Changing patterns of take up and participation in SNAP and the role of out-of-pocket medical expenses

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Abstract

We use longitudinal data from the nationally representative Health and Retirement Survey from 2002 to 2016 to document how SNAP eligibility, participation, and take-up changed over time for older adults. Then, we investigate the role that out-of-pocket medical expenses have played in these changing patterns. We rely upon the state adoption of the Medicaid expansion in 2014 as a source of identifying variation. While the Medicaid expansion did reduce out-of-pocket medical expenses, SNAP participation and take-up did not change among our full sample or our three subgroups (individuals 59 and below, 60-64, and 65 plus or disabled).

Executive Summary

SNAP eligibility and participation rates have been increasing for adults 50 years and older since 2008. At the same time, SNAP participation continues to fall over the life course, with the lowest rates concentrated among individuals 85 years and above. We use longitudinal data from the nationally representative Health and Retirement Survey from 2002 to 2016 to document how SNAP eligibility, participation, and take-up changed over time for older adults. Then, we investigate the role that out-of-pocket medical expenses have played in these changing patterns. We rely upon the state adoption of the Medicaid Expansion in 2014 as a source of exogenous variation.

Given the change in SNAP eligibility rules at age 60, we expect that the household well-being effect would be concentrated in the age 50-59 group and the reduced administrative costs would dominate in the age 60-64 group (since the adults aged 60 and above are allowed to deduct the cost of medical expenses from their gross household income for eligibility and benefit calculation purposes). We find that adoption of the Medicaid expansion was not associated with meaningful changes in SNAP take-up or participation in any of subgroups examined. Importantly, our results were robust to our treatment of state adoption of the broad based categorical eligibility provision.

These findings indicate that out-of-pocket medical expenses are not a significant driver of SNAP take-up decisions for the population below aged 65 and that national efforts to reduce medical expenses for older adults are unlikely to substantively change SNAP take-up or participation.

Introduction

      Food insecurity is an important social issue for a substantial share of the US population, affecting more than 7.3% of persons aged 60 and older, or 5.3 million individuals in 2018 (Ziliak and Gundersen, 2020b). Among those age 50-59, levels of food insecurity are even higher—10.6% (Ziliak and Gundersen, 2020a). The Supplemental Nutrition Assistance Program (SNAP) provides financial assistance to aid low-income households with food purchases. A large literature has probed the nature of the relationship between health and food insecurity and SNAP participation throughout the life course (Gundersen and Ziliak, 2015; Keith-Jennings, Llobrera, and Dean, 2019). Food insecurity is now recognized as a social determinant of health, and screening measures, known as the Hunger Vital Sign (Gundersen, Engelhard, Crumbaugh, and Seligman, 2017; Hager et al., 2010) are now included at intake in many clinical settings (National Quality Forum 2020). However, the role of medical out-of-pocket expenses on the SNAP participation decision, particularly among the older adult population income eligible for SNAP, has received relatively less attention.

The effects of medical out-of-pocket expenses on SNAP could change over time and across populations for several reasons. Increases in insurance coverage could alleviate unexpected medical cost burdens for enrollees, and therefore could influence SNAP participation by decreasing a household's financial instability (Chang, Kim, and Chatterjee, 2018). Medical out-of-pocket expenses could also directly affect SNAP participation through its effects on SNAP eligibility determination, such as allowing for medical deductions, for applicable populations. Finally, the effects of medical out-of-pocket expenses on SNAP could change over time because of generational differences in labor force participation, health behaviors and needs, as well as social policy environments (DePew and Gonzales, 2020; Leveille, Wee, and Iezzoni, 2005), which warrants a fresh look at recent trends and patterns.

This study provides a unique contribution to the literature. While most research has focused on explaining SNAP caseload size or the SNAP participation margin, we are able to estimate SNAP eligibility at the household level by using the restricted access Health and Retirement Study data, which contains detailed household information on income, assets, and out-of-pocket medical expenses in addition to state of residence. This allows us to estimate *SNAP take-up* (that is, participation among those eligible) and *SNAP participation*. This is important because SNAP participation among eligible adults 60 and over is roughly half that of the general population: 42% compared to 83% overall in 2015 (Gray and Cunnyngham, 2017). By exploring both SNAP take-up and participation, we contribute a fuller understanding of the role that out-of-pocket expenses is playing in SNAP outcomes.

Research Methods

We use longitudinal data from the nationally representative Health and Retirement Survey (HRS) to document changes in the population eligible for SNAP and the consequences of these changes for SNAP take-up and participation from 2002 to 2016 for older adults. Given the increase in medical out-of-pocket expenses for older adults experienced over time (William, Wimer, Betson, and Manfield, 2018), we investigate the role that these expenses have played in the overall patterns of SNAP eligibility, participation, and take-up over time. We focus on the Affordable Care Act's Medicaid expansion, which provided public health insurance for low-income

individuals beginning in 2014 and decreased out-of-pocket expenses among enrollees (Glied, Chakraborty, and Russo, 2017) on average. We study the relationship between Medicaid expansion on SNAP participation and take-up to assess the extent to which medical out-of-pocket expenses played a role, using an event study design.

We examine SNAP outcomes using several models. We first estimate SNAP eligibility following a process pioneered by Haider et al. (2003) and refined by (Jones, 2019). This approach allows us to calculate each household's estimated eligibility in each state and year based on both federal rules and state policy options related to eligibility from 2002 to 2016.

Our primary outcomes of interest are SNAP participation and take-up. SNAP participation is based on self-reported household receipt of SNAP at any time in the two years prior to the interview. SNAP take-up is defined as self-reported participation among those estimated to be income eligible using the policies relevant for the household based on their age, state of residence, and the year of the survey.

We exploit variation stemming from the Medicaid expansion, which affects out-of-pocket expenses and potentially SNAP enrollment. We first confirm that Medicaid expansion affected out-of-pocket expenses as was found in prior literature (Glied et al., 2017). Our measure of out-of-pocket expenses includes all self-reported, individual-level total out-of-pocket medical costs in the previous two years (including hospital, nursing home, doctor, dentist, outpatient surgery, monthly prescription drug, home health care, and special facilities costs).

To identify the effect of out-of-pocket expenses on SNAP participation and take-up, we exploit state-level variation in Medicaid expansion and implement an event study design. States in our data implemented Medicaid expansion in 2014 or 2016. To mitigate bias from potential heterogeneity in treatment effects due to staggered timing (Callaway and Sant'Anna, 2020; Goodman-Bacon, 2021; Sun and Abraham, 2020), we follow the approach outlined in (Cengiz, Dube, Lindner, and Zipperer, 2019) and create event-specific (i.e., Medicaid expansion) cohorts, where cohorts are aligned by event-time (i.e., year of expansion), that are then stacked to estimate an average effect. This approach allows us to ensure that only clean comparisons are made against each treated unit (Baker, Larcker, and Wang 2021; Cengiz et al., 2019; Cunningham, 2021).

Data
We use data from the 2002 to 2016 waves of the Health and Retirement Survey (HRS), 8 waves in total, linked to restricted geographic data. HRS is a longitudinal survey that began in 1992 and collects self-reported data on more than 20,000 Americans over the age of 50 every two years. The HRS provides a large, nationally representative sample of individuals in the contiguous 48 states. The HRS includes a wide array of financial and demographic information necessary to estimate whether an individual is eligible for SNAP, including labor market earnings, pension income, assets, number of people in the household, out-of-pocket medical expenses, and expenses on rent, mortgage, and utilities.

Our data are divided into three samples: 1) individuals under 60 years of age and without disabilities (hereafter called *below age 60*), 2) individuals between ages 60 and 64 without disabilities (hereafter called *age 60-64*), and 3) individuals 65 years of age or older or with disabilities (hereafter called *65 plus or disabled*). The Medicaid expansion was applicable to

non-disabled individuals below age 65 so this is the target group for our analysis. However, SNAP eligibility rules change at age 60 so the nondisabled population between age 60 and 64 deserves special consideration. As a result, we split our sample of individuals below 65 into two age groups (below age 60 and age 60-64). We examine the population over age 65 or with disabilities as a falsification test since our analysis finds that their out-of-pocket medical expenses did not change as a result of the Medicaid expansion.

Results
Overall, we find no clear evidence that Medicaid expansion decreased SNAP take-up in any of our four analysis groups. Among the age 60-64 sample, the group for whom we find the largest magnitude of results, the point estimates indicate take-up decreases of 7.29 percentage points (SE=7.73) and 1.18 percentage points (SE=6.90) in the first and second waves following Medicaid expansion. Compared to an average take-up rate of 38% for this sample, these point estimates represent decreases of approximately 19 percent and 3.1 percent, respectively, although they are not statistically significant.

The evidence that Medicaid expansion affected SNAP participation is similarly weak and expected given the estimates on take-up. For instance, the point estimates indicate decreases of 1.43 percentage points (SE=1.80) and 0.78 percentage points (SE = 1.99) to participation in the first and second waves following Medicaid expansion among the age 60-64 subgroup, again the group for whom we observe the strongest magnitude of results. The average participation rate is 7.40% for this subpopulation; thus, these point estimates are not necessarily modest, particularly since these estimates are noisy with 95% confidence intervals that range from a decrease of 5 percentage points to an increase of 3 percentage points. However, the patterns are again consistent across subgroups and over waves and are robust to controlling for person-level characteristics, such as functional impairments, age, and race. Furthermore, results are robust to our treatment of state adoption of the Broad Based Categorical Eligibility (BBCE) provision.

Discussion
These findings indicate that out-of-pocket medical expenses are not a significant driver of SNAP take-up decisions for the population below aged 65 and that national efforts to reduce medical expenses for older adults are unlikely to substantively change SNAP take-up or participation. However, given the bundled adoption of the Medicaid expansion in states with the BBCE already in place, it may be that the BBCE has already reached the population likely to be pulled into SNAP by the Medicaid expansion.

Conclusion
These results help us understand the complexity in the connections between health, healthcare expenses and SNAP outcomes. While we find that changes in access to public health insurance did not change the level of SNAP take-up or participation, it is possible that the composition or well-being of the caseload on SNAP did change. For example, it may be that the SNAP population has gotten healthier in states with the Medicaid expansion, given their greater access to healthcare to support chronic disease management. Additional research is needed to better understand falling take-up among adults throughout the life course.

Introduction

Food insecurity is an important social issue for a substantial share of the US population, affecting more than 7.3% of persons aged 60 and older, or 5.3 million individuals in 2018 (Ziliak and Gundersen, 2020b). Among those age 50-59, levels of food insecurity are even higher—10.6% (Ziliak and Gundersen, 2020a). The Supplemental Nutrition Assistance Program (SNAP) provides financial assistance to aid low-income households with food purchases. A large literature has probed the nature of the relationship between health and food insecurity and SNAP participation throughout the life course (Gundersen and Ziliak, 2015; Keith-Jennings, Llobrera, and Dean, 2019). Food insecurity is now recognized as a social determinant of health, and screening measures, known as the Hunger Vital Sign (Gundersen, Engelhard, Crumbaugh, and Seligman, 2017; Hager et al., 2010) are now included at intake in many clinical settings (National Quality Forum 2020). However, the role of out-of-pocket medical expenses on the SNAP participation decision, particularly among the older adult population income eligible for SNAP, has received relatively less attention.

The effects of out-of-pocket medical expenses on SNAP could change over time and across populations for several reasons. Increases in insurance coverage could alleviate unexpected medical cost burdens for enrollees, and therefore could influence SNAP participation by decreasing a household's financial instability (Chang, Kim, and Chatterjee, 2018). Out-of-pocket medical expenses could also directly affect SNAP participation through its effects on SNAP eligibility determination, such as allowing for medical deductions, for applicable populations. Finally, the effects of out-of-pocket medical expenses on SNAP could change over time because of generational differences in labor force participation, health behaviors and needs, as well as social policy environments (DePew and Gonzales, 2020; Leveille, Wee, and Iezzoni, 2005),

which warrants a fresh look of recent trends and patterns. We use longitudinal data from the nationally representative Health and Retirement Survey (HRS) to document changes in the population eligible for SNAP and the consequences of these changes for SNAP take-up and participation from 2002 to 2016 for older adults. Given the increase in out-of-pocket medical expenses for older adults experienced over time (William, Wimer, Betson, and Manfield, 2018), we investigate the role that these expenses have played in the overall patterns of SNAP eligibility, participation, and take-up over time. We focus on the Medicaid expansion that part of the Patient Protection and Affordable Care Act (P.L. 111-148; also known as the Affordable Care Act), which provided public health insurance for an expanded group of low-income individuals beginning in 2014 and decreased out-of-pocket expenses among enrollees (Glied, Chakraborty, and Russo, 2017) on average. We study the relationship between Medicaid expansion on SNAP participation and take-up to assess the extent to which out-of-pocket medical expenses played a role, using an event study design.

This study provides a unique contribution to the literature. While most research has focused on explaining SNAP caseload size or the SNAP participation margin, we are able to estimate SNAP eligibility at the household level by using the restricted access Health and Retirement Study data, which contains detailed household information on income, assets, and out-of-pocket medical expenses in addition to state of residence. This allows us to estimate *SNAP take-up* (that is, participation among those eligible) and *SNAP participation*. This is important because SNAP participation among eligible adults 60 and over is roughly half that of the general population: 44% compared to 82% overall in 2018 (Lauffer and Vigil 2021). By exploring both SNAP take-up and participation, we contribute a fuller understanding of the role that out-of-pocket expenses play in SNAP outcomes.

Background

      SNAP is the largest federal food and nutrition program in the United States: In fiscal year 2019 SNAP served approximately 35.7 million participants per month on average at a total annual cost of $60.3 billion; average monthly benefits per person were $129.83 (USDA 2021). Despite low take-up rates among older adult households, 1 in 4 SNAP households contained an adult aged 60 and over in 2018 (Cronquist, 2019), Although empirical focus on SNAP take-up among older adults has been thin relative to the focus on SNAP participation or caseloads, nonparticipation in SNAP among the elderly is usually attributed to administrative burden, lack of information and the low value of the benefits (Finkelstein and Notowidigdo, 2018; Gundersen and Ziliak, 2015; Meyer and Abdul-Malak, 2020).

      Consequently, federal rules determining eligibility and benefit size are more generous for those age 60 and above (and the disabled). In addition, states may adopt additional policy options to expand the reach further. For example, the Broad Based Categorical Eligibility (BBCE) provision increases the gross household income limit and extends or removes asset limits, likely changing the size and characteristics of the population who can take up the program. It also may reduce the stigma and administrative burden of applying for benefits, which could have affected SNAP take-up and participation margins (Anders and Rafkin, 2021). In addition, while federal rules allow senior or disabled households to deduct the cost of out-of-pocket medical expenses from gross household income in determining eligibility and benefit size, several states have adopted the Standard Medical Deduction (SMD), which allows senior or disabled households with medical expenses exceeding $35 per month to deduct a standard amount instead of having to itemize each expense. This treatment of medical expenses both increases the population eligible for SNAP and increases the size of the SNAP benefit for which those age 60 and above and the disabled qualify (Levin et al., 2020).

