This is consistent with the corresponding rise in employment rates which we observe after SSI generosity falls. The employment measures capture the number of jobs per 100 residents, which could reflect multiple changes. When SSI generosity falls, recipients of all ages might increase their labor force participation to offset lower benefits. As long as earnings stay below the SSI means test, individuals can still stay eligible. However, it is likely that some individuals start earning too much and no longer eligible and are removed from the program.

This work provided new evidence of how people respond to SSI generosity. Even though state supplements are one of the few sources of plausibly exogenous variation in the SSI program, there has been little research exploiting this variation. Neumark and Powers (2000) and Neumark and Powers (2005) exploit state SSI supplements between 1980 and 2000 to look at SSI participation and labor supply of older men nearing retirement. In a follow-up paper, Neumark and Powers (2006) exploit the same variation between 1980 and 2000 to see if there is “welfare migration” among the elderly in response to SSI state supplements. Both papers studied a period when SSI participation was steadily rising, so patterns might be different in the 2000s, especially since the trend reversal in 2010. No previous work has examined the effect of SSI generosity on application behavior directly or other flows into and out of the program, only eventual receipt. Given SSI's eligibility determination process, it seems plausible that benefit generosity might affect application rates differently than award rates and the slower-moving stock of recipiency. It is also plausible that the enrollment and application decisions of younger individuals with disabilities respond differently to benefit generosity.

This paper provides new evidence on how the generosity of SSI benefits affects program participation. I find that participation is sensitive to benefit levels, but only in specific cases. Small changes in benefit levels do not significantly affect SSI enrollment rates or employment rates. I only find evidence of SSI enrollment and employment responding to changes in benefit generosity after the large, salient benefit reduction in California starting in 2009. These results suggest that large benefit increases might induce moral hazard disemployment responses, but in aggregate these responses are likely small. Although the real value of SSI state supplemental benefits has declined over time, this does not explain the decline in application, awards, and enrollment since 2010.

2 Setting: SSI and State Supplements

The Supplemental Security Income program (SSI) was instituted at the federal level in 1974 as part of the War on Poverty. It was designed to replace a patchwork of state and local programs that offered aid to low-income households with disabilities (Berkowitz and DeWitt, 2013). Because the federal benefit was sometimes less generous than the pre-existing program, some states were required while others chose to implement supplements to the federal benefit (Duggan et al., 2015). The Social Security Administration (SSA) was chosen to administer SSI in part to reduce the stigma associated with welfare offices, but also to streamline the disability determination process (Duggan et al., 2015). Eligibility is based on both a means-tested and a disability determination criteria. Applicants that are 65 or older, referred to as "aged" recipients, only have to meet the means-tested eligibility criteria. The means-test has both an income and asset requirement. The asset cap is $2,000 for an individual and $3,000 for a couple, excluding the value of a home, one car, and personal effects.[2] Any countable income earned during the month reduces the federal benefit rate dollar for dollar, where countable income is all unearned income and 50 percent of earned income, minus a$20 income exclusion and a $65 earned income exclusion. If the SSI recipient is living with a spouse or others who generate income, this income can be "deemed" towards the recipient's benefit level as countable income. However, the deeming allows for a moderately high level of spousal earnings before the SSI benefit is reduced (Duggan et al., 2015). In practice, less than five percent of the non-elderly recipients had any earned income (Duggan et al., 2015), and in 2022, 57 percent of beneficiaries had no income other than their SSI payment (Social Security Administration, 2023).

Working-age applicants between 18 and 64 must meet both the means test and a disabil-ity determination. The disability determination process is the same as that used for Social Security Disability Insurance (SSDI). Workers must document that they have a permanent disability that will (1) last at least one year, (2) keep them from performing the work they did previously, and (3) prohibit them from adjusting to other work. Applicants are first reviewed at a local SSA field office to verify the individual meets all non-medical requirements. Then the application is passed on to a state-level Disability Determinations Services (DDS) agency. If a DDS examiner determines that the individual is sufficiently disabled, the case is approved and benefits are calculated. If not, the application is denied, but the applicant can have the case re-examined through a reconsideration and appeals process. SSI claimants can be simultaneously considered for both SSI and SSDI if they meet the criteria for both programs, however SSDI benefits are counted as unearned income when calculating the SSI benefit and thus crowds out SSI dollar for dollar.

The disability determination process for children under 18 is similar, but the list of eligible

[2]The value of burial plots, small life insurance policies, Plan to Achieve Self-Support (PASS) resources, and Achieving a Better Life Experience (ABLE) account balances are also exempt (Social Security Administration, 2023).

medical conditions is broader, to encompass conditions that limit the child's functions, even if it does not meet the typical criteria. Child SSI recipients must undergo a re-evaluation when they turn 18, to verify that they continue to meet the eligibility standards. Previous work has exploited child medical reviews and the age 18 re-evaluation process to show that parents increase labor supply to fully offset the loss of SSI receipt (Deshpande, 2016*b*), but that child SSI recipients who are removed from the program rolls at 18 only recover one third of the lossed SSI income (Deshpande, 2016*a*) and have more criminal charges related to income-generation (Deshpande and Mueller-Smith, 2022). The means test requirements for children are similar. They face the same asset and income limits, but the income of parents in the household are deemed towards the children, after an exclusion that can result in relatively high parental earnings before the SSI benefit begins to be clawed back. For example, in 2015 parental earnings needed to exceed $1,591 per month before the benefit began to be phased out (Duggan et al., 2015).

In Figure 1, I provide aggregate trends in SSI applications, awards, and the number of recipients. In 2020, there were 8.6 million SSI recipients. This is down nearly 400,000 from the high point, between 2011 and 2015. Between 13 and 16 percent of SSI recipients are under 18, while between 24 and 30 percent are over 64, and 56 and 61 percent are working age. Between 1980 and 2011 the total number of SSI recipients increased nearly every year, doubling during that time period. This increase was driven largely by working age recipients and to a lesser extent child recipients. Since 1980, SSI applications rose steadily from around 1 million a year to 3.1 million in 2010. Since then, there has been an abrupt, steady decline, with applications falling to half the level of 2010. There has been a corresponding pattern in awards. The decline in applications and awards is most pronounced among working age individuals, although it is also present among child applicants. To date we do not have a complete understanding of what led to this reversal in applications, awards, and enrollment. There is a similar decline in enrollment and application in SSA disability insurance.

State SSI Supplements

As noted above, the federalization of SSI led to lower benefits in some geographic areas. As such, some states have instituted supplements to the federal SSI benefit. Each state sets its own benefit levels, which can vary depending on household and housing arrangement. For example, in most states that offer a supplemental benefit, the benefit for SSI eligible couples is less than twice as large as the benefit for an individual, meaning the per person benefit is smaller. Over time, states have implemented, done-away with, or changed the generosity of their state supplements. Often these changes are relieve state-level spending fiscal pressure. Unfortunately, there is not a comprehensive database outlining the value of state supplements across states, over time, and for different groups. The SSA maintains a current list of states that do not offer a supplement, offer a supplement that is administered by the SSA, or offer a supplement that they distribute themselves. Unfortunately, they do not provide the benefit levels or the historical offerings. To compile a state-by-state database of SSI supplements, I rely on two main sources: the Ways and Means Committee's Green Book and the SSA Research Policy and Analysis website. Starting with these lists, I completed a state-by-state check to identify if states offer state supplements and what the level of this benefit for every year from 1991 to 2020.[3] From 2002 to 2020, I am able to rely on reports from the Research Policy and Analysis website. The information prior to 2002 is not available through SSA, but I am able to use values from the Green Book for 1994, 1996, and 2002. We cross-checked the numbers in 2002 from both sources and find that they agree. The Green Book data provides supplement levels for the four prior years (as well as previous five year intervals). This allows us to measure state supplements annually back to 1991. The SSA data record supplementation levels in dollars and cents whereas the Green Book records levels rounded to the nearest dollar. In this database I round all supplements to the nearest dollar for consistency. These records provide snapshots of benefit levels across states

[3]A special thank you to research assistants James Hamilton and Thomas Barden for help compiling this database.

for individuals living singly and couples where both individuals are SSI recipients (see the SSA records from 2006 and 2011 for example (Social Security Administration, 2007, 2012)).

For some states, the supplement is broad based, while for others it is more tailored. As Duggan et al. (2015) note, in states like Alaska, California, Massachusetts, Maine, Michigan, Oklahoma, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Wisconsin, nearly all SSI recipients received a state supplement. In other states the levels are much lower. Based on the 2006 and 2011 SSA reports, some individuals receive supplements, even if there is no codified supplement in the state legal code. This might be determined on a case-by-case basis. However, in most cases these are rare events effecting less than five percent of the state's SSI recipients. There are two exceptions. During our sample, the Illinois legal code specifies that the size of the supplement will be determined on a case-by-case basis so I am unable to observe the supplement in Illinois and Illinois counties are not included in our analysis. Connecticut in 1995 and 1996 pursued a similar case-by-case approach, after which it reverted to a uniform benefit. I measure the prescribed state supplements based on the legal code. If a state does not have a supplement in their legal code I record this as zero. For Illinois and Connecticut in 1995 and 1996 we leave the value for these years blank. I include a more detailed explanation of this dataset in Appendix B.

Twenty-six states have offered some individual-level SSI supplement at some point between 1991 and 2020. On average, the maximum individual state SSI supplement is \$69 a month, but ranges from \$1 to \$374 (all in nominal dollars). As seen in Figure 2, states have changed the generosity of their supplement from time to time. Between 1991 and 2020 there were 108 year-to-year changes in the state-level supplement; two thirds of these changes were a decrease in the state-level supplement. Decreases in state supplements, or even keeping benefits at the same level in nominal dollars result in overall less generous benefits over time.

Some states like California and Connecticut have had monthly supplements that exceeded \$200, while other states have supplements of \$70, \$50, or less. These supplements might seem small, but with a maximum federal benefit level of only \$783 (in 2020) a \$200 monthly supplement can increase benefits by 26 percent, while even a $50 supplement leads to a non-negligible increase of 6 percent. Some of these state supplements are administered by the state, while other states rely on the Social Security Administration (SSA) for supplemental benefit disbursement. I will exploit these differences and changes in state SSI supplement generosity between neighboring counties to identify the effect of SSI benefit generosity on SSI enrollment, applications, and awards and other flows.

3 Data

This analysis makes use of many data sources, with their provenances in Data Appendix B.

First, I collect annual, county-level enrollment data from the SSA "SSI Recipients by State and County" report. This has been released each year since 1998, but between 1998 and 2001 the data is not in a useable data format. These data include the count of individuals in each county receiving SSI benefits for either age or disability/blindness. County-level SSI recipients are also tabulated by age for individuals under 18, between 18 and 64 and 65 and older. I use the data continuously from 2002 to 2022. Using this measure, and annual county-level population estimates I construct SSI recipiency rates for the full population, but also by age group. These measures will be my primary outcomes of interest.[4]

In addition to exploring SSI recipient rates, I am also interested in identifying whether more generous SSI benefits lead to moral hazard labor supply responses. Using the Quarterly Census of Employment and Wages (QCEW) I construct county-level measures of employment. I take the employment in each county and divide it by the total population in the county. One advantage of the QCEW is that it captures an accurate measure of county-level employment. It has two drawbacks though. First, the QCEW captures place of work employment. As such, employment rates will be high in counties with many cross-county commuters or if people work multiple jobs. Second, it does not provide employment measures by worker characteristics. As such, I cannot estimate effects separately by age. The

[4]Through out I refer to recipiency rates and enrollment rate interchangeable.

US Census Bureau Longitudinal Employer-Household Dynamics (LEHD) Origin Destination Employment Statistics (LODES), provides county-level employment based on workers place of residence between 2002 and 2016. Importantly, this allows me to measure county-level employment based on where the individual lives, not where she works. This might be important if people work across state or county border lines.[5] In the LODES I can also observe employment counts by age.[6] This will help to identify where employment responses to SSI generosity are concentrated among, if there are any. This data is reported at the census block level and can be aggregated up to the county-level. However, for privacy purposes, the Census Bureau infuses noise into the census block measures, which will result in more measurement error in the county-level estimates than is observed in the QCEW.

I supplement these administrative enrollment records and employment measures with measures of flows into and out of the SSI program to see if participation might be changing from other dimensions. Using an extract from the administrative 831 file, that provides zip code level SSI applications, awards from DDS, and final awards each year by age and by diagnositic code, I can measure flows into SSI.[7] Applications and awards (also called allowances by SSA) are dated to the year of application. Unfortunately, this data only covers a subset of applications and awards. It only includes cases that go through the disability determination process, so any applications that were initially denied on grounds of income are not included. It also only covers disability related claimants, so child claimants and "aged" claimants are not observed. Using a zip code to county crosswalk I aggregate up the number of applications and awards to the county level for each year. Due to privacy reasons, application and award counts under 10 are suppressed, thus the county-level estimates will miss some applications. These data are available from 1991-2016.

The primary way individuals flow out of SSI at the county-level is either through death,

[5] As Wilson (2022) documents, people are far less likely to commute across state lines than within state, but there are still some cross state flows.

[6] Other subgroup splits, such as industry, gender, education level, and earnings level are also available, but many of the relevant person-level characteristics are not available until 2009.

[7] This extract was originally obtained from SSA with help from Manasi Deshpande for work reported in Kearney et al. (2021) but is now publicly available.

in-eligibility through earnings, or moving to another county.[8] Using underlying cause of death data from the CDC, I construct county-level death rates (per 100) from all causes, internal causes (disease and neoplasms), external causes, and drug and alcohol related deaths specifically. I examine these separately by age. With this data I can examine if the change in state SSI supplements is associated with changes in disease related deaths or potentially related deaths of despair (Case and Deaton, 2015, 2017). This data was collected for 1999-2020.

To capture migration I use the IRS Statistics of Income (SOI) county-to-county migration flows. These annual county-to-county migration flows data are constructed by tracking the number of tax units and tax exemptions (to proxy for households and people) that change their tax form 1040 filing county from one filing year to the next. These files provide the number of tax returns (to proxy for households) and exemptions (to proxy for individuals) that were filed in one county in year $t-1$ and in another county in year t. They also provide the total number of returns and exemptions that moved out of the county to a different state. I use this measure to construct in- and out-migration flows to the county to (from) a different state per 100 residents. For privacy purposes, the IRS suppresses flows that have fewer than 20 returns whose filers have moved in previous year. The suppression threshold increased from 10 to 20 returns in the 2013 data release. I divide the number of exemptions by the origin county population (in hundreds) to measure the number of migrants per 100 people.

Using the National Cancer Institute Surveillance, Epidemiology, and End Results Program (SEER) annual county-level population counts I am able to construct SSI enrollment rates, employment rates, application rates, award rates, and migration rates.[9] From the SEER I construct other population measures such as the age, race, and gender distribution of a county, to verify that the neighboring border counties are similar.

[8] Migration could also represent an inflow at the county-level, so I will explore both.

[9] The CDC mortality data includes county population measures aggregated up for the same age groups as are reported in the mortality data, so to construct death rates I use the population measures from the CDC.

4 Empirical Approach

The programmatic structure of SSI leaves little exogenous variation available to identify causal effects in the application decision. However, I exploit one source of variation that does exist: SSI state supplements. Although the state supplements create variation in benefit generosity across states, it could be that the underlying population in states that adopt state supplements might differ in unobserved ways that are correlated with SSI eligibility and take-up. For example, if a state's population is becoming more disabled, or is in economic decline, the state could endogenously adjust supplements to meet this extra need. This could result in bias estimates of the effect of SSI generosity on take-up and enrollment. As seen in Figure A1, the state SSI supplemental benefit can vary greatly between neighboring states. I adopt a border county comparison identification strategy to examine the effect of benefit generosity on SSI enrollment rates and other outcomes.

Although overall population characteristics may vary across states in ways that are correlated with SSI state supplement presence and size, populations are more likely to be similar when they are in close proximity, for example, just across state borders. Building on this intuition, researchers have used state border designs to compare outcomes in neighboring counties across state borders to estimate the causal effect of state-level policies, like the minimum wage, on outcomes (cf. Dube et al. (2010)). This strategy relies on the assumption that the underlying population just across state lines is similar along both observable and unobservable dimensions. I will build on this strategy by comparing SSI enrollment, applications, and other behavioral responses among neighboring counties along state borders.

For example, Massachusetts has had a supplemental benefit that has been at $114 (nominal dollars) during the entire sample period. Meanwhile, neighboring state Connecticut, had a much larger supplemental benefit around $250, that declined to just $168 between 2003 and 2005. By comparing counties on either side of the Massachusetts/Connecticut border I can see how enrollment rates and SSI flows evolve before and after the gap in generosity changes.

For each pair of neighboring counties that touch but lie across state borders I create a panel, with one observation for each county in each year. I then stack each of these panels to estimate, similar to Deshpande and Li (2019). As such, a county-year observation might appear in the sample more than once. For example, if a county in Massachusetts borders three counties in Connecticut, there would be three observations for this county for each year. Figure 3 highlights the counties that are included in the regression, where darker shading corresponds to higher average state supplements over the sample period. I then estimate the effect of the maximum SSI benefit on SSI outcomes as follow

$$Y_{cpt} = \beta \mathit{Maximum\ SSI\ Benefit}_{ct} + X_{ct}\Gamma + \delta_c + \phi_{pt} + \varepsilon_{cpt} \tag{1}$$

The primary outcome of interest is the enrollment rate in county c in border pair p in year t. The coefficient β represents the estimated effect of an extra \$100 in the total (state + federal) SSI maximum benefit on the county enrollment rate. I will also examine flows into and out of SSI, including application rates, award rates, migration rates, death rates, and employment rates as outcomes. I include county fixed effects, to control for time invariant characteristics of the county, and border pair by year fixed effects to make this a comparison between neighboring counties in the same year, where the size of the state supplement varies between the two counties. In the baseline specification I do not include additional controls (X_{ct}). For robustness, I can include other time-varying county controls, like the unemployment rate, or age distribution, which might separately affect outcomes. Because the analysis relies on the comparison of cross border counties, I create a separate panel for each border county pair and stack these panels. Since the variation in treatment occurs at the state level, I correct standard errors for clustering at the state level.[10]

The identifying assumption is that SSI enrollment rates and other outcomes would have

[10]This will account for the fact that a given county-year observation might show up in the sample multiple times.

evolved similarly in the neighboring counties, if not for the differences in state supplements and maximum benefit levels. Because there have been changes in SSI state supplements over time, I can verify that this is true prior to the changes by looking for parallel pre-trends and I can also verify that observable characteristics are balanced between neighboring counties where the maximum benefit is different.