Nearly two decades ago, Haider and colleagues (2003) used the 1998 and 2000 waves of the Health and Retirement Study (HRS) to estimate both SNAP eligibility and take-up. They concluded that the eligible seniors who did not take-up SNAP appeared to not be very needy according to measures such as skipped meals and median housing values (Haider, Jacknowitz, and Schoeni, 2003), suggesting that the reduction in SNAP take-up at older ages is not a significant problem. Levy (2015) examined this issue more recently using 2008 and 2010 HRS data using a measure that subtracted out-of-pocket medical expenses from household income and found that material hardship increased as medical expenses increased. Alternatively, the Center for Budget and Policy Priorities (Jones, 2014) has suggested that older adults have lower SNAP participation due to the difficulty in keeping track of and claiming the full amount of their out-of-pocket medical expenses, implying that cognitive and administrative burden related to reporting out-of-pocket expenses prevents older adults from receiving needed benefits. To build on this prior research, we are interested in exploring the relationship between out-of-pocket medical expenses and SNAP take-up.

Previous research

Several studies draw a connection between out-of-pocket medical expenses and SNAP participation. Chang, Kim and Chatterjee (2018) used the Panel Study of Income Dynamics and a sample of adults younger than age 65 to explore the role of changes in out-of-pocket expenses on SNAP participation between 2003 and 2011 and found that inter-temporal increases in out-of-pocket expenses were associated with an increased likelihood of SNAP participation. Similarly, Nguyen (2020) used the Health and Retirement Study and found that reductions in out-of-pocket expenses from declines in prescription drug spending after the adoption of Medicare drug coverage or Part D in 2006 were associated with reductions in SNAP participation (Nguyen, 2020).

Previous research has studied whether expanding Medicaid coverage directly affects SNAP participation, focusing both on changes to labor supply as well as an increased awareness of social program enrollment processes which reduce the transaction costs of apply to SNAP, sometimes referred to as the "welcome mat" effect. The landmark study in this area is Baicker et al. (2014) who utilized a lottery-based expansion of Medicaid in Oregon and found a 10-percentage point increase in the probability of enrollment in SNAP (Baicker, Finkelstein, Song, and Taubman, 2014), which they attribute to the "welcome mat" effect and not changes in labor supply. Other research has confirmed that labor supply effects are small (Burney, Boehm, and Lopez, 2018; Schmidt, Shore-Sheppard, and Watson, 2019), while finding support for the "welcome mat" effect of the Medicaid expansion on SNAP enrollment, particularly when including the effect of Medicaid outreach efforts (Agirdas, 2016; Lanese, Fischbein, and Furda, 2018; Schmidt et al., 2019) although Mandal (2020) finds no effect. To our knowledge, prior studies have not examined the effects of Medicaid expansion on SNAP take-up.

This study builds on previous research by using the HRS to first predict SNAP eligibility, which then allows us to explore the role of out-of-pocket expenses directly on SNAP take-up and participation. Our study provides information on recent years and also allows for comparison with previous research. We focus our lens on older adults in the 50-59 and 60-64 age bands who may be experiencing declining health and changes in out-of-pocket expenses. We exploit time and state variation in the adoption of the Medicaid expansion as a source of change in out-of-pocket expenses.

Conceptual Framework

SNAP eligibility and participation rates have been increasing for adults 50 years and older since 2008. At the same time, SNAP participation continues to fall over the life course,

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with the lowest rates concentrated among individuals 85 years and above. One possible factor underlying these changes may be related to out-of-pocket medical expenses, which in turn could be affected by insurance coverage policy.

A major change in recent insurance coverage policy is Medicaid expansion. Under the Affordable Care Act, states had the opportunity to expand Medicaid coverage to adults age 18-64 with household incomes up to 138% of the Federal Poverty Level. In the first year of expansion in 2014, 24 states and Washington DC had expanded Medicaid coverage. By 2016, an additional 5 states had expanded. States that opted for the expansion saw sizeable increases in Medicaid enrollment (Kaiser Family Foundation, 2021) and reductions in the under-65 population's out-of-pocket expenses (Glied et al., 2017). While recent evidence suggests that the Medicaid expansion increased Medicaid take-up among older adults (McInerney, Mellor and Sabik 2021; McInerney, Mellor and Sabik 2017), greater health needs among older adults may also affect out-of-pocket medical expenses and contribute to differential SNAP participation rates over the life course. To explore the relationship between SNAP outcomes and out-of-pocket medical expenses, we use the state adoption of the Medicaid expansion as a source of variation in out-of-pocket expenses to identify the accompanying change in SNAP outcomes.

In theory, higher out-of-pocket expenses should increase SNAP eligibility for individuals older than age 60 or with disabilities. This is because adults over age 60 or with disabilities have the option to deduct out-of-pocket expenses from their gross household income. Therefore, higher out-of-pocket expenses should make them more likely to be eligible for SNAP as well as receive higher benefit levels. In reality, research suggests that many older adults are not aware of the program, or do not have the necessary documentation on hand to claim all their out-of-pocket expenses when applying for SNAP (Jones, 2014). In 2019, this exemption was claimed by less

than 14.7 percent of elderly households despite the fact that among low-income, elderly individuals with out-of-pocket medical expenses, the majority had expenses well over $35 (US Department of Agriculture 2021; Leftin et al. 2017)   Additionally, adults aged 60-64 who live in states with the Medicaid expansion are likely to have lower levels of predicted eligibility compared to similar adults residing in states without the Medicaid expansion since they have lower levels of out-of-pocket expenses to deduct from household income to meet the net income test during the SNAP eligibility determination process.

Conditional on eligibility, we hypothesize that higher out-of-pocket expenses are associated with an increase in SNAP take-up as medical expenses reduce the level of available resources to support food consumption. Thus, adoption of the Medicaid expansion should be associated with a decrease in SNAP take-up for both age groups under age 65. Additionally, for adults below age 65, the Medicaid expansion could also increase SNAP take-up through what is known as the "welcome mat" effect: since SNAP and Medicaid are often administered through the same agency, signing up for Medicaid expansion might increase information regarding program eligibility and decrease the transaction costs of signing up for SNAP. We can isolate this effect from the out-of-pocket expenses effect by examining SNAP outcomes separately for those age 60-64.

Finally, the direct relationship between out-of-pocket expenses and SNAP take-up and participation is complicated and ambiguous. On the one hand, higher out-of-pocket expenses might reflect higher health care needs due to chronic health conditions or cumulative health disadvantage and be associated with lower financial resources signaling increased need for food assistance. On the other hand, higher out-of-pocket expenses may reflect a taste for health care

spending and reflect greater access to economic resources to spend on healthcare, which would lead to a negative association between out-of-pocket expenses and SNAP participation.

In summary, our main analysis centers on Medicaid expansion and its effects on SNAP outcomes across several subpopulations: below 60, age 60-64, and age 65plus or disabled. Recall that take-up differs from participation in that, take-up is whether individuals eligible for SNAP enroll in SNAP, while participation is calculated from a denominator of all individuals in the state (i.e., includes non-SNAP and non-Medicaid expansion eligible older adults). Moreover, individuals in the subgroup *below 60* are eligible for the Medicaid expansion and not able to deduct medical expenses during the SNAP eligibility process; so, while eligibility did not change with this age group, take-up and participation may fall if household welfare improves. However, we expect a larger effect on take-up and participation among individuals in the subgroup *age 60-64* since SNAP eligibility would decline after Medicaid expansion due to reductions in the amount of medical expenses that are deducted from gross household income. In addition, the size of the SNAP benefits for which *age 60-64* individuals qualify may also fall reducing the expected return to participation. Thus, observed effects of the Medicaid expansion, to the extent that there are any, would likely be greatest for individuals in subgroup *age 60-64* than the other two subgroups and the SNAP take-up outcome rather than SNAP participation.[1]

One possible confounding factor is the BBCE. State BBCE adoption could be important because the timing correlates with Medicaid expansion, another voluntary social program, and the BBCE

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[1] The estimates from this study come from an event study design, which requires that the key identifying assumption of parallel pretrends be met. While we cannot assess this directly, we can look at the pre-treatment leads on the outcomes to discern whether our inferences may be invalid. Reassuringly, we find no evidence of violation of parallel pretrends.

targets SNAP outcomes, by design. Most states that adopted Medicaid expansion in our study period had also adopted BBCE (33 out of 51 states). In essence, the Medicaid expansion and BBCE are experienced as a treatment bundle. Consequently, in the analysis that follows we separate our analysis into states with and without the BBCE.

DATA AND METHODS

Data

We use data from the 2002 to 2016 waves of the Health and Retirement Survey (HRS), 8 waves in total, linked to restricted geographic data. HRS is a longitudinal survey that began in 1992 and collects self-reported data on more than 20,000 Americans over the age of 50 every two years. The HRS provides a large, nationally representative sample of individuals in the 50 US states and Washington DC. The HRS includes a wide array of financial and demographic information necessary to estimate whether an individual is eligible for SNAP, including labor market earnings; pension income; assets; number of people in the household; out-of-pocket medical expenses; and expenses on rent, mortgage, and utilities. The interviewees are asked to refer to the prior two-year period for most of these questions, including estimates of their out-of-pocket expenses and SNAP participation. Finally, we link the HRS files to the Cross-Wave Geographic Information State Restricted data with core data to determine each individual's state of residence in order to take advantage of state-time variation in policies that might influence SNAP eligibility determination.

We exclude 7 states that expanded Medicaid prior to the Affordable Care Act's expansion, as there was limited variation in changes in Medicaid eligibility among these states in our sample period. We also exclude 7 states across 352 state-wave pairs with fewer than 10

individuals to ensure that estimates are derived from states with more reliable information. Overall, our study includes 37 states (Figure 1).

Following these exclusions, our data are divided into three samples: 1) individuals under 60 years of age and without disabilities (hereafter called *below age 60*), 2) individuals between ages 60 and 64 without disabilities (hereafter called *age 60-64*), and 3) individuals 65 years of age or older or with disabilities (hereafter called *65 plus or disabled*). The Medicaid expansion was applicable to non-disabled individuals below age 65 so the this is the target group for our analysis. However, SNAP eligibility rules change at age 60 so the nondisabled population between age 60 and 64 deserves special consideration. As a result, we split our sample of individuals below 65 into two age groups (below age 60 and 60-64). We examine the population over age 65 or with disabilities as a falsification test since our analysis (shown in Appendix Table 10) indicates no evidence that their out-of-pocket medical expenses changed as a result of the Medicaid expansion.

Our first sample, *below age 60* includes 12,986 individuals across 35 states. Our second sample, *age 60-64*, contains 8,926 individuals across 34 states. Our third sample, *age 65 plus or disabled*, includes 18,045 individuals across 37 states. Since we are using longitudinal data, we observe our SNAP outcomes for individuals once each wave and individuals move across samples as they age.[2]

As expected, the *below age 60* sample were younger, less likely to have responded to the HRS interviews via proxies and had approximately half the average number of functional limitations as the *age 65 plus or disabled* sample. The *below age 60 sample* also had lower mean

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[2] We estimate models with both individual-level and household-level clustering of standard errors and our results were robust.

annual out-of-pocket expenses and a greater share of individuals without any out-of-pocket

expenses compared with the two samples above age 60 (15.30% vs. 10.76% and 10.79%; Table

1). Descriptive values for the *age 60-64 sample* fall between the other two samples, as expected,

but are closer to the younger sample.

Empirical Analysis
SNAP eligibility

We examine SNAP outcomes using several models. We first estimate SNAP eligibility

following a process pioneered by Haider et al. (2003) and refined by (Jones, 2019).[3] This

approach allows us to calculate each household's estimated eligibility in each state and year

based on both federal rules and state policy options related to eligibility, including adoption of

BBCE, the SMD, rules governing ownership and value of vehicles, and asset limits from 2002 to

2016 (See Appendix Tables A1-A3, A4). Using linear regression models, we find that the net

income test and BBCE have a large effect on eligibility, and out-of-pocket medical expenses

have a modest effect on eligibility for the elderly or disabled group overtime as a result of the

medical expense deduction (see Appendix Table A6). Specifically, we find consistent evidence

that high out-of-pocket medical expenses, defined as those having medical expenses in the

highest tertile, are associated with higher eligibility for SNAP in seven out of eight years.[4]

SNAP Participation and Take-up

Our primary outcomes of interest are SNAP participation and take-up. SNAP

participation is based on self-reported household receipt of SNAP at any time in the two years

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[3] Our methodology is distinct from the microsimulation model used for official estimates of SNAP eligibility
detailed in Appendix D of Vigil (2019).
[4] The odd year, 2006, appears to be a bit out an outlier relative to the other years despite the fact that the values for
out-of-pocket medical expenses appear to be in line with prior and later years.

prior to the interview. SNAP take-up is defined as self-reported participation among those estimated to be eligible using the policies relevant for the household based on their age, state of residence, and the year of the survey. Another way to conceptualize the differences between take-up and participation is that take-up focuses on enrollment among a low-income population eligible for social programs like Medicaid expansion and SNAP and therefore most directly affected by these programs. Participation entails a more expansive population with higher income and wealth and for whom means-tested social programs are unlikely to have a direct effect.

We exploit variation stemming from Medicaid expansion, which affects out-of-pocket expenses and potentially SNAP enrollment (Figure 1). We first confirm that Medicaid expansion affected out-of-pocket expenses as was found in prior literature (Glied et al., 2017). Our measure of out-of-pocket expenses includes all self-reported, individual-level total out-of-pocket medical costs in the previous two years (including hospital, nursing home, doctor, dentist, outpatient surgery, monthly prescription drug, home health care, and special facilities costs).

A substantial share of individuals (13.7%) under 65 years without disabilities incurred no out-of-pocket costs. There was also substantial skewness (range $0.54 – 856, 668.30) among those who had any costs. Therefore, we use a two-part model implemented with the Stata command `twopm` (Belotti, Deb, Manning, and Norton, 2015; Deb and Norton, 2018) under a difference-in-differences design. We model the extensive margin using logit and the intensive margin using GLM with a log link function and gamma distribution. Consistent with prior literature (Glied et al., 2017), these results suggest that Medicaid expansion was associated with a statistically significant decrease of $304.06 (SE=95.86) in out-of-pocket expenses. This effect reflected both a decrease in the probability of incurring out-of-pocket expenses by 7.75

percentage points (SE=1.24) and a decrease in the amount of out-of-pocket expenses by $346.97

(SE=103.58) (Appendix Table A7). Our results suggest that the reduction in out-of-pocket

expenses was twice as high ($672.10) when limiting the sample to those below age 60.