To identify the causal effect of SSI generosity on SSI decisions, using differences in state SSI supplement generosity between neighboring counties on the state border, I must assume that within a border pair of counties, the level of generosity is as good as random. If this is the case, we would expect characteristics between the counties to be similar on average. In Table 1 I provide average population, labor market, industry composition, and housing market characteristics between border counties where one has a higher state SSI supplement and the other has a lower state SSI supplement. Column (5) tests to see if average characteristics are different between the higher and lower supplement county in the border pair, after controlling for border pair fixed effects. I also include average characteristics for all counties and all border counties for reference. I also include measures of SSI participation, which we would expect to differ if the state supplements affect SSI outcomes. On average, border counties are similar to all counties in terms of both population shares, labor market measures, and industry shares. Among neighboring border counties, counties with higher SSI supplements and counties with lower SSI supplements are similar on average along demographic and labor market dimensions. The differences between subgroup populations are small between higher and lower SSI supplement neighboring counties.[11] The same is true for both QCEW place of work employment measures and LODES place of residence employment measures. There is even similarity in the pay distribution of workers in high and low SSI supplement neighbors. Differences in housing values are also small. Only one characteristic is significantly different at the five percent level, the share of employment in hospitality. This pattern is consistent with there not being differential selection between neighboring high supplement and low

[11] The averages in columns (3) and (4) do not correspond to the averages in column (2) since counties next to many cross-border neighbors are over represented in the analysis dataset.

supplement counties.

In contrast, I provide average SSI measures in the bottom panel of Table 1. Among border county pairs, the county with higher benefit levels have significantly higher SSI recipient rates, application rates, and award rates. There are 3.7 more SSI recipients per 1,000 residence in higher supplement counties than in their neighboring county with lower, or no, supplement. In the next section I document how responsive SSI decisions are to SSI benefit generosity.

5 Results

Effects on SSI Enrollment

In Table 2, I estimate the effect of total (state plus federal) SSI benefit generosity on total and group specific SSI enrollment rates.[12] The maximum SSI Benefit is measured in hundreds of dollars. A $100 increase in the maximum SSI benefit is associated with an additional 0.32 SSI claimants for every 100 residents. The average SSI enrollment rate is 2.73. During the sample period, the average federal SSI maximum benefit is $665, suggesting that a 15 percent (100/665) increase in benefits is associated with a 11.7 (0.32/2.73) percent increase in SSI enrollment. In columns (2) through (6) I explore impacts of SSI generosity on enrollment for different types, and ages of claimants. The effect for aged SSI claimants is large, positive, and statistically significant with an effect size of 1.02 while the effect for disabled individuals is close to zero and insignificant. When I look at age groups, an extra $100 state supplement is associated with a marginally significant additional 0.22 claimants for every 100 children under 18, an insignificant 0.14 increase among adults 18 to 64, and a large, significant increase of 1.42 claimants for every 100 adults over 64. Notably, these effects are slightly larger than those in column (2) which captures SSI recipients in the aged category. This estimate includes both elderly recipients that meet

the income-eligibility criteria only (aged)

[12]Because the maximum federal benefit is uniform across place within a year, and pair-by-year fixed effects are included, these estimates are the same as if I only included the state-level supplement.

and those that meet both the income- and disability-eligibility criteria, suggesting changes in participation in both of these groups among the elderly. When SSI benefits become more generous, there is a shift in participation among the elderly, with no evidence of changes among the working age, but potentially some changes among child recipients.

Event Study Evidence

Before examining other outcomes, I first explore event study evidence to evaluate whether the identifying assumptions seem plausible. As seen in Figure 4 the SSI state supplement levels fluctuate over time and across states. For each border county pair I identify the largest year-to-year change in the SSI state supplement. I then compare the SSI enrollment rate in the county that experienced this change relative to the bordering county in a different state before and after the change, as a function of the dollar amount of the change, as follows

$$Y_{cpt} = \sum_{\tau=-6}^{6} \beta_\tau \mathit{Change\ Amount\ (\$100)}_c * (\tau\, \mathit{Years\ from\ Change})_t + \delta_c + \phi_{pt} + \varepsilon_{cpt} \qquad (2)$$

where the outcome is the SSI enrollment rate for county c in border pair p in year t. This is regressed on a set of year indicators, interacted with a continuous measure that equals the size of the change (in hundreds of dollars) if the county is in the state that experienced the change in the SSI benefit, and equals zero if the county is in the neighboring state. As such, the β_τ trace out the difference in SSI enrollment for a 100 dollar increase in the benefit amount in the county that experienced the change relative to the neighboring county. The interaction in $t-1$ is omitted as the base year, so all estimates are relative to $t-1$. As before, I include county and border pair-by-year fixed effects, with standard errors corrected for clustering at the state level. This specification allows me to see if SSI enrollment rates were trending similarly in the treated county and in the neighboring border county prior to the change, and to see how enrollment evolved after SSI generosity changed. I include

Change Amount as a continuous variable rather than as a dummy variable, as sometime the change is an increase in SSI generosity and other times it is a reduction, which should affect SSI enrollment in the opposite direction if there is an effect at all.

The β_τ coefficients from equation (2) are provided in Figure 4. In the 6 years prior to the change, there are no significant differences or trends in SSI enrollment rates between the treated counties and neighboring counties. However, in the year that the change occurs, there is a sharp, persistent increase of 0.2 recipients per 100 residents in the SSI enrollment rate for a 100 dollar increase in the SSI state supplement. This effect is only significant at the ten percent level in any give year, but jointly after the event there is a 0.22 percentage point increase in the SSI recipiency rate (p-value 0.03).

The immediate change in enrollment is perhaps surprising. A change in enrollment can be explained by several channels. SSI enrollment is a stock variable, with inflows –through applications, awards, and the mobility of SSI recipients– and outflows through program exit, mortality, and, at the county-level, migration. If the increase in SSI generosity encouraged people to apply who would not have otherwise applied with the smaller benefits, we would expect to observe a more gradual increase in SSI enrollment, as this would only change the inflow to enrollment and it takes time to gain access to SSI after application. The same is true for award rates. As such, it is likely that this effect is driven by a change in outflows, which could result in an immediate change in the recipiency rate.

Mechanisms: Effects on SSI Inflows and Outflows

I next document the effects of SSI generosity on these potential inflows and outflows in Table 3. First, I document changes in application and award rates. Unfortunately, the application and awards data only covers working age claimants, while the changes in enrollment are concentrated among older and younger claimants, so these measures might miss some change. As seen in Table 3 changes in SSI generosity has no significant effect on total application or award rates.[13] This is perhaps not surprising, since the change in recipiency rates is immediate while these inflows would affect enrollment rates more gradually. It seems unlikely that moderate changes in benefit generosity significantly change the decision to apply for and be awarded SSI. I also do not observe changes in in-migration from out of state. For a $100 increase in the maximum benefit, there is an insignificant 0.09 percentage point drop in the in-migration rate.

Turning to outflows in columns (4)-(6), I do not observe significant changes in migration out of the county to a different state. However, there are significant changes in death rates and employment rates. A $100 increase in the maximum SSI benefit is associated with a 0.09 percentage point increase in the death rate, calculated using CDC data. This is the opposite of what we would expect from an increase in SSI generosity. If anything, this would lead to lower SSI enrollment rates among the elderly.[14] In column (6) I find that a $100 increase in the maximum SSI benefit leads to a 2.88 percentage point decrease in the county level employment rate. This is a very large drop, even larger than the change in actually SSI enrollment. This is however not implausible. Individuals can still work and receive SSI benefits. Since this is just capturing employment at the extensive margin, it could reflect recipients who worked very little no longer working for small amounts of money. Some of these people would have become ineligible for SSI (due to the means tests) but others might have still been earning under the countable income threshold. Thus, an increase in benefit levels could lead to a bigger change in employment than the change in SSI enrollment.

If more generous benefits keep people from participating in the labor market, this would reflect a moral hazard employment disincentive created by the program. This could suggest inefficiencies are introduced by SSI. In Table 4 I estimate the effect of the maximum SSI

[13] For completeness, I look at subgroup specific application and award rates by age group in Appendix Table A2, but only see a small, significant decrease in applications for adults ages 40-54, with no effects on award rates.

[14] In Appendix Table A3 I look at the effect on age specific death rates. The entire effect is concentrated among individuals over 64. In Appendix Table A4 I explore separate causes of death among those over 64 and see that most of the increase is due to disease related deaths, but there are small significant increases in deaths from external causes or from drug and alcohol related deaths.

benefit for individuals on employment rates for different age groups. The QCEW does not provide age-specific employment measures, but the LODES allows me to look at employment rates for specific age groups. The LODES provides place of residence measures of employment, but as noted above, since the LODES is provided at the Census Block level, there is significant noise infusion for to maintain privacy, and this noise gets aggregated up to the county level. The point estimate on total employment rates in the LODES is similar to the QCEW, but as expected the standard errors are much larger. I estimate large, but insignificant, decreases in employment rates for 30-54 year-olds (-4.77) and for individuals over 54 (-3.55). Relative to the mean, the change in employment rates is the largest for individuals over 55 (13.2 percent). The group over 54 corresponds to the same age group that saw the largest declines in SSI enrollment. Parents of children receiving SSI are also likely to be between 30 and 54, which might explain the large estimates for that group. Although noisy, these patterns are consistent with an employment disincentive associated with more generous SSI benefits.

5.1 Robustness

I next explore robustness of the SSI enrollment results in Table 5. One concern is that even though counties might be bordering each other, they might be part of different local economies. Differences in local economic conditions could lead to differences in SSI enrollment or employment rates. In column (2) I limit the sample to border county pairs in the same commuting zone. This sample is about one quarter the size, but still yields similar results. In column (3) I weight each county by its total population at the beginning of the sample, in 2002. This does not significantly change the estimated effect of SSI generosity on SSI enrollment. in column (4) I control for the annual unemployment rate, age shares (under 18, 18-30, 30-54, 55-64, over 64), and race shares (non-Hispanic White, non-Hispanic Black, Hispanic, and non-Hispanic Other). This also does not significantly change the estimated relationship. If I measure benefits in logs (column 5), I estimate that a one percent increase in SSI benefits increases SSI enrollment by 1.6 percentage points. Estimates are slightly smaller if I measure benefits in real 2020 dollars (to account for the fact that benefits that are unchanged become less generous over time). I also provide the estimated effects on the total employment rate (from the QCEW) for each of these specifications. Although the estimates change more across specifications, they remain large and statistically significant.

Finally, I omit states that experienced very large changes in benefit levels during the time period. If I omit border pairs that include Connecticut, the effects are virtually the same, for both SSI recipiency rates and employment rates. However, if I omit border pairs that include California there is no longer a significant effect of SSI generosity on SSI enrollment rates and the coefficient is close to zero (- 0.019). There is still a marginally significant decrease in employment rates, but this suggests that the aggregate results are nearly all driven by the large changes in generosity by California.

Case Study: 2009 California Benefit Decrease

As seen in Figure 2, the most stark change in benefits during my sample window (2002-2019) occurred in California between January 2009 and January 2010. In May 2009, the California legislature started to cut the state level supplement. By October 2009, the individual supplement had decreased by $62 a month. Off of the initial level of $230, this represents a 27 percent decrease in the state supplement. During this time there was considerable concern about the drop in benefits and predictions that it would affect SSI enrollment levels and claimant well-being.[15] This change was large and perhaps more salient than other, smaller state-level changes. In Appendix Table A1, I provide summary statistics for California border pairs. Border counties in California (higher benefit counties) and in neighboring states are not statistically different along most dimensions, although there are some industry differences and home values are statistically higher in California counties.

[15] See for example, https://ca4ssi.org/the-cuts, or https://www.gerinkahn.com/california-reduces-ssi-payment-again-in-october-2009/.

In Figure 5, I estimate the California specific event study, comparing California border counties to neighboring border counties before and after 2009. We see flat, parallel trends in SSI enrollment prior to 2009, followed by a sharp 0.2 percentage point decline in SSI enrollment rates. This drop persists through the end of the sample. In Table 6, I estimate a version of equation (1), but interacted the maximum SSI benefit with an indicator that equals one if the border pair has a California county in it, and with an indicator that equals one if the border pair does not have a California county in it, as follows

$$Y_{cpt} = \beta_1 Maximum\ SSI\ Benefit_{ct} * NoCA_{cp} + \beta_2 Maximum\ SSI\ Benefit_{ct} * AnyCA_{cp} + X_{ct}\Gamma + \delta_c + \phi_{pt} + \varepsilon_{cpt} \quad (3)$$

The direct effect of *Maximum SSI Benefit* is excluded, so β_1 and β_2 can be interpreted as the total effect of the benefit increase for non-California pairs and California pairs. I provide the estimated effects from equation (3) on SSI recipiency rates (total and group specific) and on SSI inflows and outflows in Table 6. In the top panel, I observe no significant changes in SSI recipiency rates in non-California county pairs. All of the enrollment effects are concentrated in California. Since the main change in SSI benefits in California during the time period is actually a decrease, I will interpret the coefficients as such. For a $100 decrease in the maximum SSI benefit, total SSI recipiency rates fell by 0.48 percentage points. This is driven by large changes among "aged" claimants (1.77 percentage points) and those over 64 (2.21 percentage points), but there are also smaller, significant changes among child and working age recipients. For a $100 decrease in the maximum SSI benefit, child SSI enrollment rates fall by 0.20 percentage points while adult participation fell by a marginally significant 0.32 percentage points.

When looking at SSI inflows and outflows, there is a marginally significant decline in applications and employment rates in non-California county pairs, but no other changes.[16] In

[16] Event study plots for employment rates suggest some differences in cyclicality between California and its neighbors, this is partially ameliorated if I focus on cross border counties in the same commuting zone

California county pairs a $100 decrease in the maximum SSI benefit is associated with a 0.26 percentage point increase in in-migration from out of state and a marginally significant 0.07 percentage point increase in out-migration to another state. There is a 0.1 percentage point decrease in deaths associated with a drop in the maximum SSI benefit. For a $100 decrease in the maximum SSI benefit, the employment rate increases by 2.18 percentage points.[17] Only the large changes in the SSI state supplement in California affect SSI participation decisions, suggesting SSI recipiency rates are likely inelastic to small changes in benefit generosity.

6 Discussion

Since 2010, we have seen steady declines in SSI application, award, and recipiency rates. Because SSI is a federal program that only varies across individuals endogenously, our understanding of what affects the decision to apply for, and participate in, SSI is severely limited. Exploiting variations in SSI generosity created by state SSI supplements that add on top of the federal policy, I am able to examine a primary question of interest: how does SSI generosity affect SSI participation?

I compare neighboring counties across state borders to find that a $100 increase in the maximum SSI benefit available to an individual increases SSI recipiency rates by 0.32 percentage points. In other words, increasing benefits by 15 percent increases recipiency rates by 11.7 percent. However, these patterns are only present when examining county pairs that include counties from California. In 2009, California experienced a large decrease in the SSI state supplement, falling by $62 (27 percent) between May and October 2009. This is the largest change in benefit generosity during my analysis period. It also received attention from the public and was perhaps more salient to claimants. Event study evidence shows that SSI recipiency rates in California border counties were trending similar to rates

(Figure A2.

[17]For completeness, I provide the estimates corresponding to equation (3) in the bottom panels of Appendix Tables A2, A3, and A4 to look at subgroup specific changes in application, award, and death rates. Changes in death rates and cause of death specific death rates are all driven by California, while there are no changes in applications or award rates in California county pairs.

in neighboring counties in other states but that SSI rates suddenly dropped in December 2009. Consistent with this drop, I find a corresponding increase in employment rates when the maximum SSI benefit falls, suggesting some level of substitution between employment and SSI benefit receipt. I do not find changes in application or award rates.

Overall, I do not find that changes in benefit generosity affect SSI enrollment. Even though the real value of state SSI supplements has fallen over time, this does not explain the decline in SSI enrollment, applications, and awards since 2010. This would suggest that SSI participation is not sensitive to SSI generosity, at least not for moderate changes in SSI generosity. The evidence for California suggests that this might be different for large changes in generosity, but this could also be something specific to the event in California. The decrease in SSI participation and application over the last 15 years is likely not driven by the decrease in real SSI benefit levels.

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7 Tables and Figures

Figure 1: Aggregate SSI Trends: Enrollment, Applications, and Awards

Notes: Aggregate, annual level enrollment, applications, and awards reported.

Source: Author's own calculations using data obtained from the 2022 SSI Annual Statistical Report.

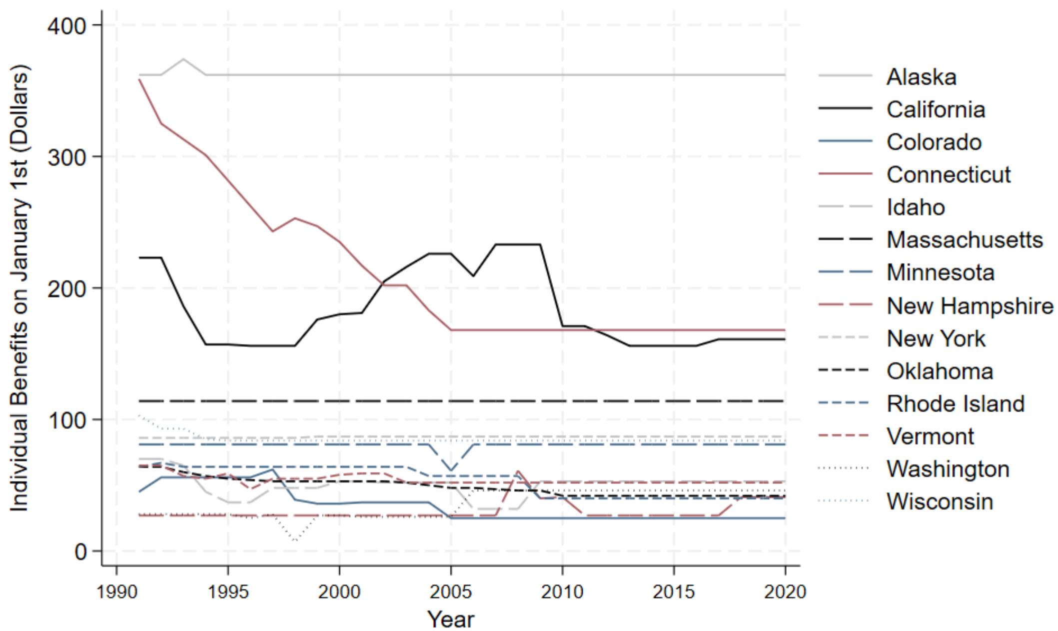

Figure 2: State-level Individual SSI Supplements Over Time

Notes: The maximum individual state supplement is provided. Only states that ever had a state supplement over $35 between 1991 and 2020 are plotted. There are 11 other states that had some supplement (< $35) at some point between 1991 and 2020. Nominal dollars, as reported in the legal code are provided.