To identify the effect of out-of-pocket expenses on SNAP participation and take-up, we

exploit state-level variation in Medicaid expansion and implement an event study design. States

in our data implemented Medicaid expansion in 2014 or 2016. To mitigate bias from potential

heterogeneity in treatment effects due to staggered timing (Callaway and Sant'Anna, 2020;

Goodman-Bacon, 2021; Sun and Abraham, 2020), we follow the approach outlined in Cengiz,

Dube, Lindner, and Zipperer (2019) and create event-specific (i.e., Medicaid expansion) cohorts,

where cohorts are aligned by event-time (i.e., year of expansion), that are then stacked to

estimate an average effect. This approach allows us to ensure that only clean comparisons are

made against each treated unit (Baker, Larcker, and Wang 2021; Cengiz et al., 2019;

Cunningham, 2021). To be specific, for the cohort of states that began Medicaid expansion in

2014, their comparison group consists of clean data from states that never implemented Medicaid

expansion and clean data, 2008-2014, from the states that expanded Medicaid in 2016; for the

cohort of states that began Medicaid expansion in 2016, their comparison group consists of states

that never implemented Medicaid expansion and clean data, 2008-2012, from the states that

expanded Medicaid in 2014. Using this stacked dataset, we estimate the following regression:

$$SNAP_{istc} = \sum_{k} \delta_k \mathbb{1}[t - E_s = k] + \alpha_{sc} + \lambda_{tc} + \epsilon_{itcs} \qquad (1)$$

Where $SNAP_{istc}$ is the outcome, SNAP participation or not and take-up or not, for individual i in

state s during wave t and in event-specific cohort c. E_s is the year that the event, Medicaid

expansion, began for the state, and $\mathbb{1}[t - E_s = k]$ is an indicator for being k years from the

policy's start year. In this regression, $t \in \{2002, 2004, \ldots, 2016\}$. Therefore, $k = 0$ is the first

wave following the policy's effective date and $k = -1$ is the wave prior to treatment, which

serves as the reference period in our regression. α_{sc} and λ_{tc} are fully interacted fixed effects for

state and wave with each event-specific cohort c. In sensitivity analyses, we also examine the

robustness of our results after adjusting for demographic characteristics (age, sex, race,

education, household income, and rural residence), health (presence of impaired activities of

daily living, presence of impaired instrumental activities of daily living, receipt of Supplemental

Security Income or Disability Income, and completion of the survey through a proxy reporter[5]),

and BBCE status. We cluster standard errors at the state-cohort level. In this specification, δ_k,

are the parameters of interest. $\widehat{\delta_0} > 0$ and $\widehat{\delta_1} > 0$ would suggest that Medicaid expansion was

associated with a differential increase in the probability of SNAP participation or take-up when

compared to states without Medicaid expansion.

Results
Trends in SNAP Eligibility, Take-up and Participation by age

We begin by showing how SNAP eligibility, take-up and participation have changed by age over

time. In Figure 2, we present estimated SNAP eligibility from 2002 to 2016 by age in five-year

bins beginning with age 50-54. We find that estimated eligibility increases throughout the life

course with older adults being more likely to be eligible for SNAP than younger adults but that

the differences are greater for the oldest old relative to the younger old. Consistent with the

adoption of broad-based categorical eligibility and other provisions to increase the coverage of

SNAP, as well as the economic downturn, we find that estimated eligibility increases for all ages

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[5] According to HRS documentation, proxy interviewers are used when the respondents are unable to complete the interview on their own because of physical symptoms or cognitive impairment.

around 2008 and continues to increase until around 2012. By 2016, estimated SNAP eligibility is higher for all ages by about 8 percentage points relative to 2002 with even higher increases for adults aged 75 and above. Thus, state and federal policy were successful at increasing the pool of older adults eligible for SNAP over this time period.

In Figure 3, we show the trend in SNAP take-up among those predicted to be eligible by age. Here, the patterns are the opposite of those for eligibility with the oldest age groups the least likely to take-up SNAP and the youngest groups the most likely. We find that SNAP take-up falls from around 60% at age 50-54 to 20% at age 85 in 2016. Additionally, most of the temporal increase in SNAP take-up occurs between 2002 and 2008 and this is concentrated among the younger age groups: SNAP take-up is relative constant from 2008 to 2016 for all age groups. This suggests that either imperfect information regarding SNAP eligibility or the administrative burden associated with applying for SNAP thwarted the ability of newly eligible populations to access to SNAP. Alternatively, it is possible that SNAP eligibility extended above the group at greatest need for the benefits and low take-up reflects the true need for food assistance among the eligible population.

Finally, for comparison, in Figure 4, we present SNAP participation by age group. We find that SNAP participation was fairly consistent after age 50 in 2002 at about 3-5% of the total population but that SNAP participation increases over time for all age groups with the sharpest increases after the 2008 Recession. By 2016, levels of SNAP participation are much more dispersed across older adults and decreasing with age: in 2016 SNAP participation ranges from 17% at age 50-54 to 6-8% from age 65 onwards. These patterns are consistent with those reported by Ziliak and Gunderson using the Current Population Survey (2019).

SNAP Take-up and Participation as a function of Medicaid expansion

Figure 5 shows the event-study estimates, the δ_k, from equation (1) for the two outcomes,

take-up (panels A-D) and participation (panels E-H). In these graphs, the vertical axes display

the differential effects, in percentage points, of a given wave (horizontal axes) relative to the

wave prior to Medicaid expansion among expansion states and non-expansion states.

Overall, we find no evidence that Medicaid expansion decreased SNAP take-up. For

instance, the point estimates indicate decreases of 7.29 percentage points (SE=7.73) and 1.18

percentage points (SE=6.90) in the first and second waves following Medicaid expansion among

the age 60-64 sample (Appendix Table A13, Column 5). Compared to an average take-up rate of

38% for this sample, these point estimates represent decreases of approximately 19 percent and

3.1 percent. While the sample sizes are small for this population and the estimates are imprecise,

there is also no discernable change over time in the patterns of the point estimates following

Medicaid expansion. For instance, in the third wave prior to expansion, the estimated effect is a

decrease of 4.89 percentage points (SE=5.27), which is similar in direction and magnitude as the

post-expansion estimates (Figure 5, Panel C). We find similar post-expansion estimates across

the other samples, consistent with the notion that Medicaid expansion did not have a meaningful

effect on the take-up of SNAP (Figure 5, Panels B-D).

The evidence that Medicaid expansion affected SNAP participation is similarly weak and

expected given the estimates on take-up. For instance, the point estimates indicate decreases of

1.43 percentage points (SE=1.80) and 0.78 percentage points (SE = 1.99) on participation in the

first and second waves following Medicaid expansion among the age 60-64 subgroup (Appendix

Table A13, column 1). The average participation rate is 7.4% for this subpopulation, thus these

point estimates are not necessarily modest, particularly since these estimates are noisy with 95%

confidence intervals that range from a decrease of 5 percentage points to an increase of 3 percentage points. However, the patterns are again consistent across groups and over years (Figure 5, Panels E-H). These estimates are robust to controlling for person-level characteristics, such as functional impairments, age, and race (Appendix Table A13, columns 2-4).

Next, we explore the extent to which Medicaid expansion worked differently in states with and without the BBCE. We find clear evidence that BBCE affected SNAP participation and take-up. In Appendix Figure A1, we show the relationship between BBCE and our two SNAP outcomes. For both subgroups under age 65, the estimates of BBCE on participation indicate a clear positive change in trend following the first wave of the BBCE (Appendix Figure A1, Panels F-G). For the group age 65 plus or disabled, the change occurs several waves following BBCE start dates (Appendix Figure A1, Panel H). The effects of BBCE on take-up are less precise, but generally indicate a decrease in take-up following BBCE. For the group age 60-64, the effect on take-up shows a clear decrease (Appendix Figure A1, Panel C).

We check the robustness of our Medicaid expansion results to the BBCE in two ways. First, we control for BBCE in equation (1). The estimates of the effects of Medicaid expansion do not change meaningfully (Appendix Tables A11-A14). Second, we restrict the comparison group to states that had adopted the BBCE by 2014. Because the identifying assumption for our event study is the existence of parallel pre-trends between treatment and control groups, states that did not adopt BBCE by 2014 may be a selected group and may not have been on the same trajectory as the states with both Medicaid expansion and BBCE. We also find similar results to our main results to those shown in Figure 5 above (Appendix Figure A1-A2. For example, among the age 60-64 subgroup, the estimated effect of Medicaid expansion in the first wave following expansion was a decrease of 8.27 percentage points (SE=7.55) or 22% of the average

take-up rate, and a decrease of 1.10 percentage points (SE=6.88) or 2.9% of the average take-up rate in the second wave following expansion (Appendix Table A21, column 5). Together, the evidence suggests that the Medicaid expansion did not have a meaningful effect on SNAP participation or take-up, and it was unlikely that there was a welcome mat or medical expense effect.

Discussion

This study investigated the relationship between out-of-pocket medical expenses and SNAP take-up and participation among the older adult population. While much of the prior literature has focused on modeling SNAP participation, we make use of the rich income and expenditure data in the HRS to also examine SNAP take-up, that is, participation among those estimated to be eligible for SNAP. Since SNAP among adults is known to decrease with age, predictors of take-up are of particular policy relevance. Given the change in SNAP eligibility rules at age 60, we expect that the household well-being effect would be concentrated in the age 50-59 group and the reduced administrative costs would dominate in the age 60-64 group (since adults aged 60 and above are allowed to deduct the cost of medical expenses above a $35 threshold from their gross household income for eligibility and benefit calculation purposes). Consistent with the results of Levy (2021), we find that adoption of the Medicaid expansion was not associated with meaningful changes in SNAP take-up or participation in any of subgroups examined. Among our set of largely null results, our most compelling findings (those with the largest magnitudes) are observed in our age 60-64 group, where the statistically insignificant results suggest that the Medicaid expansion reduced SNAP participation and take-up. Importantly, our results were robust to our treatment of adoption of the BBCE.

These findings indicate that out-of-pocket medical expenses are not a significant driver of SNAP take-up decisions for the population age 50-59 and that national efforts to reduce medical expenses for older adults are unlikely to substantively change SNAP take-up or participation. While previous research by Levy (2015) has shown that poor health among older adults is associated with higher out-of-pocket medical expenses, lower household incomes and higher levels of hardship such as food insecurity, our results were consistent when we added direct measures of health (for those without a formal disability). Given that low-income households may spend less on medical expenses regardless of the availability of public insurance given their budget constraint, it makes sense that household income would be much more important than out-of-pocket medical expenses in predicting SNAP behavior.

Our analysis of the BBCE suggests that this state policy option is associated with increased levels of SNAP participation across all age groups. Furthermore, while SNAP take-up may fall at first when the pool of newly eligible adults increases, over time the take-up rate returns to previous levels, perhaps as program information for the newly eligible increases. Given the bundled adoption of the Medicaid expansion in states with the BBCE already in place, it may be that the BBCE has already reached the population likely to be pulled in by the Medicaid expansion.[6]

The age-stratified findings from the event study analysis confirm age patterns from the descriptive analysis: SNAP participation and take-up decisions follow different patterns with respect to the Medicaid expansion across the different age samples. While we view the *age 65 and older* sample as a falsification test since they were not the target population of the Medicaid

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[6] The gross income limits by many states for the BBCE are often above those for the Medicaid expansion.

expansion, our other two age groups have different patterns although we lack the precision to say for certain that the groups are different. Clearly, understanding the age patterns in SNAP take-up and participation is an important topic for future research.

These results help us understand the complexity in the connections between health, healthcare expenses and SNAP outcomes. While growing evidence suggests that the older adult SNAP population suffers from high levels of chronic diseases and medication nonadherence (Heflin et al. 2021), we find that changes in access to public health insurance did not change the level of SNAP take-up or participation. However, it is possible that the composition or well-being of the caseload on SNAP did change. For example, it maybe that the SNAP population has gotten healthier in states with the Medicaid expansion, given their greater access to healthcare to support chronic disease management. Given that we do find a decrease of $304 in individual out-of-pocket medical expenses associated with state adoption of the Medicaid expansion, this is a sizable welfare gain that could well result in the ability to purchase both high quality and quantity of food as well as more effectively control chronic diseases through prescription drugs.

This study has several limitations worthy of mention. First, while the HRS offers a rich set of data, the data are self-reported and may contain reporting error. Certain systemic biases, particularly with sensitive topics like income and participation in welfare programs, may affect the accuracy of the HRS study participants' responses. Over reporting of income, for instance, would bias our SNAP eligibility estimates and SNAP enrollment downwards, as would having more out-of-pocket medical expenses than reported in the HRS. However, we have little reason to suspect differential misreporting, such as if individuals in Medicaid expansion states were more likely to misreport after expansion.

Furthermore, the HRS includes a 2-year look-back period for most of the interview items and SNAP eligibility is calculated based a monthly reference period. Having a 2-year, as opposed to a more recent recall period, means that estimates of out-of-pocket medical expenses, enrollment in social programs like SNAP, and income are likely a mixture of experiences from over two years and more recent events. Given this, it is important to calibrate interpretations of our estimates associated with the first wave following a policy start date and to treat that wave as a mixture of post-treatment and pre-treatment experiences. Additionally, as described previously, several policies including Medicaid expansion and BBCE, were voluntary for states. Given that the states' choice to implement a policy is likely not exogeneous, we caution the reader from interpreting individual estimates as causal, and rather, to consider the body of evidence with these caveats in mind.

This study has important implications for food and nutrition policy aimed at older adults. Giving the greying of America, policy discussions are increasingly turning to the need to buffer health and food and nutrition programs from potential future demands. Increasing evidence suggests that expanded access to public insurance is unlikely to lead to increases in SNAP caseloads. In fact, our most compelling event history analysis (although still not statistically significant) for the subgroup aged 60-64 suggests the opposite: increasing access to public insurance for low-income older adults may decrease SNAP participation. This finding also draws attention to the difficulty in increasing SNAP take-up through the "welcome mat" effect from increased participation in public insurance programs. Additional research is needed to better understand falling take-up over the life course.

References

Agirdas, C. (2016). How did medicaid expansions affect labor supply and welfare enrollment? Evidence from the early 2000s. *Health Economics Review, 6*(1), 1-16.

Anders, J., and Rafkin, C. 2021. *The Welfare Effects of Eligibility Expansions: Theory and Evidence from SNAP*. Working paper.https://www.charlierafkin.com/papers/ar_eligibility.pdf

Baicker, K., Finkelstein, A., Song, J., and Taubman, S. 2014. The Impact of Medicaid on Labor Market Activity and Program Participation: Evidence from the Oregon Health Insurance Experiment. *American Economic Review, 104*(5), 322-328. doi:10.1257/aer.104.5.322

Baker, A., Larcker, D F., and Wang C. C. Y., How Much Should We Trust Staggered Difference-In-Differences Estimates? (March 29, 2021). European Corporate Governance Institute – Finance Working Paper No. 736/2021. http://dx.doi.org/10.2139/ssrn.3794018

Belotti, F., Deb, P., Manning, W. G., and Norton, E. C. 2015. Twopm: Two-Part Models. *The Stata Journal, 15*(1), 3-20. doi:10.1177/1536867x1501500102

Burney, S., Boehm, R., and Lopez, R. 2018. The Impact of the 2014 Medicaid Expansion on SNAP Participation and Benefits.