Source: Author's own calculations using hand collected state supplements.

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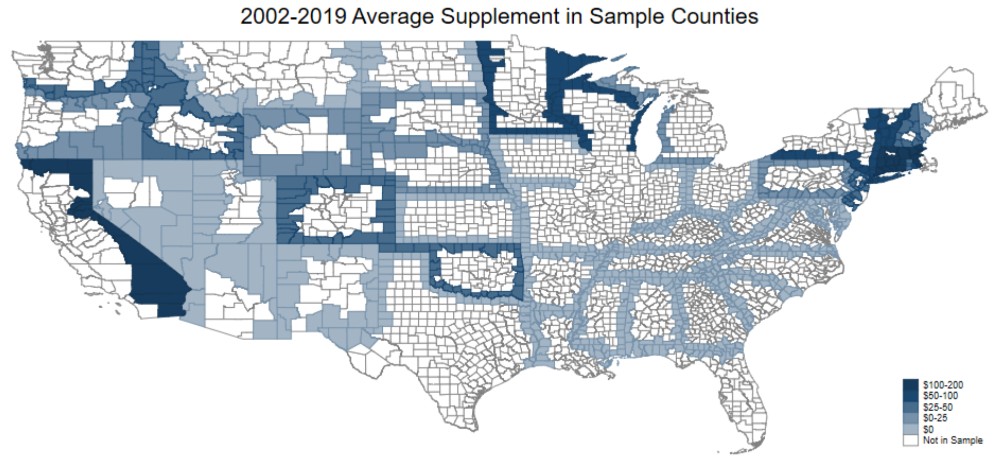

Figure 3: Border County Sample and State-level Individual SSI Supplements Variation

Notes: The average maximum individual state supplement between 2002 and 2019 is provided for counties on state borders that are included in the analysis sample.

Source: Author's own calculations using hand collected state supplements.

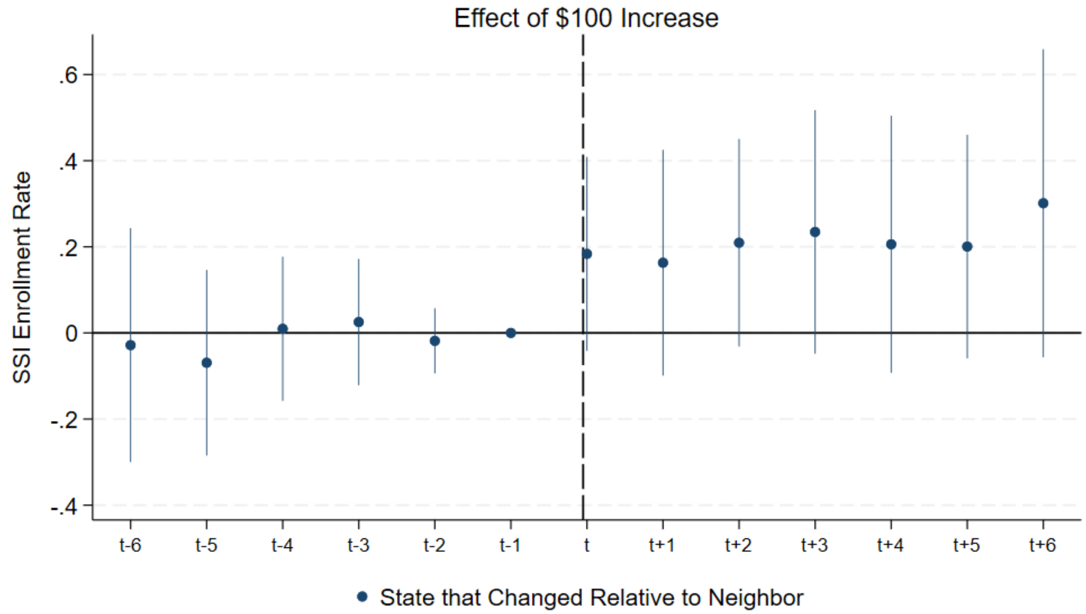

Figure 4: State-level Individual SSI Supplement Event Study

Notes: Sample restricted to border county pairs where at least one county experienced a change in the SSI state supplement. The biggest change, in absolute value is selected as year 0 for the border pair, and the effect of the change (in $100) in the county that experienced the change, relative to the neighbor is plotted for every year. Sample restricted to years between 2002 and 2019 and within 6 years of the benefit change event.

Source: Author's own calculations using SSI county caseloads and hand collected state supplements.

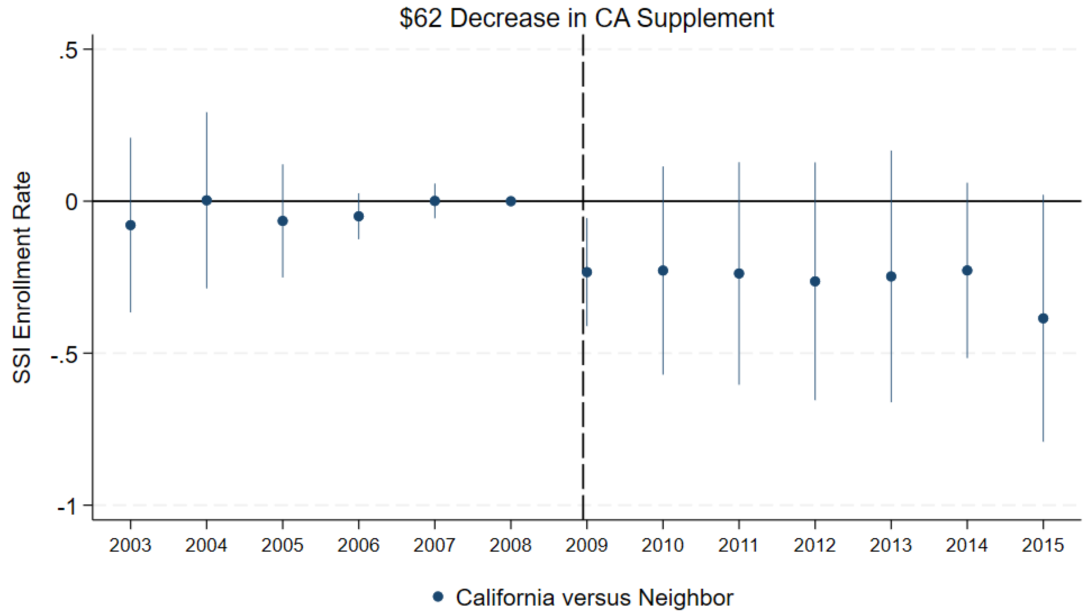

Figure 5: California 2009 Supplement Decrease Event Study

Notes: Sample restricted to border county pairs where one county is in California. The $62 drop in individual level benefits occurred in California between May and October 2009. I estimate county level SSI enrollment rates in California border counties relative to contiguous border counties in a different state before and after 2009. Sample restricted to years between 2003 and 2015.

Source: Author's own calculations using SSI county caseloads and hand collected state supplements.

Table 1: County-level Summary Statistics

	All Counties (1)	Border Counties (2)	Border County Pairs Higher Benefit (3)	Lower Benefit (4)	Difference (5)
Total Population (1,000s)	98.89	97.52	120.56	118.69	1.87
Male Population (1,000s)	48.63	47.76	59.07	58.32	0.75
Female Population (1,000s)	50.27	49.76	61.48	60.37	1.11
Population NH White (1,000s)	64.11	65.22	80.35	82.79	-2.44
Population NH Black (1,000s)	12.76	13.63	12.32	12.94	-0.62
Population NH Other (1,000s)	5.87	5.41	7.54	7.39	0.15
Population Hispanic (1,000s)	16.16	13.27	20.35	15.56	4.78
Population Under 18 (1,000s)	23.53	23.05	28.37	27.33	1.05
Population Under 40 (1,000s)	53.22	51.85	63.84	62.39	1.44
Population 40-54 (1,000s)	20.49	20.41	25.47	25.14	0.33
Population 55-64 (1,000s)	11.55	11.61	14.34	14.34	0.00
Population 65+ (1,000s)	13.63	13.65	16.91	16.82	0.09
Total Employment (1,000s) (QCEW)	42.27	41.14	53.09	52.79	0.30
Average Weekly Wages	662.00	664.72	685.45	677.51	7.94
Natural Resources	0.04	0.04	0.05	0.05	0.01
Construction	0.04	0.04	0.04	0.04	0.00
Manufacturing	0.12	0.12	0.09	0.10	-0.01
Trade	0.19	0.19	0.18	0.19	-0.00
Information	0.01	0.01	0.01	0.01	0.00
Finance	0.04	0.04	0.04	0.04	0.00
Professional	0.06	0.06	0.06	0.06	0.00
Education/Health	0.12	0.12	0.12	0.12	-0.00
Hospitality	0.09	0.10	0.10	0.11	-0.01**
Other	0.02	0.02	0.03	0.03	-0.00
Public	0.21	0.21	0.23	0.21	0.02
Total Jobs (1,000s) (LODES)	38.48	37.86	45.05	47.65	-2.60
Jobs Earning Under 1,250	8.31	8.13	9.21	9.77	-0.56
Jobs Earning 1,250-3,333	14.45	13.94	15.45	16.98	-1.52
Jobs Earning Over 3,333	15.71	15.80	20.39	20.90	-0.51
Median Home Value	124.23	126.48	160.72	157.48	3.25
SSI Recipient Rate	2.65	2.68	2.13	1.76	0.37***
SSI Aged Recipient Rate	1.70	1.60	1.38	1.08	0.31**
SSI Disabled Recipient Rate	2.72	2.74	2.08	1.68	0.40***
SSI Child Recipient Rate	1.56	1.56	1.16	1.01	0.16**
SSI Application Rate	0.59	0.57	0.39	0.35	0.04**
SSI Award Rate	0.23	0.22	0.15	0.14	0.01
Observations	56,675	21,312	12,005	10,851	

Notes: Sample restricted to counties between 2002 and 2019. Column (1) includes one observation for each county and year. Column (2) restricts the sample to counties on state borders. Columns (3) and (4) restrict the sample to counties in county border pairs. Counties are assigned to multiple border county pairs, so each county-year observation might appear multiple times. Means separately reported for counties with the larger state supplement in the border county pair in columns (3) and (4). Column (5) provides the differences between higher benefit and lower benefit counties, with border pair fixed effects. If there is no difference between the benefit within a county pair the county pair is excluded from columns (3)-(5). Standard errors are corrected for clustering at the state level. $p < 0.01$ ***, $p < 0.05$ **, $p < 0.1$ *.

Table 2: Effect of State SSI Supplement Generosity on SSI Recipiency Rates

	SSI Recipiency Rates					
	Total	Aged	Disabled	Under 18	18 to 64	Over 64
	(1)	(2)	(3)	(4)	(5)	(6)
Maximum SSI Benefit ($100s)	0.319**	1.017**	-0.154	0.181*	0.139	1.415**
	(0.120)	(0.489)	(0.247)	(0.096)	(0.159)	(0.533)
Dependent Mean	2.73	1.67	2.82	1.59	2.91	3.72
Observations	43,908	43,908	43,908	43,908	43,908	43,908

Notes: Sample restricted to border counties between 2002 and 2019. Counties are assigned to border county pairs, so each county-year observation might appear multiple times. The maximum individual benefit is measured in hundreds of nominal dollars. The SSI enrollment rates are constructed by dividing the number of recipients at the county level by the corresponding population at the county level, and then multiplied by 100. County fixed effects are included to control for time invariant characteristics of the county. County pair by year fixed effects are also included, making this a comparison between bordering counties that have different SSI state supplements. Standard errors are corrected for clustering at the state level. $p < 0.01$ ***, $p < 0.05$ **, $p < 0.1$ *.

Table 3: Effect of State SSI Supplement Generosity on Flows Into and Out of SSI

	SSI Inflows			SSI Outflows		
	SSI Application Rate Rate (1)	SSI Award Rate Rate (2)	In Migration Rate (3)	Out Migration Rate (4)	Death Rate (5)	Employment Rate (6)
Maximum SSI Benefit ($100s)	-0.034	-0.010	-0.088	-0.008	0.086***	-2.875***
	(0.030)	(0.025)	(0.150)	(0.070)	(0.027)	(0.694)
Dependent Mean	0.58	0.22	2.30	2.20	0.97	35.04
Observations	32,228	32,228	42,464	42,634	43,896	43,920

Notes: Sample restricted to border counties between 2002 and 2019. Counties are assigned to border county pairs, so each county-year observation might appear multiple times. The maximum individual benefit is measured in hundreds of nominal dollars. The rates are constructed by dividing the number of recipients at the county level by the corresponding population at the county level, and then multiplied by 100. Award and application rates are only available for individuals who go through the disability determination system, so children and "aged" recipients are not included. Migration rates capture the total number of people who move into the county from out of state and who move out of the county to a different state, per 100 residents. County fixed effects are included to control for time invariant characteristics of the county. County pair by year fixed effects are also included, making this a comparison between bordering counties that have different SSI state supplements. Standard errors are corrected for clustering at the state level. $p < 0.01$ ***, $p < 0.05$ **, $p < 0.1$ *.

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Table 4: Effect of State SSI Supplement Generosity on Local Employment Rates, by Group

	Employment per 100 residents				
	QCEW	LODES	LODES	LODES	LODES
	All	All	30	30-54	Over 55
	(1)	(2)	(3)	(4)	(5)
Maximum SSI Benefit ($100s)	-2.875***	-2.947	-0.824	-4.768	-3.553
	(0.694)	(4.008)	(6.478)	(7.075)	(3.062)
Dependent Mean	35.04	36.77	61.78	62.72	26.94
Observations	43,920	43,920	43,920	43,920	43,920

Notes: Sample restricted to border counties between 2002 and 2019. Counties are assigned to border county pairs, so each county-year observation might appear multiple times. The maximum individual benefit is measured in hundreds of nominal dollars. The rates are constructed by dividing the number of recipients at the county level by the corresponding population at the county level, and then multiplied by 100. The outcome in column (1) comes from the QCEW and represents place of work employment. Outcomes in columns (2)-(5) come from the LODES and represent employment based on place of residence. However, since this data is reported at the Census Block level it contains significant noise infusion before being aggregated to the county level. County fixed effects are included to control for time invariant characteristics of the county. County pair by year fixed effects are also included, making this a comparison between bordering counties that have different SSI state supplements. Standard errors are corrected for clustering at the state level. $p < 0.01$ ***, $p < 0.05$ **, $p < 0.1$ *.

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Table 5: Robustness of Effect of State SSI Supplement on SSI Enrollment

	Baseline (1)	Same CZ County Pairs (2)	Population Weighted (3)	Include Controls (4)	Log Maximum Benefits (5)	Benefits Inflation Adjusted (6)	Drop Connecticut Pairs (7)	Drop California Pairs (8)
					Total SSI Rate			
Maximum SSI Benefit ($100s)	0.319**	0.328**	0.383***	0.324**	1.622**	0.200***	0.311**	-0.019
	(0.120)	(0.150)	(0.110)	(0.121)	(0.684)	(0.067)	(0.126)	(0.181)
Dependent Mean	2.73	2.76	2.73	2.73	2.73	2.73	2.75	2.74
Observations	43,908	10,584	43,908	43,892	43,908	43,908	43,224	42,864
					Employment Rate			
Maximum SSI Benefit ($100s)	-2.875***	-3.078***	-4.163*	-2.863***	-13.886**	-1.489***	-3.125***	-4.294*
	(0.694)	(0.776)	(2.413)	(0.938)	(5.426)	(0.549)	(0.759)	(2.177)
Dependent Mean	35.04	36.56	35.04	35.04	35.04	35.04	34.95	35.01
Observations	43,920	10,584	43,920	43,904	43,920	43,920	43,236	42,876

Notes: Sample restricted to border counties between 2002 and 2019. Counties are assigned to border county pairs, so each county-year observation might appear multiple times. The maximum individual benefit is measured in hundreds of nominal dollars. The rates are constructed by dividing the number of recipients at the county level by the corresponding population at the county level, and then multiplied by 100. County fixed effects are included to control for time invariant characteristics of the county. County pair by year fixed effects are also included, making this a comparison between bordering counties that have different SSI state supplements. Column (2) weights each county by its total population in 2002. Column (3) controls for the county annual unemployment rate and race/ethnicity, and age shares. Column (4) uses log maximum benefits. Column (5) uses the maximum benefit in real 2020 dollars. Column (6) Rounds benefits to the nearest dollar, to not exploit changes less than one dollar which are due to reporting error. Column (7) excluded border pairs that include Connecticut counties while column (8) excluded border pairs that include California counties. Standard errors are corrected for clustering at the state level. $p < 0.01$ ***, $p < 0.05$ **, $p < 0.1$ *.