Callaway, B., and Sant'Anna, P. H. C. 2020. Difference-in-Differences with multiple time periods. *Journal of Econometrics*. doi:https://doi.org/10.1016/j.jeconom.2020.12.001

Cengiz, D., Dube, A., Lindner, A., and Zipperer, B. 2019. The Effect of Minimum Wages on Low-Wage Jobs. *The Quarterly Journal of Economics, 134*(3), 1405-1454. doi:10.1093/qje/qjz014

Chang, Y., Kim, J., and Chatterjee, S. 2018. Health Care Expenditures, Financial Stability, and Participation in the Supplemental Nutrition Assistance Program (SNAP). *Forthcoming in the Journal of Policy Practice*.

Cronquist, K. 2019. *Characteristics of Supplemental Nutrition Assistance Program Households: Fiscal Year 2018*. Washington DC: Mathematica Policy Research.

Cunningham, S. 2021. *Causal Inference: The Mixtape*: Yale University Press.

Deb, P., and Norton, E. C. 2018. Modeling Health Care Expenditures and Use. *Annual Review of Public Health, 39*(1), 489-505. doi:10.1146/annurev-publhealth-040617-013517

DePew, R., and Gonzales, G. 2020. Differences in Health Outcomes Between Millennials and Generation X in the USA: Evidence from the National Health Interview Survey. *Population Research and Policy Review, 39*(3), 605-616. doi:10.1007/s11113-019-09563-w

Finkelstein, A., and Notowidigdo, M. J. 2018. The Effects of Information and Application Assistance: Experimental Evidence from SNAP.

Glied, S. A., Chakraborty, O., and Russo, T. 2017. *How Medicaid Expansion Affected Out-of-Pocket Health Care Spending for Low-Income Families*. Retrieved from https://www.commonwealthfund.org/publications/issue-briefs/2017/aug/how-medicaid-expansion-affected-out-pocket-health-care-spending

Goodman-Bacon, A. 2021. Difference-in-differences with variation in treatment timing. *Journal of Econometrics*. doi:https://doi.org/10.1016/j.jeconom.2021.03.014

Gray, K. F., and Cunnyngham, K. 2017. *Trends in Supplemental Nutrition Assistance Program Participation Rates: Fiscal Year 2010 to Fiscal Year 2015*. https://www.mathematica.org/our-publications-and-findings/publications/trends-in-snap-participation-rates-fiscal-year-2010-to-fiscal-year-2015

Gundersen, C., Engelhard, E. E., Crumbaugh, A. S., and Seligman, H. K. 2017. Brief assessment of food insecurity accurately identifies high-risk US adults. *Public Health Nutrition, 20*(8), 1367-1371. doi:http://dx.doi.org/10.1017/S1368980017000180

Gundersen, C., and Ziliak, J. P. 2015. Food Insecurity And Health Outcomes. *Health Affairs, 34*(11), 1830-1839. doi:10.1377/hlthaff.2015.0645

Hager, E. R., Quigg, A. M., Black, M. M., Coleman, S. M., Heeren, T., Rose-Jacobs, R., . . . Frank, D. A. 2010. Development and Validity of a 2-Item Screen to Identify Families at Risk for Food Insecurity. *Pediatrics, 126*(1), e26-e32. doi:10.1542/peds.2009-3146

Haider, S. J., Jacknowitz, A., and Schoeni, R. F. 2003. Food Stamps and the Elderly: Why is Participation So Low? *Journal of Human Resources, 38*(Suppl), 1080-1111. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.162.3147&rep=rep1&type=pdf

Jones, J. 2019. *Food Retailer Responses to the Supplemental Nutrition Assistance Program*. Working paper. https://www.semanticscholar.org/paper/Food-Retailer-Responses-to-the-Supplemental-Program-Jones/cd0ed169ae0e012adc67d57dae213687330c3b86

Jones, T. 2014. SNAP's excess medical expense deduction-2014. Center on Budget and Policy Priorities.

Kaiser Family Foundation. Status of State Action on the Medicaid expansion Decision. 2021.

Keith-Jennings, B., Llobrera, J., and Dean, S. 2019. Links of the Supplemental Nutrition Assistance Program With Food Insecurity, Poverty, and Health: Evidence and Potential. *American Journal of Public Health, 109*(12), 1636-1640.

Lanese, B. G., Fischbein, R., and Furda, C. 2018. Public Program Enrollment Following US State Medicaid Expansion and Outreach. *American Journal of Public Health, 108*(10), 1349-1351. doi:10.2105/AJPH.2018.304592

Lauffer, S. and Vigil, A. 2021. Trends in Supplemental Nutrition Assistance Program Participation Rates: Fiscal Year 2016 to Fiscal Year 2018. Prepared by Mathematica Policy Research for the USDA Food and Nutrition Service. Available online at: www.fns.usda.gov/research-and-analysis.

Leftin, J., Godfrey, T., Mabli, J., Wemmerus, N., and Tordella, T. 2017. *Examination of the Effect of SNAP Benefit and Eligibility Parameters on Low-Income Households*. Prepared by Decision Demographics under Contract No. AG-3198-C-15-0015. Alexandria, VA: U.S. Department of Agriculture, Food and Nutrition Service.Leveille, S. G., Wee, C. C., and Iezzoni, L. I. 2005. Trends in Obesity and Arthritis Among Baby Boomers and Their Predecessors, 1971–2002. *American Journal of Public Health, 95*(9), 1607-1613. doi:10.2105/ajph.2004.060418

Levin, M., et al. 2020. *Evaluation of Alternatives to Improve Elderly Access to SNAP*. Final report submitted to the U.S. Department of Agriculture, Food and Nutrition Service. Oakland, CA: Social Policy Research Associates.

Levy, H. (2015). Income, Poverty, and Material Hardship Among Older Americans. *RSF: The Russell Sage Foundation Journal of the Social Sciences.*, 1 (1) 55-77; DOI: https://doi.org/10.7758/RSF.2015.1.1.04

Levy, H. (2021). Food Insecurity Among Seniors: The Role of Social Insurance. Paper Presented at "*Understanding Food-Related Hardships Among Older Americans*" Conference Sponsored by the University of Kentucky Center for Poverty Research and the US Department of Agriculture Food and Nutrition Service. August 4, 2021.

Mandal, B. (2020). Rural-Urban Difference in SNAP participation with Medicaid Expansion. *Agricultural and Applied Economics Association Annual Meeting*. Kansas City, Missouri, July 26-28.

McInerney, M., Mellor, J. M. and Sabik, L.M. 2017. The Effects of State Medicaid Expansions for Working-Age Adults on Senior Medicare Beneficiaries. *American Economic Journal: Economic Policy*, 9 (3): 408 - 438.

McInerney, M., Mellor, J. M. and Sabik, L.M. 2021. Welcome Mats and On-Ramps for Older Adults: The Impact of the Affordable Care Act's Medicaid Expansions on Dual Enrollment in Medicare and Medicaid. *Journal of Policy Analysis and Management*, 40 (1):12 - 41.

Meyer, M. H., and Abdul-Malak, Y. 2020. *Grandparenting Children with Disabilities*. Cham, Switzerland: Springer.

National Quality Forum, 2020, Food Insecurity and Health: Overcoming Food Insecurity Through Healthcare-Based Interventions.

Nguyen, T. 2020. *Essays on the Effects of Public Health Insurance Policies on Health Care Utilization, Expenditure, and Well-Being.* (Doctor of Philosophy). State University of New York at Albany, Albany.

Schmidt, L., Shore-Sheppard, L., and Watson, T. 2019. *The Impact of Expanding Public Health Insurance on Safety Net Program Participation: Evidence from the ACA Medicaid Expansion*.

Sun, L., and Abraham, S. 2020. Estimating dynamic treatment effects in event studies with heterogeneous treatment effects. *Journal of Econometrics*. doi:https://doi.org/10.1016/j.jeconom.2020.09.006

USDA. 2021. *Supplemental Nutrition Assistance Program Participation and Costs*. https://fns-prod.azureedge.net/sites/default/files/resource-files/SNAPsummary-8.pdf

U.S. Department of Agriculture, Food and Nutrition Service, Office of Policy Support. 2021. *Characteristics of Supplemental Nutrition Assistance Program Households: Fiscal Year 2019*, by Kathryn Cronquist. Project Officer, Barbara Murphy. Alexandria, VA.U.S. Department of Agriculture, Food and Nutrition Service. 2021. *SNAP Quality Control(QC) Technical Documentations (Fiscal Year 2001-2017)*, Retrieved from http://snapqcdata.net/datafiles

U.S. Department of Agriculture, Food and Nutrition Service. 2021. *SNAP Eligibility*, Retrieved from http://www.fns.usda.gov/snap/recipient/eligiblity

Vigil, A. 2019. Trends in Supplemental Nutrition Assistance Program Participation Rates: Fiscal Year 2010 to Fiscal Year 2017. *Mathematica Policy Research Published Reports*.

William, J. C., Wimer, C., Betson, D. M., and Manfield, L. 2018. Poverty among the aged population: The role of out-of-pocket medical expenditures and annuitized assets in supplemental poverty measure estimates. In: Social Security Bulletin.

Ziliak, J. P., and Gundersen, C. 2020a. *Hunger Among Adults Age 50-59 in 2018*. Report Prepared for Feeding America.

Ziliak, J. P., and Gundersen, C. 2020b. *The State of Senior Hunger in America in 2018: An Annual Report*. Report Prepared for Feeding America.

Table 1 Characteristics of the sample HRS respondents (waves 2002-2016)

	Below age 60	Age 60-64	Age 65 plus or disabled
	Mean (SD)	Mean (SD)	Mean (SD)
SNAP			
Eligibility rate, %	20.81(0.41)	18.88(0.39)	25.18(0.43)
Participation rate, %	10.42(0.31)	7.09(0.26)	9.49(0.29)
Take-up rate, %	50.07(0.50)	37.55(0.48)	37.70(0.48)
Out-of-Pocket Medical Expenses			
Annual (CPI-indexed), $	1,745.23(6059.65)	2,190.84(8129.03)	2,668.62(7229.77)
No expenses, %	15.30(0.36)	10.76(0.31)	10.79(0.31)
Lowest Tertile, $	212.34(138.11)	299.01(190.26)	388.06(242.05)
Middle Tertile, $	950.48(328.97)	1,223.29(407.48)	1,592.72(503.17)
Highest Tertile, $	5,004.90(10696.15)	5,819.98(14207.38)	6,984.93(12152.86)
Individual Characteristics			
Age, y	54.01(4.32)	62.00(1.41)	73.48(8.57)
Female, %	60.55(0.49)	57.19(0.49)	58.02(0.49)
Married, %	67.59(0.47)	68.45(0.46)	55.49(0.50)
Rural, %	20.07(0.40)	22.35(0.42)	23.99(0.43)
Race			
White, %	67.66(0.47)	74.75(0.43)	78.80(0.41)
Black, %	22.46(0.42)	19.01(0.39)	17.31(0.38)
Other, %	9.89(0.30)	6.23(0.24)	3.87(0.19)
Education Level			
Less Than High School, %	18.34(0.39)	20.06(0.40)	30.30(0.46)
High School, %	26.86(0.44)	29.37(0.46)	31.90(0.47)
More Than High School, %	54.79(0.50)	50.55(0.50)	37.78(0.48)
Physical Functional Limitations			
ADL, No.	0.15(0.58)	0.17(0.62)	0.45(1.04)
IADL, No.	0.12(0.48)	0.12(0.51)	0.42(1.02)
Proxy Respondents, %	3.38(0.18)	4.52(0.21)	6.48(0.25)

Household Characteristics

Family Size, No.	2.67(1.359)	2.29(1.16)	2.04(1.06)
Household Income-cpi ($)	107,793.20(293455.5)	97,547.59(155562.2)	67,620.17(285110.1)
SSI or SSDI Receipt, %	------	------	8.79(0.28)
Number of States	35	34	37
Number of Individual Observations	32,402	16,702	74,407
Number of Unique Individuals	12,986	8,926	18,045

Notes: Below age 60 = individuals under 60 years of age and without disabilities; age 60-64 = individuals between ages 60 and 64 without disabilities; age 65 plus or disabled = individuals 65 years of age or older or with disabilities. ADL = activities of daily living; IADL = instrumental activities of daily living. The District of Columbia, California, New Jersey, Connecticut, Minnesota, Vermont, and Massachusetts were excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data were excluded as well.
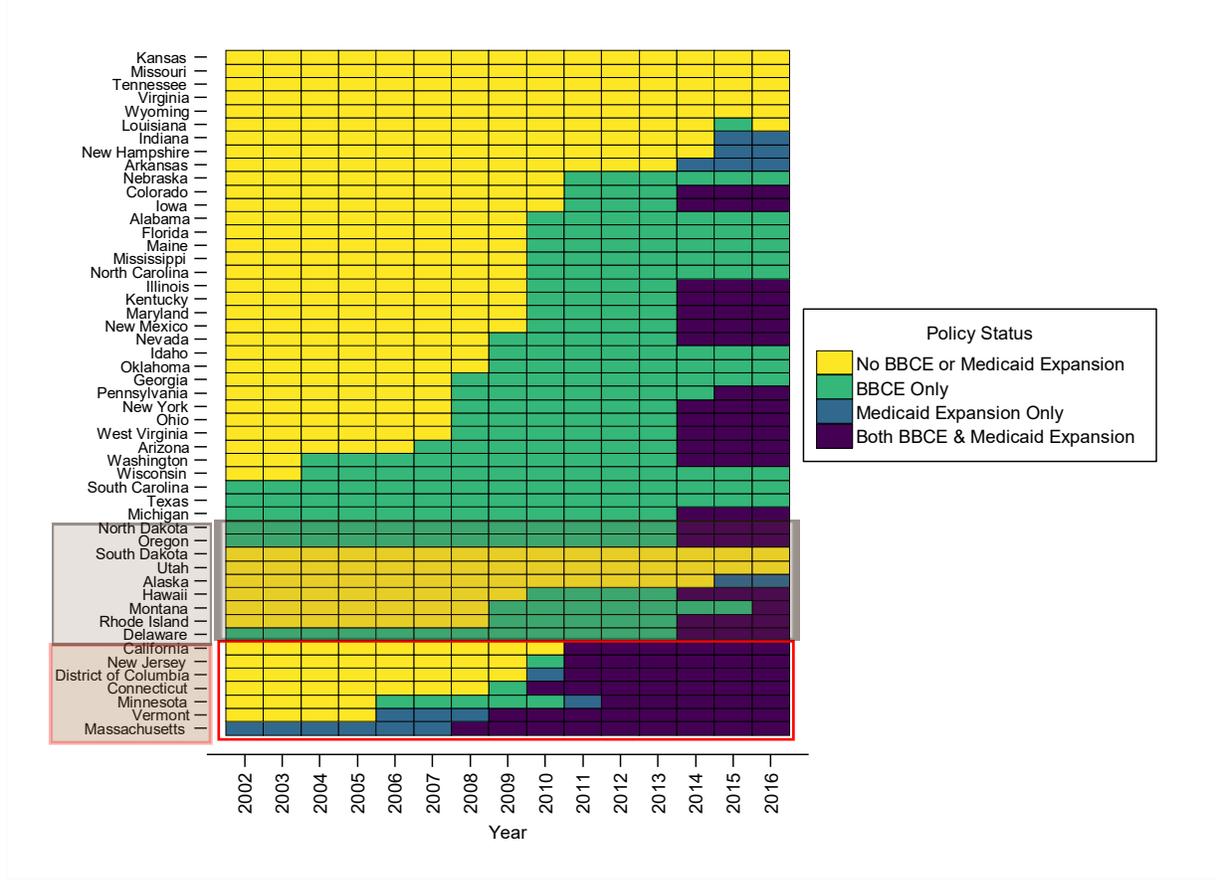
Figure 1 Implementation of the SNAP Broad Based Categorical Eligibility policy and Medicaid expansion in the United States from 2002 to 2016