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Table 6: Effects of State SSI Supplement Generosity on Outcomes, in California and non-California Pairs

	SSI Recipiency Rates					
	Total	Aged	Disabled	Under 18	18 to 64	Over 64
	(1)	(2)	(3)	(4)	(5)	(6)
Maximum SSI Benefit ($100s)*Non-CA Border	-0.019	-0.513	-0.510	0.153	-0.231	-0.215
	(0.181)	(0.451)	(0.358)	(0.235)	(0.233)	(0.519)
Maximum SSI Benefit ($100s)*CA Border	0.484***	1.765***	0.020	0.195**	0.320*	2.211***
	(0.089)	(0.406)	(0.266)	(0.079)	(0.168)	(0.457)
	SSI In and Out Flow					
	Application Rate	Award Rate	In-Migration Rate	Out-Migration Rate	Death Rate	Employment Rate
	(1)	(2)	(3)	(4)	(5)	(6)
Maximum SSI Benefit ($100s)*Non-CA Border	-0.108*	-0.021	0.266	0.123	0.050	-4.294*
	(0.057)	(0.030)	(0.229)	(0.161)	(0.052)	(2.176)
Maximum SSI Benefit ($100s)*CA Border	0.007	-0.005	-0.261**	-0.072*	0.103***	-2.180***
	(0.031)	(0.040)	(0.112)	(0.036)	(0.032)	(0.489)
Dependent Mean	0.58	0.22	2.30	2.20	0.97	35.04
Observations	32,228	32,228	42,464	42,634	43,896	43,920

Notes: Sample restricted to border counties between 2002 and 2019. Counties are assigned to border county pairs, so each county-year observation might appear multiple times. The maximum individual benefit is measured in hundreds of nominal dollars. The rates are constructed by dividing the number of recipients at the county level by the corresponding population at the county level, and then multiplied by 100. County fixed effects are included to control for time invariant characteristics of the county. County pair by year fixed effects are also included, making this a comparison between bordering counties that have different SSI state supplements. Estimation is analogous to equation (1), but the maximum benefit is interacted with either an indicator for the border pair does not include a California county or an indicator for the border pair does include a California county. The direct effect of the maximum benefit is not included, so these are each interpreted as the total effect. Standard errors are corrected for clustering at the state level. $p < 0.01$ ***, $p < 0.05$ **, $p < 0.1$ *.

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Appendix A. Supplementary Analyses (for online publication)

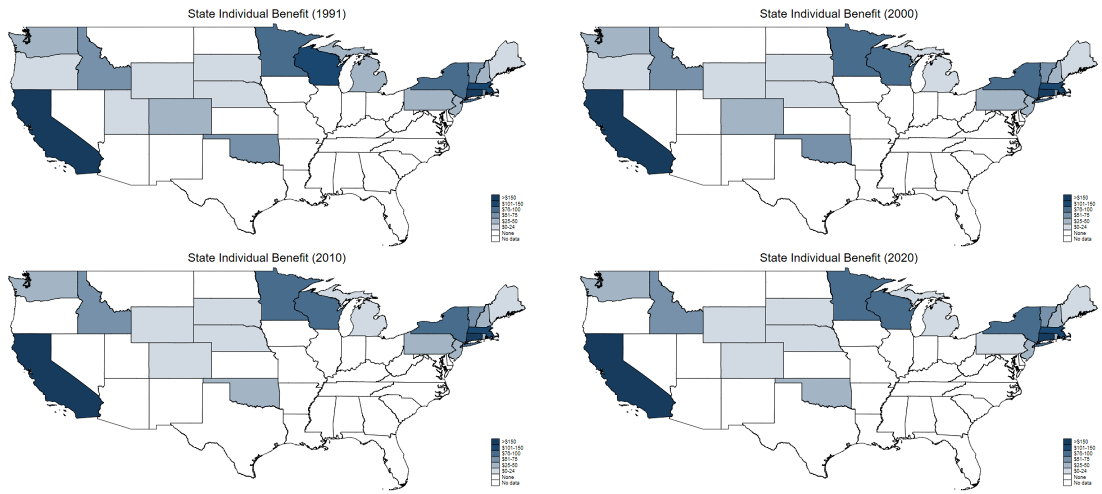

Figure A1: State SSI Supplements Over Time

Notes: The maximum individual state supplement in each year is provided. Nominal dollars, as reported in the legal code are provided.

Source: Author's own calculations using hand collected state supplements.

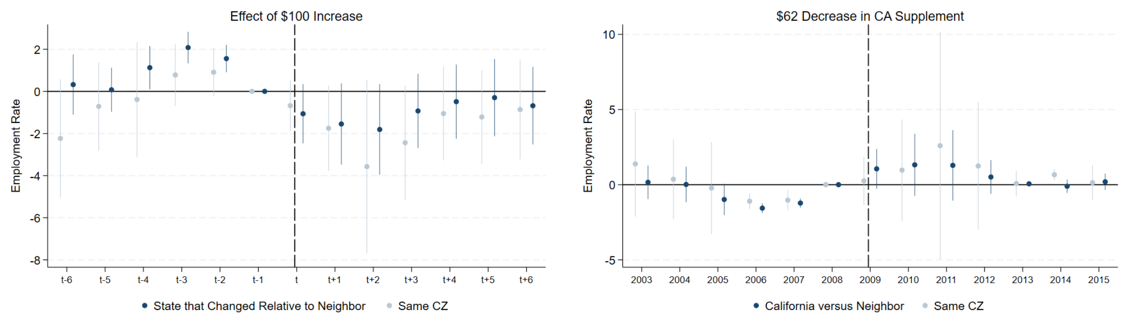

Figure A2: Event Study Evidence SSI Supplement Changes on Employment Rates

Notes: In the left panel the sample is restricted to border county pairs where at least one county experienced a change in the SSI state supplement. The biggest change, in absolute value is selected as year 0 for the border pair, and the effect of the change (in $100) in the county that experienced the change, relative to the neighbor is plotted for every year. Sample restricted to years between 2002 and 2019 and within 6 years of the benefit change event. In the right panel the sample is restricted to border county pairs where one county is in California. The $62 drop in individual level benefits occurred in California between May and October 2009. I estimate county level SSI enrollment rates in California border counties relative to
2 contiguous border counties in a different state before and after 2009. Sample restricted to years between 2003 and 2015.

Source: Author's own calculations using SSI county caseloads and hand collected state supplements.

Table A1: California County-Pair County-level Summary Statistics

	Border County Pairs		
	Higher Benefit	Lower Benefit	Difference
	(1)	(2)	(3)
Total Population (1,000s)	354.48	252.19	102.29
Male Population (1,000s)	176.72	126.76	49.96
Female Population (1,000s)	177.76	125.43	52.33
Population NH White (1,000s)	149.65	149.74	-0.09
Population NH Black (1,000s)	25.25	17.58	7.66
Population NH Other (1,000s)	25.38	21.36	4.02
Population Hispanic (1,000s)	154.20	63.51	90.69
Population Under 18 (1,000s)	97.76	59.52	38.24
Population Under 40 (1,000s)	206.02	134.53	71.49
Population 40-54 (1,000s)	70.99	51.35	19.64
Population 55-64 (1,000s)	36.84	30.48	6.36
Population 65+ (1,000s)	40.63	35.84	4.79
Total Employment (1,000s) (QCEW)	114.12	110.33	3.80
Average Weekly Wages	704.33	720.81	-16.48
Natural Resources	0.04	0.06	-0.02
Construction	0.05	0.05	-0.00
Manufacturing	0.04	0.07	-0.03*
Trade	0.16	0.18	-0.02*
Information	0.01	0.01	-0.00
Finance	0.04	0.03	0.00
Professional	0.06	0.08	-0.02
Education/Health	0.09	0.09	0.00
Hospitality	0.17	0.17	0.00
Other	0.04	0.02	0.01**
Public	0.29	0.18	0.11**
Total Jobs (1,000s) (LODES)	118.84	99.80	19.05
Jobs Earning Under 1,250	26.12	19.47	6.65
Jobs Earning 1,250-3,333	44.98	43.35	1.63
Jobs Earning Over 3,333	47.74	36.97	10.77
Median Home Value	220.02	183.91	36.10*
SSI Recipient Rate	3.38	1.88	1.50*
SSI Aged Recipient Rate	3.94	1.45	2.49
SSI Disabled Recipient Rate	3.25	1.71	1.55*
SSI Child Recipient Rate	0.98	0.98	0.01
SSI Application Rate	0.50	0.41	0.09
SSI Award Rate	0.21	0.18	0.03
Observations	522	522	

Notes: Sample restricted to counties between 2002 and 2019 that are in a California county pair where one county is in California. Columns (1) and (2) restrict the sample to counties in county border pairs. Counties are assigned to multiple border county pairs, so each county-year observation might appear multiple times. Means separately reported for counties with the larger state supplement in the border county pair in columns (1) and (2). Column (3) provides the differences between higher benefit and lower benefit counties, with border pair fixed effects. If there is no difference between the benefit within a county pair the county pair is excluded from columns (1)-(3). Standard errors are corrected for clustering at the state level. $p < 0.01$ ***, $p < 0.05$ **, $p < 0.1$ *.

Table A2: Effect of State SSI Supplement on SSI Applications and Awards for Subgroups

	Application Rates by Group				Award Rates by Group			
	Total	Below 40	40-54	55-64	Total	Below 40	40-54	55-64
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Maximum SSI Benefit ($100s)	-0.034	-0.013	-0.151**	-0.064	-0.010	0.029	-0.040	-0.005
	(0.030)	(0.043)	(0.069)	(0.041)	(0.025)	(0.026)	(0.039)	(0.036)
Maximum SSI Benefit ($100s)*Non-CA Border	-0.108*	-0.055	-0.167*	-0.184***	-0.021	-0.009	-0.038	-0.098**
	(0.057)	(0.073)	(0.093)	(0.065)	(0.030)	(0.036)	(0.040)	(0.044)
Maximum SSI Benefit ($100s)*CA Border	0.007	0.011	-0.141	0.002	-0.005	0.050	-0.041	0.046
	(0.031)	(0.056)	(0.099)	(0.051)	(0.040)	(0.041)	(0.063)	(0.050)
Dependent Mean	0.58	0.48	0.71	0.26	0.22	0.10	0.22	0.15
Observations	32,228	32,228	32,228	32,228	32,228	32,228	32,228	32,228

Notes: Sample restricted to border counties between 2002 and 2019. Counties are assigned to border county pairs, so each county-year observation might appear multiple times. The maximum individual state supplement is measured in hundreds of nominal dollars. The rates are constructed by dividing the number of recipients at the county level by the corresponding population at the county level, and then multiplied by 100. Award and application rates are only available for individuals who go through the disability determination system, so children and "aged" recipients are not included. County fixed effects are included to control for time invariant characteristics of the county. County pair by year fixed effects are also included, making this a comparison between bordering counties that have different SSI state supplements. Standard errors are corrected for clustering at the state level. $p < 0.01$ ***, $p < 0.05$ **, $p < 0.1$ *.

Table A3: Effect of State SSI Supplement on Death Rates for Subgroups

	Death Rates by Group				
	Total	Below 15	15-39	40-64	Over 64
	(1)	(2)	(3)	(4)	(5)
Maximum SSI Benefit ($100s)	0.086***	-0.001	0.009	-0.002	0.364***
	(0.027)	(0.003)	(0.011)	(0.032)	(0.115)
Maximum SSI Benefit ($100s)*Non-CA Border	0.050	-0.006	-0.002	-0.059	0.327
	(0.052)	(0.005)	(0.012)	(0.052)	(0.278)
Maximum SSI Benefit ($100s)*CA Border	0.103***	0.002	0.015	0.026	0.382***
	(0.032)	(0.002)	(0.014)	(0.032)	(0.114)
Dependent Mean	0.97	0.01	0.06	0.54	4.61
Observations	43,896	43,920	43,920	43,920	43,896

Notes: Sample restricted to border counties between 2002 and 2019. Counties are assigned to border county pairs, so each county-year observation might appear multiple times. The maximum individual state supplement is measured in hundreds of nominal dollars. The rates are constructed by dividing the number of recipients at the county level by the corresponding population at the county level, and then multiplied by 100. Death rates are constructed from CDC death and population counts. They are reported in year bins that do not correspond to the year bins used to measure SSI and employment rates. Measures are aggregated over both sexes. Age-by-sex cells with fewer than 10 deaths are suppressed. County fixed effects are included to control for time invariant characteristics of the county. County pair by year fixed effects are also included, making this a comparison between bordering counties that have different SSI state supplements. Standard errors are corrected for clustering at the state level. $p < 0.01$ ***, $p < 0.05$ **, $p < 0.1$ *.

Table A4: Effect of State SSI Supplement on Over 64 Death Rates by Cause

	Over 64 Death Rates by Cause			
	Total	Disease	External	Drug and Alcohol
	(1)	(2)	(3)	(4)
Maximum SSI Benefit ($100s)	0.364***	0.333**	0.021**	0.003*
	(0.115)	(0.140)	(0.009)	(0.002)
Maximum SSI Benefit ($100s)*Non-CA Border	0.327	0.139	-0.002	-0.001
	(0.278)	(0.312)	(0.014)	(0.002)
Maximum SSI Benefit ($100s)*CA Border	0.382***	0.428***	0.032***	0.006***
	(0.114)	(0.115)	(0.004)	(0.002)
Dependent Mean	4.61	4.29	0.03	0.00
Observations	43,896	43,896	43,896	43,896

Notes: Sample restricted to border counties between 2002 and 2019. Counties are assigned to border county pairs, so each county-year observation might appear multiple times. The maximum individual state supplement is measured in hundreds of nominal dollars. The rates are constructed by dividing the number of recipients at the county level by the corresponding population at the county level, and then multiplied by 100. Death rates are constructed from CDC death and population counts. They are reported in year bins that do not correspond to the year bins used to measure SSI and employment rates. Measures are aggregated over both sexes. Age-by-sex cells with fewer than 10 deaths are suppressed. County fixed effects are included to control for time invariant characteristics of the county. Disease related death includes cancer and neoplasms. County pair by year fixed effects are also included, making this a comparison between bordering counties that have different SSI state supplements. Standard errors are corrected for clustering at the state level. $p < 0.01$ ***, $p < 0.05$ **, $p < 0.1$ *.

Table A5: Effect of State SSI Supplement on Participation Rates in other Social Programs

	SSDI ecipiency Rate (1)	SNAP Enrollment Rate (2)
Maximum SSI Benefit ($100s)	0.228	-1.223
	(0.179)	(3.706)
Maximum SSI Benefit ($100s)*Non-CA Border	-0.403	-21.439
	(0.297)	(16.362)
Maximum SSI Benefit ($100s)*CA Border	0.460***	1.814***
	(0.123)	(0.606)
Dependent Mean	5.73	13.96
Observations	38,960	28,030

Notes: Sample restricted to border counties between 2002 and 2019. Counties are assigned to border county pairs, so each county-year observation might appear multiple times. The maximum individual state supplement is measured in hundreds of nominal dollars. The rates are constructed by dividing the number of recipients at the county level by the corresponding population at the county level, and then multiplied by 100. SSDI recipiency rates obtained from annual SSA reports. Supplemental Nutrition Assistance Program (SNAP) enrollment rated obtained from the USDA. County pair by year fixed effects are also included, making this a comparison between bordering counties that have different SSI state supplements. Standard errors are corrected for clustering at the state level. $p < 0.01$ ***, $p < 0.05$ **, $p < 0.1$ *.

Appendix B. Data Appendix

7.1 State Supplementation Database

We find our state supplementation levels from two primary sources: editions of the House of Representative's Ways and Means Committee's Green Book (specifically the 1994, 1996, and 2002 editions) and the Social Security Administration's Research Policy and Analysis Website with recent years' levels of supplementation on a state level. For 1991 through 2002, we rely on the Ways and Means Committee data; for 2002 through 2020, we refer to the Social Security Administration's data. We find that in 2002 the data from both sources agree. The Ways and Means Committee Green Book provides information for several years prior. For example, the 1996 version provides state-level supplement values each year going back to 1990. Although the Ways and Means Committee reports that this is the supplement levels, for aged recipients, cross validation with the SSA Research Policy and Analysis website suggest that the values are the same for disabled individuals, at least in 2002. The Green Book also notes, "In most States these maximums apply also to blind or disabled SSI recipients who are living in their own households; but some States provide different benefit schedules for each category."

The supplementation levels are the monthly payment for each state as of January of each year. Two levels of supplementation are given – living independently and filing singly or living independently and filing jointly with another person also receiving the SSI payments – and both are considered for those receiving supplemental security income due to a disability.

27 states currently provide no additional state supplementation under these classifications: Alabama, Arizona, Arkansas, Delaware, District of Columbia, Florida, Georgia, Hawaii, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Mississippi, Missouri, Montana, New Mexico, North Carolina, North Dakota, Ohio, Oregon, South Carolina, Texas, Tennessee, Virginia, and West Virginia. Of these, 3 offered some supplementation at the beginning of our sample period and later stopped: the District of Columbia, Hawaii, and Oregon. Illinois offers supplementation amounts on a case-by-case basis. So, we omitted them from our sample as we have been unable to find reliable data consistent with the rest of our sample.

Specific notes about the data that warrant recording here:

- The SSA data record supplementation levels in dollars and cents whereas the Green Book records levels rounded to the nearest dollar. We round all supplements to the nearest dollar for consistency to prevent our regression from interpreting this difference in our time-fixed effects.
- In Washington and Minnesota, the counties in which Seattle and Minneapolis fall offer different levels of supplementation than the counties in the rest of the state. The levels given are the levels for those counties as we cannot find the supplementation levels for the other counties.
- Like Illinois, in 1995 and 1996 Connecticut administered supplementation on a case-by-case basis, so those observations are also omitted.

An additional source that we used to corroborate the data we collected was `https://brendanconley.com/faq/questions-about-benefits/optional-state-supplements-for-ssi-in-each-state/`

7.2 Data Sources

SSI Recipients by State and County

Social Security Administration Research, Statistics, and Policy Analysis
`https://www.ssa.gov/policy/docs/statcomps/ssi_sc/index.html`

SSI Applications and Allowances (Awards) by County

Social Security Administration From previous work (Kearney et al., 2021) I have obtained annual counts of SSDI applications and allowances at the ZIP code level. I am grateful to Manasi Deshpande for facilitating the extraction of these data for us. SSA censors these data for privacy purposes: any ZIP code with fewer than 10 SSDI or SSI applications in a given year will have both application measures suppressed, and the same is true for allowances. These data are only provided for applications that go through the disability determination process, so aged recipients are not included. Neither are applicants that are denied for not meeting the means requirements, prior to disability determination.

SEER County Population

National Cancer Institute Surveillance, Epidemiology, and End Results (SEER) Program
`https://seer.cancer.gov/popdata/`

Quarterly Census of Employment and Wages (QCEW)

U.S. Bureau of Labor Statistics
`https://www.bls.gov/cew/downloadable-data-files.htm`

LEHD Origin Destination Employment Statistics (LODES)

Longitudinal Employer-Household Dynamics (LEHD) Origin Destination Employment Statistics (LODES)
`https://lehd.ces.census.gov/data/`

IRS Migration Data

Internal Revenue Service County-to-County Migration Data
`https://www.irs.gov/statistics/soi-tax-stats-migration-data`

CDC Mortality Data

National Center for Health Statistics Mortality Data on Center for Disease Control WONDER
`https://wonder.cdc.gov/mcd.html`

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