Notes: BBCE = Broad Based Categorical Eligibility; We exclude 7 states (South Dakota, Utah, Alaska, Hawaii, Montana, Rhode Island, Delaware) with fewer than 10 individuals in the HRS data. We exclude 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) and the District of Columbia that expanded Medicaid prior to the Affordable Care Act's expansion. Overall, our study includes 37 states. Our primary information source includes U.S. Department of Agriculture, Food and Nutrition Service. 2021. *SNAP Quality Control(QC) Technical Documentations (Fiscal Year 2001-2017)*, Retrieved from http://snapqcdata.net/datafiles
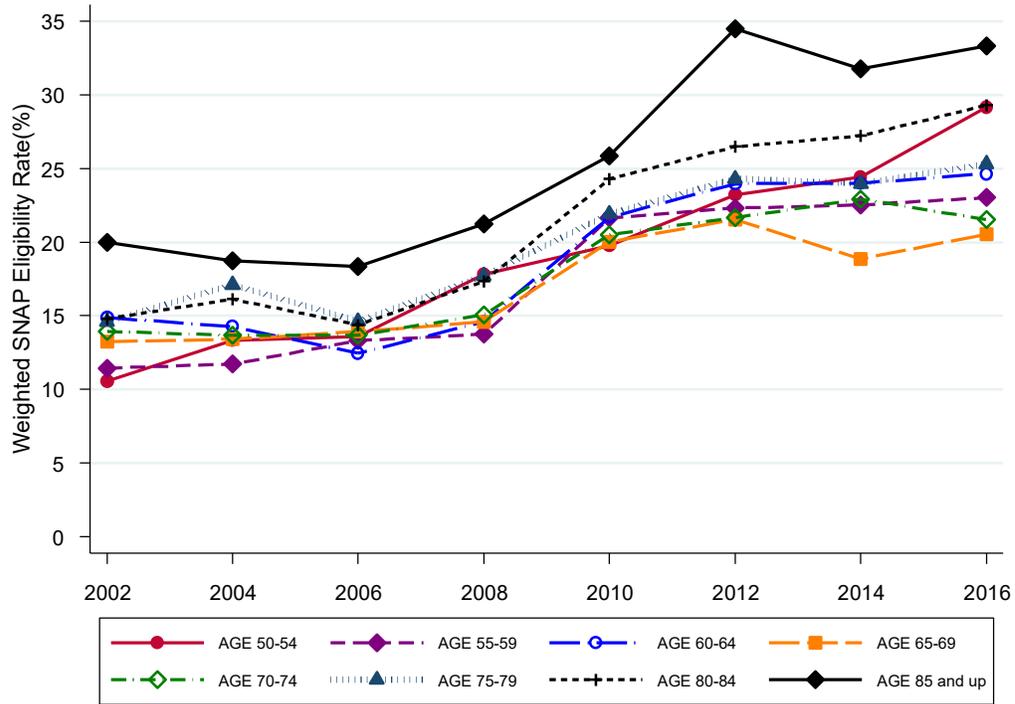
Figure 2 Trends in Estimated SNAP eligibility rate by age across 2002-2016
Notes: Data source is based on authors' calculation using HRS data and respondent weights.
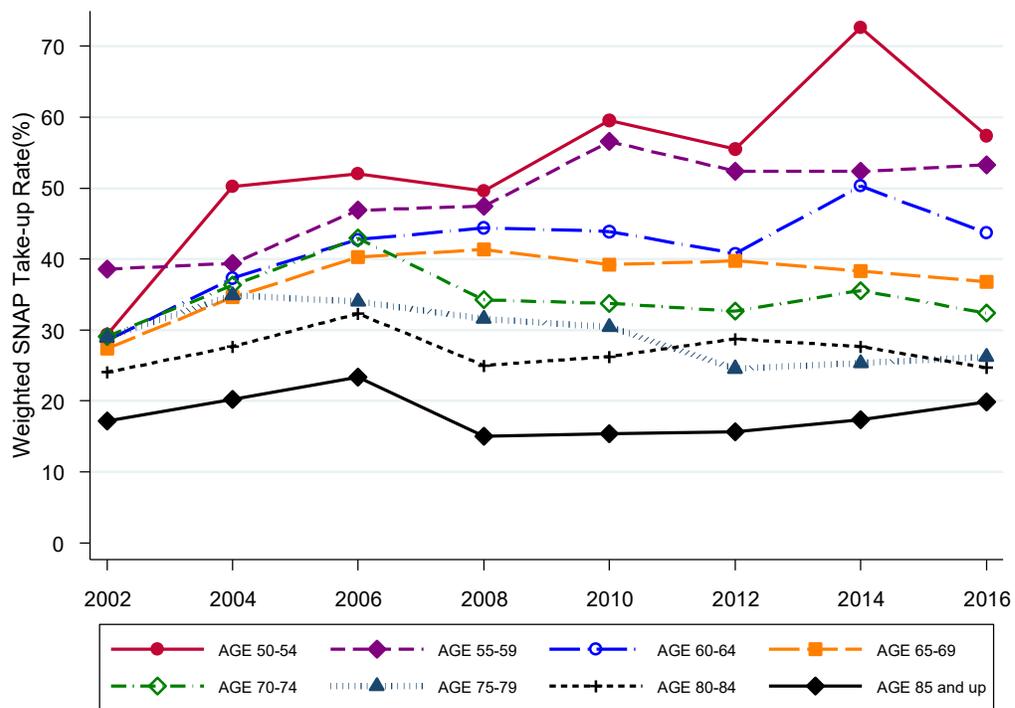
Figure 3 Trends in SNAP take-up rate by age across 2002-2016
Notes: Data source is based on authors' calculation using HRS data and respondent weights.
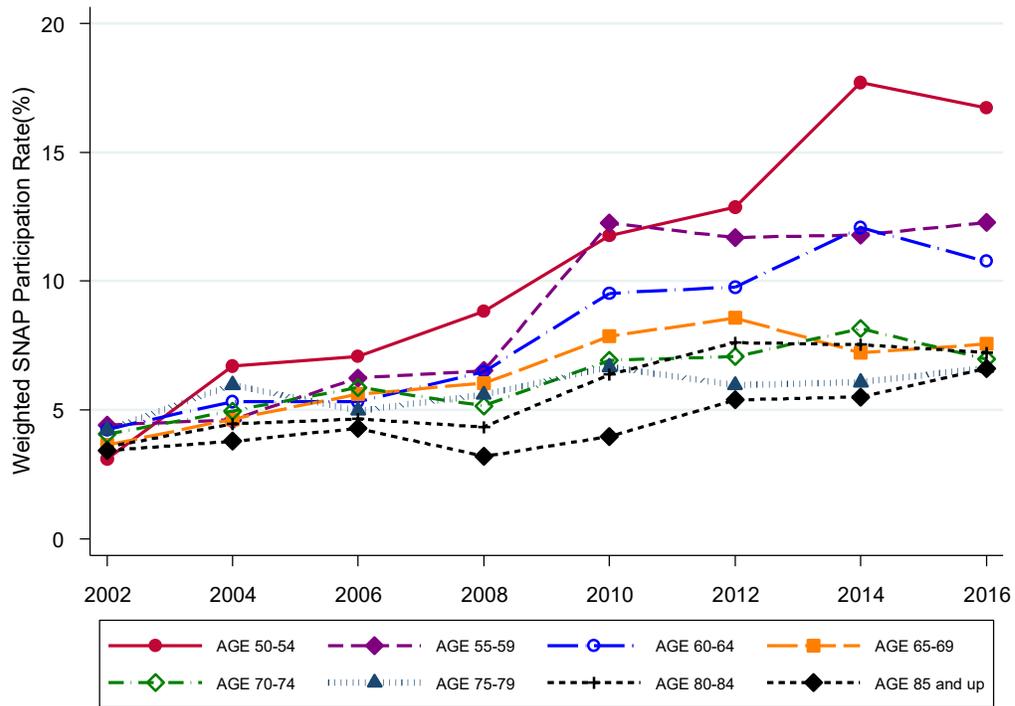
Figure 4 Trends in SNAP participation rate by age across 2002-2016
Notes: Data source is based on authors' calculation using HRS data and respondent weights.
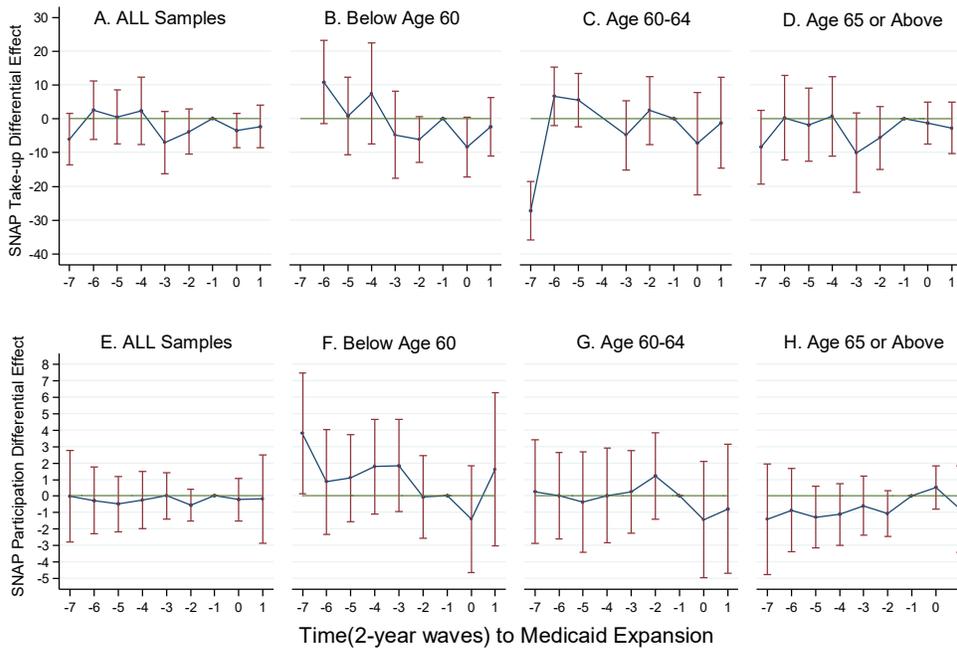
Figure 5 Event study estimates of the differential effects of Medicaid expansion on SNAP take-up and participation

Notes: Participation is whether individuals enroll in SNAP while take-up is whether individuals eligible for SNAP enroll in SNAP. Below age 60 = individuals under 60 years of age and without disabilities; age 60-64 = individuals between ages 60 and 64 without disabilities; age 65 plus or disabled = individuals 65 years of age or older or with disabilities. The District of Columbia and 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) are excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data are excluded as well. Panel A and E present results of model 5 and model 1 in Table A11, respectively. Panel B and F present results of model 5 and model 1 in Table A12, respectively. Panel C and G present results of model 5 and model 1 in Table A13, respectively. Panel D and H present results of model 5 and model 1 in Table A14, respectively. The vertical axes display the differential effects, in percentage points, of a given wave (horizontal axes) relative to the wave prior to Medicaid expansion.

Supplementary Materials

Changing Patterns of Take Up and Participation in SNAP and the Role of

Out-of-Pocket Medical Expenses

Table A1 HRS Information and Adjustments for Determining SNAP Eligibility

Table A2 Changes in federal SNAP rules across HRS 2002-2016 Waves

Table A3 State SNAP expansions across HRS 2002-2016 Waves

Table A4. The SNAP eligibility calculation procedure

Table A5 OLS of eligibility on eligibility criteria for non-elderly and non-disabled households by year

Table A6 OLS of eligibility on eligibility criteria for elderly and/or disabled households by year

Table A7 Relationship between out-of-pocket medical expenses and Medicaid expansion among age<65 and non-disabled

Table A8 Relationship between out-of-pocket medical expenses and Medicaid expansion among individuals in the below age 60 sample

Table A9 Relationship between out-of-pocket medical expenses and Medicaid expansion among individuals in the age 60-64 sample

Table A10 Relationship between out-of-pocket expenses and Medicaid expansion among individuals in the age 65 plus or disabled sample

Table A11 Event study estimates of the differential effects of Medicaid expansion on SNAP take-up and participation (all samples)

Table A12 Event study estimates of the differential effects of Medicaid expansion on SNAP take-up and participation (below age 60)

Table A13 Event study estimates of the differential effects of Medicaid expansion on SNAP take-up and participation (age 60-64)

Table A14 Event study estimates of the differential effects of Medicaid expansion on SNAP take-up and participation (age 65 plus or disabled)

Table A15 Event study estimates of the differential effects of BBCE on SNAP take-up and participation (all samples)

Table A16 Event study estimates of the differential effects of BBCE on SNAP take-up and participation (below age 60)

Table A17 Event study estimates of the differential effects of BBCE on SNAP take-up and participation (age 60-64)

Table A18 Event study estimates of the differential effects of BBCE on SNAP take-up and participation (age 65plus or disabled)

Table A19 Event study estimates of the differential effects of Both policies verses BBCE only on SNAP take-up and participation (all samples)

Table A20 Event study estimates of the differential effects of Both policies verses BBCE only on SNAP take-up and participation (below age 60)

Table A21 Event study estimates of the differential effects of Both policies verses BBCE only on SNAP take-up and participation (age60-64)

Table A22 Event study estimates of the differential effects of Both policies verses BBCE only on SNAP take-up and participation (age 65 plus or disabled)

Figure A1 Event study estimates of the differential effects of BBCE on SNAP take-up and participation

Figure A2 The event study estimates of the differential effects of Both policies verses BBCE only on SNAP take-up and participation

Table A1 HRS information and adjustments for estimating SNAP eligibility

	Eligibility Rules for Nonelderly and Nondisabled Households	Differences in Rules for Elderly and Disabled Households	Source of Information in the HRS	Data Limitations and Adjustments Made
Gross income test	Total income ≤ 130 percent of HHS poverty line	Not subject to gross income test	Ratio of household income to the U.S. Census poverty threshold times the poverty threshold	Total income from last year was reported; monthly average used
Net income test	Total income less deductions ≤100 percent of HHS poverty line	No difference	See above	See above
Deductions				
Standard	Standard deduction	No difference	Household size.	N/A
Earned income	20 percent of earned income	No difference	Sum of earned income of both core respondents and non-core resident family members who were age 16 or above and worked.	The earned income data of non-core resident family members in HRS FAT data have missing values. We calculated income of non-core resident family members and used it as estimation where the missing values are present.
Excess shelter deduction	Excess shelter costs > 1/2 of the household's income after all other deduction. Capped	No cap	Sum of mortgage payments, rental payments, park and association fees, and real estate taxes	Some costs reported in brackets. For closed brackets, use the midpoint. For open brackets, use the lower bound Utility expenditure data are unavailable. Ignored

Out-of-Pocket Medical expense	None	Elderly medical expenses ≥ $35 per month	Respondent's and spouse or partner's out-of-pocket medical expenses	None
Dependent care	Uncapped deduction for dependent care needed for work, training, or education	No difference	Data unavailable	Ignored
Child support payment	Legally owed child support to a nonhousehold member	No difference	Data unavailable	Ignored
Asset test				
Limit	Assets ≤ $2,000 (for the 2002 through 2012 data collections) Assets ≤ $2,250 (for the 2014 and 2016 data collections)	Assets ≤ $3,000 (for the 2002 through 2012 data collections) Assets ≤ $3,500 (for the 2014 and 2016 data collections)	Stocks, mutual funds, and investment trusts, checking, savings, or money market accounts, CD, bonds, and T-bills, and bond funds.	
Excluded assets	Vehicle under $4,650	Value of vehicle used to transport a disabled household member, no maximum	Value of vehicle.	No data available on vehicle use. Regarded all vehicle as transportation assets
Other				
AFDC/TANF and SSI	If all household members receive program, then eligibility presumed	No difference	Respondent and spouse's SSI income	Data on TANF receipt unavailable. Assume no TANF receipt Data on SSI receipt by additional household members is unavailable. Assume additional household members do not receive SSI

Work requirements	Able-bodied household head may be required to work	Not subject to work requirements	Data unavailable	Ignored
Citizenship	Some permanent residents are eligible	Eligible if > 65 years older and in the United States on August 22, 1996	Place of birth	Ignored
Institutionalized	Not eligible if institutionalized	In nursing home is not eligible	Institutionalized individuals are assigned zero weight	Limit the sample to observations with nonzero weight

Notes: This table is adapted from (Haider et al., 2003) and (Coe and Wu, 2014) [7] Our primary information source includes U.S. Department of Agriculture, Food and Nutrition Service. 2021. *SNAP Eligibility*, Retrieved from http://www.fns.usda.gov/snap/recipient/eligiblity

7 Coe, N.B. and Yanyuan Wu, A. 2014, What Impact does Old-age Pension Receipt Have on the Use of Public Assistance Programs Among the Elderly?, *Safety Nets and Benefit Dependence* (*Research in Labor Economics, Vol. 39*), Emerald Group Publishing Limited, Bingley, pp. 259-295.

Table A2A Changes in federal SNAP rules across HRS 2002-2016 waves

Year	Vehicle exclusion ($)	Assets limits ($) No elderly or disabled	Any elderly or disabled	Excess shelter deduction cap ($)
2002	4650	2000	3000	354
2004	4650	2000	3000	378
2006	4650	2000	3000	400
2008	4650	2000	3000	431
2010	4650	2000	3000	459
2012	4650	2000	3250	459
2014	4650	2250	3500	478
2016	4650	2250	3500	504

Dollar values are nominal. Values of deductions and deduction caps shown are per month.

Table A2B Changes in federal SNAP rules across HRS 2002-2016 Waves

Year	Standard deduction ($) for households of size: 1-3	4	5	6+	Maximum allotment ($) for households of size: 1	2	3	4	5	6	7	8	+
2002	134	134	134	134	135	248	356	452	537	644	712	814	102
2004	134	134	149	171	141	259	371	471	560	672	743	849	106
2006	134	134	157	179	152	278	399	506	601	722	798	912	114
2008	134	143	167	191	162	298	426	542	643	772	853	975	122
2010	141	153	179	205	200	367	526	668	793	952	1052	1202	150
2012	147	155	181	208	200	367	526	668	793	952	1052	1202	150
2014	152	163	191	219	190	349	499	635	754	904	1000	1142	143
2016	155	165	193	221	194	357	511	649	771	925	1022	1169	146

Dollar values are nominal. Values of deductions and allotments shown are per month. For households with more than 8 members, the maximum allotment is equal to the allotment for households of 8 members plus the number of members in excess of 8 multiplied by the last "+" column, e.g. the maximum allotment for a household of 10 in 2016 is $1,169 + $146 × 2 = $1,461.

Table A2C Changes in federal SNAP rules across HRS 2002-2016 Waves

| Year | Monthly federal poverty level (FPL) ($) for households of size: | | | | | | | | |
	1	2	3	4	5	6	7	8	+
2002	716	968	1220	1471	1723	1975	2226	2478	252
2004	749	1010	1272	1534	1795	2057	2319	2580	262
2006	798	1070	1341	1613	1885	2156	2428	2700	272
2008	851	1141	1431	1721	2011	2301	2591	2881	290
2010	903	1215	1526	1838	2150	2461	2773	3085	312
2012	908	1226	1545	1863	2181	2500	2818	3136	319
2014	958	1293	1628	1963	2298	2633	2968	3303	335
2016	981	1328	1675	2021	2368	2715	3061	3408	347

Rules shown are for fiscal years, not calendar years. Dollar values are nominal. Values of the FPL shown are per month. For households with more than 8 members, FPL is equal to the FPL for households of 8 members plus the number of members in excess of 8 multiplied by the last "+" column, e.g. the FPL for a household of 10 in 2016 is $3,408 + $347 × 2 = $4,102.

Notes: This table is adapted from Jones, 2020. "Food Retailer Responses to SNAP." Our primary information source includes U.S. Department of Agriculture, Food and Nutrition Service. 2021. *SNAP Quality Control (QC) Technical Documentations (Fiscal Year 2001-2017)*, Retrieved from http://snapqcdata.net/datafiles

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Table A3 State SNAP expansions across HRS 2002-2016 waves

| State | Wave | Applicable households | BBCE expansions | | Asset limit | Other expansions | |
			Gross income limit (%FPL)	Net Income limit (%FPL)		Waves Excluded all vehicles	SMD ($) Cut-off (Wave)
AL	2010-2016	All elderly or disabled	200	100	None	2002-2016	165(2016)
		No or some elderly or disabled	130	None	None		
AZ	2008-2016	All	185	None	None	2004-2016	
AR							103(2012-2016)
CA	2012	All	130	None	None	2004-2016	
	2014	Any elderly or disabled	200	None	None		
		No elderly or disabled	130	None	None		
	2016	All	200	None	None		
CO	2012-2016	Any elderly or disabled	200	100	None	2004-2016	
		No elderly or disabled	130	100	None		
CT	2010-2016	All	185	None	None	2008-2016	
DE	2002-2016	All	200	None	None		
DC	2010-2016	All	200	None	None	2012-2016	
FL	2012-2016	All	200	None	None	2010-2016	
GA	2008-2016	All elderly or disabled	200	None	None	2006-2016	150(2016)
		No or some elderly or disabled	130	None	None		
HI	2012-2016	All	200	None	None	2004-2016	
ID	2010	All	130	100	None		144(2014-2016)
	2012-2016	Any elderly or disabled	None	100	Same as non-BBCE		
		No elderly or disabled	130	100	Same as		
IL	2010-2016	Any elderly or disabled	200	None	None		210(2012-2016)
		No elderly or disabled	130	None	None		
IN						2002-2016	
IA	2012-2016	All	160	None	None	2002-2012	105(2008-2016)
KS							140(2012-2016)
KY	2010-2016	Any elderly or disabled	200	None	None	2002-2012	
		No elderly or disabled	130	None	None		

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State	Years	Group	Col4	Col5	Col6	Col7	Col8
LA	2010-2014	Any elderly or disabled	None	100	None	2002-2012	
		No elderly or disabled	130	100	None		
ME	2012-2016	All	185	None	None		
MD	2012-2016	All	200	None	None	2002-2012	
MA	2008-2016	Any elderly or disabled or any children under 19	200	None	None	2002-2012	90(2008-2012)
		No elderly, disabled, or under 19	130	100	None		155(2014-2016)
MI	2002-2010	All	200	None	None		
	2012-2016	All	200	None	Same as non-BBCE		
MN	2008-2010	Any elderly or disabled	165	None	$7,000		
		No elderly or disabled	130	None	$7,000		
	2012-2016	All	165	None	None		
MS	2010-2016	Any elderly or disabled	None	100	None	2004-2016	
		No elderly or disabled	130	100	None		
MO						2002-2016	165(2012-2016)
MT	2010	Any elderly or disabled	None	100	None	2006-2016	
		No elderly or disabled	185	100	None		
	2012-2016	All	200	100	None		
NE	2012-2016	Any elderly or disabled	None	100	$25,000		
		No elderly or disabled	130	100	$25,000		
NV	2010-2016	All	200	None	None		
NH							83(2004-2014)
							165(2016)
NJ	2010-2016	All	185	None	None		
NM	2012-2016	All	165	None	None		
NY	2008	Any elderly or disabled	200	None	None		
		No elderly or disabled	130	None	None		
	2010-2016	Any elderly or disabled or any dependent care expenses	200	None	None		
		No elderly, disabled, or dependent care expenses	130	None	None		
NC	2012-2016	All	200	None	None	2010-2012	
ND	2002-2008	All	None	100	None		165(2014-2016)
	2010-2016	All	200	100	None		
OH	2010-2016	Any elderly or disabled	200	None	None	2002-2016	

State	Years	Household	GI	NI	Asset		
		No elderly or disabled	130	None	None		
OK	2010-2016	Any elderly or disabled	None	100	None	2010-2016	
		No elderly or disabled	130	100	None		
OR	2002-2016	All	185	None	None		
PA	2010	Any elderly or disabled	200	None	None		
		No elderly or disabled	160	None	None		
	2012-2014	Any elderly or disabled	200	None	$9,000 after excluding one vehicle		
		No elderly or disabled	160	None	$5,500 after excluding one vehicle		
	2016	Any elderly or disabled	200	None	None		
		No elderly or disabled	160	None	None		
RI	2010-2016	Any elderly or disabled	200	None	None		141(2014-2016)
		No elderly or disabled	185	None	None		
SC	2002-2008	All	200	None	None		175(2016)
	2010-2016	Any elderly or disabled	200	None	None		
		No elderly or disabled	130	None	None		
SD							165(2008-2016)
TN						2004-2016	
TX	2002-2016	All	165	None	Same as		102(2008-2016)
VT	2010-2016	All	185	None	None		138(2010-2016)
VA						2004-2016	140(2012-2016)
WA	2004-2008	All	130	None	None		
	2010-2016	All	200	None	None		
WV	2010-2012	All	130	None	None	2002-2016	
	2014-2016	All elderly or disabled and no	200	None	None		
		No or some elderly or disabled or some earned income	130	None	None		
WI	2004-2016	All	200	None	None	2002-2016	
WY							103(2006-2016)

Notes: BBCE stands for broad-based categorical eligibility. GI and NI stand for gross income and net income, respectively. SMD stands for standard medical expense deduction. This table is adapted from (Jones, 2020). "Food Retailer Responses to SNAP." Our primary information source includes U.S. Department of Agriculture, Food and Nutrition Service. 2021. *SNAP Quality Control(QC) Technical Documentations (Fiscal Year 2001-2017)*, Retrieved from http://snapqcdata.net/datafiles

A4 The SNAP eligibility calculation procedure

We use state-level policies related to SNAP eligibility to construct a household-level estimated SNAP eligibility variable. The specific details of this estimation are presented below.

<u>Federal SNAP rules</u>

We begin by applying federal rules to determine household eligibility. If households are eligible at the federal level, they are eligible at the state level as states cannot implement rules that restrict eligibility. We detailed relevant changes in the federal eligibility calculation for the standard deduction, excess shelter costs deduction cap, maximum allotment, asset limit, and federal poverty level (FPL) in Table A1 and Tables A2A-C.

<u>States SNAP eligibility expansion beyond the federal rules</u>

State adult-applicable BBCE expansion: From 1996 until 2016, states have been given the flexibility to expand SNAP eligibility by implementing "broad-based categorical eligibility" (BBCE) expansions. The most common outcome of adult-applicable BBCE expansion was the elimination or expansion the gross income limit, the net income limit, or asset limit for household of a certain type. Table A3 shows how states alter these tests differently for household of different types.

State vehicle policy: One state option of states SNAP eligibility expansion available is to alter the asset test by aligning SNAP vehicle policy with other social programs. States can increase the standard deduction applied to each vehicle's fair market value, exclude extra vehicles from the test, or eliminate vehicles from consideration. Every state has altered vehicle treatment in some way as of 2007. Table A3 shows how states altered the treatment of vehicles. Many states adopted less restrictive vehicle policies in the early 2000s, and most eventually moved to exclude all vehicles from the asset test.

State standard medical expense deduction: Another option of states SNAP eligibility expansion is to implement a standard medical expense deduction (SMD) to standardize medical deduction amounts when units' medical expenses fall within a specified range (see Table A3). In these States, if a unit with an elderly member or individual with a disability incurs medical expenses less than or equal to the State threshold, the unit receives a medical deduction equal to the threshold minus $35. Those with higher expenses can still claim actual expenses if documented. Sixteen states had implemented SMDs as of 2016.

<u>Estimated SNAP benefits</u>

The benefit formula is determined at the federal level. Each household's monthly benefit is equal to a maximum monthly allotment, which increases with household size, minus 30% of net income.

<u>Estimated SNAP eligibility</u>

Our calculation mainly refers to the methods used in (Jones, 2020). "Food Retailer Responses to SNAP."

Step1: calculate the federal-level SNAP eligibility status

a. Gross income Test: household income ≤130% FPL

   Gross income test applies to families with no elderly or disabled only.

b. Net income test: Net household income ≤100% FPL

Net household income = household income-household earned income*20%-standard deduction- Excess Shelter deduction – adjusted Medical Cost (medical cost deduction only applies to elderly or disabled individuals)

Where: Excess Shelter deduction=shelter expenses (rent + mortgage+ property taxes)-household gross income less the earned income, standard, and out-of-pocket medical expenses*50% Excess Shelter deduction is capped for families with no elderly or disabled while there is no cap for families with any elderly or disabled household members.

The adjusted medical cost is calculated on an individual basis for amounts that exceed $35. For States that have adopted an SMD, the SMD applies to individuals with medical costs greater than $35 and less than the state value of SMD. For an individual with medical expenses that exceed the state SMD, the full amount of adjusted medical cost is used.

c. Asset Test: Adjusted Assets ≤ $2000 (Or $2250 after 2014) for families with no elderly or disabled; Adjusted Assets ≤ $3000 (Or $3250 in 2012 and $3500 after 2014) for families with any elderly or disabled.

Adjusted Assets=Total assets-value of primary residence -deductible vehicle value

Where:

1)Total Assets=Net value of real estate and secondary residences (excluding primary residence), businesses, IRA/Keogh accounts, stocks, checking accounts, CDs, bonds, and other savings and debts

2)Deductible vehicle value is capped at $4,650 in most cases for families with no elderly or disabled.

Step 2: calculate whether the families are applicable for BBCE

Applied the BBCE expansion rules shown in Table A3 to assess the BBCE applicable status.

Step 3: calculate final SNAP eligibility status

SNAP eligibility depends on each of the following two criteria

1)Both spouses receiving SSI OR being eligible at federal level OR being eligible under BBCE expansion rules

2) Estimated Household's monthly benefit is positive for household having three or more family members. (For the families having one or two members, they have a minimum monthly allotment).

Notes: BBCE stands for broad-based categorical eligibility. SMD stands for standard medical expense deduction. Our primary information source includes 1) U.S. Department of Agriculture, Food and Nutrition Service. 2021. *SNAP Quality Control(QC) Technical Documentations (Fiscal Year 2001-2017)*, Retrieved from http://snapqcdata.net/datafiles. 2) U.S. Department of Agriculture, Food and Nutrition Service. 2021. *SNAP Eligibility*, Retrieved from http://www.fns.usda.gov/snap/recipient/eligiblity

Table A5 OLS of eligibility on eligibility criteria for non-elderly and non-disabled households by year

	2002	2004	2006	2008	2010	2012	2014	2016
Number of states	31	33	31	30	32	31	29	29
Mean of Dependent Variable	8.5%	11.9%	12.0%	13.4%	25.1%	25.5%	27.3%	28.5%
	0.279	0.323	0.325	0.340	0.433	0.436	0.446	0.452
Meet gross income test & net income test	0.417***	0.516***	0.484***	0.485***	0.447***	0.317***	0.286***	0.450***
	0.051	0.041	0.044	0.039	0.048	0.085	0.067	0.078
Meet assets test	0.072***	0.069***	0.070***	0.062***	0.075***	0.041***	0.043***	0.038***
	0.009	0.009	0.009	0.010	0.014	0.011	0.013	0.011
Meet BBCE	0.402***	0.334***	0.351***	0.346***	0.324***	0.454***	0.461***	0.322***
	0.044	0.036	0.044	0.032	0.043	0.082	0.068	0.071
Estimated Benefit<0 for family member>=3	-0.015**	-0.011*	-0.008	-0.014	-0.009	-0.012	-0.022*	-0.017
	0.007	0.005	0.005	0.011	0.007	0.010	0.011	0.010
SNAP benefit receipt	0.590***	0.590***	0.587***	0.554***	0.584***	0.510***	0.500***	0.541***
	0.061	0.047	0.052	0.041	0.024	0.030	0.026	0.022
_cons	-0.016***	-0.016***	-0.018***	-0.013*	0.000	0.021***	0.025***	0.030**
	0.005	0.005	0.005	0.006	0.009	0.007	0.009	0.012
R-square	0.731	0.779	0.792	0.801	0.805	0.827	0.822	0.817
N	1748	3620	2777	2177	4799	3619	2591	4401

Notes: Each column represents a separate linear probability model of the eligibility criteria on eligibility. The sample represents individuals within households with both core members <60 years of age and without disability. Standard errors are clustered at the state level; The District of Columbia and 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) are excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data are excluded as well. $*p < 0.10$ $**p < 0.05$ $***p < 0.01$.

Table A6 OLS of eligibility on eligibility criteria for elderly or disabled households by year

	2002	2004	2006	2008	2010	2012	2014	2016
Number of states	35	36	36	37	37	38	37	40
Mean of Dependent Variable	16.5%	17.0%	16.4%	18.1%	27.3%	30.7%	30.8%	33.9%
	0.371	0.375	0.370	0.385	0.446	0.461	0.462	0.474
Out-of-pocket Medical Expenses Lowest Tertile vs. Zero	-0.016*	-0.003	-0.033***	-0.000	-0.002	0.007	0.005	-0.001
	0.008	0.014	0.007	0.010	0.015	0.006	0.008	0.011
Out-of-pocket Medical Expenses Middle Tertile vs. Zero	-0.009	0.002	-0.029***	0.005	0.004	0.009	0.015**	0.010
	0.007	0.015	0.008	0.009	0.012	0.007	0.007	0.010
Out-of-pocket Medical Expenses Highest Tertile vs. Zero	0.020***	0.037**	-0.004	0.023**	0.024**	0.019***	0.023***	0.022**
	0.007	0.016	0.009	0.009	0.011	0.007	0.007	0.010
Meet net income test without Out-of-pocket Medical Expenses deduction	0.416***	0.412***	0.431***	0.413***	0.333***	0.148***	0.181***	0.174***
	0.034	0.034	0.034	0.047	0.047	0.048	0.055	0.047
Meet assets test	0.222***	0.194***	0.161***	0.141***	0.159***	0.073***	0.071***	0.086***
	0.012	0.014	0.012	0.012	0.018	0.016	0.017	0.019
Household meet BBCE rules without Out-of-pocket Medical Expenses deduction	0.373***	0.398***	0.389***	0.474***	0.507***	0.667***	0.626***	0.601***
	0.037	0.074	0.055	0.047	0.041	0.046	0.052	0.045
Estimated Benefit<0 for family member>=3 without Out-of-pocket Medical Expenses deduction	-0.048***	-0.043***	-0.041***	-0.037***	-0.046***	-0.040***	-0.048***	-0.064***
	0.008	0.010	0.008	0.012	0.007	0.014	0.012	0.010
SNAP benefit Receip	0.375***	0.404***	0.453***	0.434***	0.438***	0.396***	0.381***	0.397***
	0.027	0.027	0.033	0.035	0.033	0.034	0.026	0.024
Both spouse SSI receipt	0.190***	0.162***	0.107***	0.121***	0.076***	0.033	0.042	0.088***
	0.034	0.042	0.027	0.025	0.023	0.026	0.027	0.026
_cons	-0.021***	-0.021	0.014*	-0.007	0.009	0.027***	0.027***	0.042***
	0.008	0.014	0.008	0.008	0.010	0.008	0.009	0.011
R-square	0.695	0.683	0.714	0.721	0.741	0.790	0.784	0.762
N	12758	12389	11969	11578	12564	12526	12117	12146

Notes: Each column represents a separate linear probability model of the eligibility criteria on eligibility. The sample represents individuals within households with at least one member ≥ 60 years of age or with a disability. Standard errors are clustered at the state level. The District of Columbia and 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) are excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data are excluded as well. 11.0% of the total sample had zero out-of-pocket expenses, 29,036 individuals were in the lowest out-of-pocket expenses tertile (range $1-$840), 29,066 individuals were in the middle out-of-pocket expenses tertile (range $713-$2,665), and 29,153 individuals were in the highest out-of-pocket expenses tertile (range $2,178 - $ 856,668); *p < 0.10 **p < 0.05 ***p < 0.01.

Table A7 Relationship between out-of-pocket medical expenses and Medicaid expansion among age<65 and non-disabled

	Logit	GLM	Overall
Marginal effects (SE)			
Treatment effect	-0.0775(0.0124)***	-346.9707(103.5846)**	-304.0608(95.8564)**
Coefficients (SE)			
Treated	0.0927(0.1545)	-0.2105(0.0426)***	
Post	-0.2378(0.0594)***	0.1938(0.0567)**	
Treated x Post	-0.5469(0.0827)***	-0.1054(0.056)*	
Age	0.0385(0.0047)***	0.0106(0.006)*	
Female	0.5273(0.0623)***	0.1591(0.0378)***	
Black	-0.6553(0.0985)***	-0.3422(0.0403)***	
Other Races	-0.6678(0.1708)***	-0.1260(0.0716)*	
Less Than High School	-0.8498(0.0663)***	-0.0254(0.0684)	
High School	-0.3696(0.0621)***	-0.111(0.064)*	
Married	0.4316(0.0671)***	0.0363(0.0638)	
Family Size	-0.0921(0.0159)***	-0.0269(0.0202)	
Household Income(log)-cpi	0.1289(0.013)***	-0.0013(0.0126)	
Rural	0.1273(0.0938)	0.1442(0.0790)*	
ADL	-0.0055(0.0456)	0.2229(0.0322)***	
IADL	0.0132(0.0762)	0.1691(0.0477)***	
Proxy	0.0753(0.2046)	-0.1462(0.0724)**	
N	14,105	11,582	14,105

Notes: GLM = generalized linear model, Treated = dummy variable for resident of a Medicaid expansion state, Post = dummy variable for 2016 vs. 2012; For gender, race, education, marital status, residence status and proxy, the reference groups are male, white, more than high school, unmarried, urban, and self-report respectively; Marginal treatment effects are treatment effects on the treated; Standard errors are clustered at the state level; $*p < 0.10$ $**p < 0.05$ $***p < 0.01$. Estimates are obtained from a difference-in-differences design, by comparing adults under 65 years of age and non-disabled who resided in Medicaid expansion states vs. those who did not, between 2016 and 2012. We omit 2014 data from this analysis because even though most states implemented Medicaid expansion in 2014, the 2014 wave data were based on interviewees' estimates of their medical out-of-pocket expenses in the two years prior to their interviews and therefore, may reflect expenses before Medicaid expansion. The District of Columbia and 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) are excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data are excluded as well.

Table A8 Relationship between out-of-pocket medical expenses and Medicaid expansion among individuals in the below age 60 sample

	Logit	GLM	Overall
Marginal effects (SE)			
Treatment effect	-0.068(0.0191)***	-684.0043(176.0231)***	-672.0963(171.3917)***
Coefficients (SE)			
Treated	0.0025(0.1764) ***	-0.0599(0.069)	
Post	-0.3005(0.0922) ***	0.3561(0.0732)	
Treated x Post	-0.4290(0.1185) ***	-0.3367(0.0845)	
Age	0.0374(0.0046)***	0.0079(0.0084)	
Female	0.4662(0.0648)***	0.1734(0.0407)**	
Black	-0.5878(0.1063)***	-0.3179(0.0553)***	
Other Races	-0.6690(0.1781) ***	-0.1608(0.0894)	
Less Than High School	-0.8051(0.0723) ***	0.0075(0.0828)	
High School	-0.3282(0.0645) ***	-0.1463(0.0855)	
Married	0.3802(0.0789) ***	0.0109(0.0739)	
Family Size	-0.0741(0.0198) ***	-0.0185(0.0241)	
Household Income(log)-cpi	0.1299(0.0126) ***	-0.0124(0.0146)***	
Rural	0.0737(0.1126)	0.1504(0.1127)**	
ADL	0.0026(0.0518)	0.3007(0.0353)***	
IADL	0.0192(0.0772)	0.1029(0.058)***	
Proxy	0.0157(0.2877)	0.0110(0.0888)***	
N	9,754	7,833	9,754

Notes: GLM = generalized linear model, Treated = dummy variable for resident of a Medicaid expansion state, Post = dummy variable for 2016 vs. 2012; For gender, race, education, marital status, residence status and proxy, the reference groups are male, white, more than high school, unmarried, urban, and self-report respectively; Marginal treatment effects are treatment effects on the treated; Standard errors are clustered at the state level; *p < 0.10 **p < 0.05 ***p < 0.01. Estimates are obtained from a difference-in-differences design, by comparing adults under 59 years of age and non-disabled who resided in Medicaid expansion states vs. those who did not, between 2016 and 2012. We omit 2014 data from this analysis because even though most states implemented Medicaid expansion in 2014, the 2014 wave data were based on interviewees' estimates of their medical out-of-pocket expenses in the two years prior to their interviews and therefore, may reflect expenses before Medicaid expansion. The District of Columbia and 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) are excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data are excluded as well.

Table A9 Relationship between out-of-pocket medical expenses and Medicaid expansion among individuals in the age 60-64 sample

	Logit	GLM	Overall
Marginal effects (SE)			
Treatment effect	-.0739(0.0293)**	-121.4413(213.5600)**	-71.5938(211.5021)
Coefficients (SE)			
Treated	0.1094(0.3224)	-0.1136(0.1319)	
Post	-0.1378(0.1309)	-0.0388(0.0366)	
Treated x Post	-0.6763(0.3243)	0.0385(0.1166)	
AGE	0.0040(0.0315)	0.0215(0.0167)	
Female	0.7205(0.1104)	0.0991(0.0496)	
Black	-0.8170(0.1491)	-0.3044(0.0801)	
Other Races	-0.5732(0.1799)	-0.0007(0.0832)	
Less Than High School	-1.0281(0.1256)	-0.0709(0.0528)	
High School	-0.5403(0.1256)	-0.0392(0.0512)	
Married	0.5865(0.1354)	0.0745(0.062)	
Family Size	-0.1445(0.0296)	-0.0323(0.0222)	
Household Income(log)-cpi	0.1328(0.021)	0.0446(0.0147)	
Rural	0.2383(0.1709)	0.1375(0.0688)	
ADL	-0.0201(0.0741)	0.1268(0.0457)	
IADL	-0.0249(0.0956)	0.2508(0.0348)	
Proxy	0.1791(0.2741)	-0.3526(0.1185)	
N	4,290	3,695	4,290

Notes: GLM = generalized linear model, Treated = dummy variable for resident of a Medicaid expansion state, Post = dummy variable for 2016 vs. 2012; For gender, race, education, marital status, residence status and proxy, the reference groups are male, white, more than high school, unmarried, urban, and self-report respectively; Marginal treatment effects are treatment effect on the treated; Standard errors are clustered at the state level; $*p < 0.10$ $**p < 0.05$ $***p < 0.01$. Estimates are obtained from a difference-in-differences design, by comparing adults age 60-64 and non-disabled who resided in Medicaid expansion states vs. those who did not, between 2016 and 2012. We omit 2014 data from this analysis because even though most states implemented Medicaid expansion in 2014, the 2014 wave data were based on interviewees' estimates of their medical out-of-pocket expenses in the two years prior to their interviews and therefore, may reflect expenses before Medicaid expansion. The District of Columbia and 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) are excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data are excluded as well.

Table A10 Relationship between out-of-pocket expenses and Medicaid expansion among individuals in the age 65 or above sample

	Logit	GLM	Overall
Marginal effects (SE)			
Treatment effect	-0.027(0.0075)***	45.845(182.2439)	31.14915(169.6282)
Coefficients (SE)			
Treated	0.3133(0.2163)	-0.0175(0.0689)	
Post	-0.1759(0.0665)***	0.0511(0.0337)	
Treated x Post	-0.2993(0.0937)***	0.0418(0.0707)	
Age	0.0255(0.0035)***	0.0057(0.0021)***	
Female	0.3434(0.0493)***	0.0411(0.0318)	
Black	-0.5981(0.1005)***	-0.1645(0.0494)***	
Other Races	-0.6601(0.2063)***	0.0347(0.097)	
Less Than High School	-0.8804(0.0797)***	-0.2224(0.0437)***	
High School	-0.2339(0.0744)***	-0.1709(0.0353)***	
Married	0.4251(0.057)***	0.1303(0.0255)***	
Family Size	-0.1395(0.0181)***	-0.0305(0.0185)	
Household Income(log)-cpi	0.2328(0.0268)***	0.0340(0.034)	
Rural	0.1850(0.1392)	-0.0290(0.0431)	
ADL	-0.0783(0.0312)**	0.1021(0.0147)***	
IADL	-0.0483(0.0443)	0.0810(0.0203)***	
Proxy	-0.0431(0.1205)	-0.0184(0.068)	
N	18,540	16,287	18,540

 Notes: GLM = generalized linear model, Treated = dummy variable for resident of a Medicaid expansion state, Post = dummy variable for 2016 vs. 2012; For gender, race, education, marital status, residence status and proxy, the reference groups are male, white, more than high school, unmarried, urban, and self-report respectively; Marginal treatment effects are treatment effect on the treated; Standard errors are clustered at the state level.; *p < 0.10 **p < 0.05 ***p < 0.01. Estimates are obtained from a difference-in-differences design, by comparing adults 65 years of age or above or disabled who resided in Medicaid expansion states vs. those who did not, between 2016 and 2012. We omit 2014 data from this analysis because even though most states implemented Medicaid expansion in 2014, the 2014 wave data were based on interviewees' estimates of their medical out-of-pocket expenses in the two years prior to their interviews and therefore, may reflect expenses before Medicaid expansion. The District of Columbia and 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) are excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data are excluded as well.

Table A11 Event study estimates of the differential effects of Medicaid expansion on SNAP take-up and participation (all samples)

Dependent Variable:	Participation				Take-up			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of clusters (state#cohort)	82	82	82	82	72	72	72	72
Mean of Dependent Variable	9.7%	9.7%	9.7%	9.7%	40.8%	40.8%	40.8%	40.8%
	0.2965	0.2965	0.2965	0.2965	0.4915	0.4915	0.4915	0.4915
lead6	-0.0002	-0.0002	0.0023	0.0015	-0.0606	-0.0699	-0.0376	-0.0351
	0.0142	0.0116	0.0125	0.0123	0.0388	0.0497	0.0606	0.0624
lead5	-0.0028	-0.0013	0.0002	-0.0004	0.0250	0.0115	0.0058	0.0059
	0.0103	0.0094	0.0076	0.0075	0.0443	0.0365	0.0336	0.0328
lead4	-0.005	-0.0028	-0.0038	-0.0038	0.0055	-0.0138	-0.0310	-0.0322
	0.0086	0.0074	0.0061	0.0061	0.0413	0.0338	0.0327	0.0327
lead3	-0.0025	-0.0011	0.0002	-0.0002	0.0232	0.0103	0.0019	0.00004
	0.0089	0.0076	0.0067	0.0066	0.0513	0.0434	0.0408	0.0412
lead2	0.0001	-0.0027	-0.0021	-0.0025	-0.0711	-0.0401	-0.0316	-0.0313
	0.0072	0.0079	0.0081	0.0079	0.0473	0.0376	0.0356	0.0349
lead1	-0.0055	-0.0063	-0.0062	-0.0064	-0.0379	-0.0265	-0.0230	-0.0230
	0.0049	0.0050	0.0055	0.0054	0.0342	0.0234	0.0225	0.0223
lag0	-0.0023	-0.0022	-0.0058	-0.0056	-0.0352	-0.0358	-0.0336	-0.0333
	0.0066	0.0067	0.0062	0.0062	0.0257	0.0254	0.0225	0.0221
lag1	-0.0019	-0.0029	-0.0023	-0.0019	-0.0228	-0.0195	-0.0105	-0.0101
	0.0137	0.0134	0.0104	0.0103	0.0322	0.0338	0.0288	0.0283
State BBCE		0.0159***	0.0136***	0.0139***		-0.1157***	-0.0702***	-0.0673***
		0.0041	0.0038	0.0037		0.0149	0.0134	0.0131
AGE			-0.0021***	-0.0024***			-0.0083***	-0.0087***
			0.0001	0.0001			0.0004	0.0004
Female			0.0104***	0.0081***			0.0334***	0.0300***

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			0.0015	0.0015			0.0046	0.0049
Black			0.0464***	0.0449***			0.0387***	0.0380***
			0.0039	0.0038			0.0077	0.0075
Other Races			0.0167**	0.0155**			-0.0126	-0.0152
			0.0065	0.0064			0.0117	0.0115
Less Than High School			0.0605***	0.0575***			0.0379***	0.0344***
			0.0039	0.0038			0.0084	0.0084
High School			0.0075***	0.0077***			-0.0214***	-0.0203***
			0.0019	0.0019			0.0064	0.0064
Married			-0.0596***	-0.0573***			-0.0521***	-0.0509***
			0.0021	0.0022			0.0085	0.0084
Family Size			0.0357***	0.0344***			0.0474***	0.0464***
			0.0021	0.0020			0.0040	0.0039
Household Income(log)-cpi			-0.0321***	-0.0310***			0.0200***	0.0204***
			0.0020	0.0020			0.0018	0.0017
SSI or SSDI Receipt			0.3342***	0.3189***			0.2027***	0.1890***
			0.0104	0.0104			0.0107	0.0105
Rural			0.0016	0.0016			-0.0038	-0.0041
			0.0027	0.0027			0.0081	0.0077
ADL				0.0173***				0.0159***
				0.0018				0.0029
IADL				0.0078***				0.0131***
				0.0016				0.0029
Proxy				-0.0258***				-0.0162
				0.0034				0.0108
R-squared	0.0247	0.0249	0.2105	0.2146	0.025		0.1368	0.1405
N	209,733	209,733	209,733	209,733	49,546	49,546	49,546	49,546

Notes: For gender, race, education, marital status, residence status and proxy, the reference groups are male, white, more than high school, unmarried, urban, and self-report respectively; Participation is whether individuals enroll in SNAP while take-up is whether individuals eligible for SNAP

enroll in SNAP. The District of Columbia and 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) are excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data are excluded as well. *p < 0.10 **p < 0.05 ***p < 0.01.

Table A12 Event study estimates of the differential effects of Medicaid expansion on SNAP take-up and participation (below age 60)

Dependent Variable:	Participation				Take-up			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of clusters (state#cohort)	68	68	68	68	54	54	54	54
Mean of Dependent Variable	10.8%	10.8%	10.8%	10.8%	50.3%	50.3%	50.3%	50.3%
	0.3099	0.3099	0.3099	0.3099	0.5000	0.5000	0.5000	0.5000
lead6	0.0380**	0.0372**	0.0275*	0.0240				
	0.0186	0.0150	0.0158	0.0150				
lead5	0.0086	0.0133	0.0117	0.0082	0.1091*	0.0974	0.1199	0.0957
	0.0162	0.0136	0.0129	0.0125	0.0627	0.0778	0.0763	0.0862
lead4	0.0108	0.0186	0.0158	0.0137	0.0087	-0.0099	-0.0101	-0.0146
	0.0135	0.0114	0.0105	0.0107	0.0585	0.0588	0.0566	0.0572
lead3	0.0178	0.0234*	0.0203	0.0173	0.0749	0.0674	0.0891	0.0767
	0.0147	0.0125	0.0126	0.0127	0.0767	0.0757	0.0724	0.0711
lead2	0.0184	0.0136	0.0126	0.0084	-0.0478	-0.0348	-0.0208	-0.0316
	0.0142	0.0151	0.0150	0.0152	0.0658	0.0620	0.0606	0.0604
lead1	-0.0007	-0.0002	0.0015	-0.0001	-0.0617*	-0.0567*	-0.0573*	-0.0623*
	0.0128	0.0120	0.0109	0.0107	0.0348	0.0331	0.0333	0.0321
lag0	-0.0140	-0.0128	-0.0201	-0.0215	-0.0839*	-0.0841*	-0.0752*	-0.0779*
	0.0166	0.0171	0.0147	0.0147	0.0450	0.0447	0.0416	0.0412
lag1	0.0161	0.0132	0.0066	0.0039	-0.0234	-0.0219	-0.0117	-0.0192
	0.0238	0.0232	0.0185	0.0184	0.0444	0.0446	0.0421	0.043
State BBCE		0.0364***	0.0291***	0.0278***		-0.0643***	-0.0512**	-0.0509**
		0.0084	0.0076	0.0076		0.0227	0.0230	0.0229
Age			-0.0018***	-0.0021***			-0.0044***	-0.0050***
			0.0005	0.0005			0.0014	0.0014
Female			0.0106***	0.0074***			0.0243**	0.0163*
			0.0024	0.0023			0.0096	0.0093

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Black			0.0562***	0.0537***			0.0741***	0.0746***
			0.0051	0.0051			0.0137	0.0138
Other Races			0.0142**	0.0110*			-0.0242	-0.028
			0.0067	0.0065			0.0185	0.0185
Less Than High School			0.0891***	0.0826***			0.0338**	0.0265*
			0.0055	0.0054			0.0157	0.0157
High School			0.0191***	0.0185***			-0.0237*	-0.0236*
			0.0041	0.0040			0.0141	0.0139
Married			-0.0931***	-0.0908***			-0.0605***	-0.0606***
			0.0046	0.0045			0.0170	0.0167
Family Size			0.0360***	0.0357***			0.0276***	0.0290***
			0.0020	0.0020			0.0040	0.0041
Household Income(log)-cpi			-0.0274***	-0.0250***			0.0239***	0.0247***
			0.0023	0.0022			0.0018	0.0017
Rural			0.0093*	0.0095*			0.0259	0.0280
			0.0048	0.0049			0.0163	0.0171
ADL				0.0373***				0.0398***
				0.0035				0.0062
IADL				0.0356***				0.0233***
				0.0061				0.0082
Proxy				-0.0178***				-0.0547
				0.0054				0.0372
R-squared	0.0337	0.0346	0.1543	0.1664	0.032	0.0329	0.0823	0.0912
N	54,894	54,894	54,894	54,894	10,945	10,945	10,945	10,945

Notes: For gender, race, education, marital status, residence status and proxy, the reference groups are male, white, more than high school, unmarried, urban, and self-report respectively; Participation is whether individuals enroll in SNAP while take-up is whether individuals eligible for SNAP enroll in SNAP. The District of Columbia and 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) are excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data are excluded as well. *p < 0.10 **p < 0.05 ***p < 0.01.

Table A13 Event study estimates of the differential effects of Medicaid expansion on SNAP take-up and participation (age 60-64)

Dependent Variable:	Participation				Take-up			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of clusters (state#cohort)	68	68	68	68	40	40	40	40
Mean of Dependent Variable	7.4%	7.4%	7.4%	7.4%	38.1%	38.1%	38.1%	38.1%
	0.2620	0.2620	0.2620	0.2620	0.4858	0.4858	0.4858	0.4858
lead6	0.0026	0.0054	-0.0047	-0.0068	-0.2719***	-0.2744***	-0.2206***	-0.2259***
	0.0161	0.0131	0.0123	0.0116	0.0443	0.0468	0.0545	0.0535
lead5	0.0002	0.0048	0.0014	-0.0002	0.0665	0.0651	0.0719	0.0738
	0.0134	0.0111	0.0106	0.0104	0.0442	0.0478	0.0437	0.0453
lead4	-0.0036	0.0016	0.0028	0.0019	0.0551	0.0520	0.0170	0.0250
	0.0156	0.0133	0.0117	0.0113	0.0405	0.0421	0.0381	0.0390
lead3	0.0002	0.0033	0.0028	0.0018				
	0.0147	0.0131	0.0135	0.0132				
lead2	0.0025	-0.0029	-0.0086	-0.0093	-0.0489	-0.0464	-0.0276	-0.0379
	0.0127	0.0115	0.0119	0.0120	0.0527	0.0545	0.0617	0.0605
lead1	0.0121	0.0118	0.0062	0.0056	0.0248	0.0251	0.0318	0.0266
	0.0134	0.0129	0.0113	0.0114	0.0512	0.0515	0.0507	0.0516
lag0	-0.0143	-0.0153	-0.0140	-0.0128	-0.0729	-0.0729	-0.0626	-0.0609
	0.0180	0.0178	0.0171	0.0167	0.0773	0.0773	0.0723	0.0705
lag1	-0.0078	-0.0101	-0.0021	-0.0023	-0.0118	-0.0118	-0.0198	-0.0192
	0.0199	0.0191	0.0177	0.0177	0.0690	0.0691	0.0632	0.0641
State BBCE		0.0357***	0.0291***	0.0306***		-0.0055	0.0011	0.0051
		0.0095	0.0087	0.0085		0.0266	0.0274	0.0278
Age			-0.0037***	-0.0038***			-0.0159***	-0.0161***
			0.0007	0.0007			0.0048	0.0049
Female			0.0119***	0.0102***			0.0336**	0.0286**
			0.0031	0.0033			0.0137	0.0134

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Black			0.0509***	0.0495***			0.0848***	0.0836***
			0.0080	0.0079			0.0233	0.0229
Other Races			0.0119	0.0082			-0.0214	-0.0304
			0.0087	0.0082			0.0213	0.0207
Less Than High School			0.0625***	0.0579***			0.0283	0.0252
			0.0058	0.0056			0.0249	0.0256
High School			0.0162***	0.0156***			0.0190	0.0201
			0.0050	0.0051			0.0222	0.0222
Married			-0.0614***	-0.0596***			-0.0605***	-0.0575***
			0.0048	0.0046			0.0195	0.0182
Family Size			0.0380***	0.0374***			0.0496***	0.0510***
			0.0026	0.0026			0.0087	0.0087
Household Income(log)-cpi			-0.0258***	-0.0239***			0.0186***	0.0193***
			0.0017	0.0017			0.0025	0.0024
Rural			-0.0029	-0.0023			-0.0042	-0.0031
			0.0051	0.0052			0.0254	0.0252
ADL				0.0303***				0.0261***
				0.0038				0.0088
IADL				0.0167***				0.0150
				0.0051				0.0109
Proxy				-0.0066				-0.0275
				0.0055				0.0350
R-squared	0.035	0.0362	0.1361	0.1446	0.0441	0.0441	0.0961	0.1009
N	28,336	28,336	28,336	28,336	4,252	4,252	4,252	4,252

Notes: For gender, race, education, marital status, residence status and proxy, the reference groups are male, white, more than high school, unmarried, urban, and self-report respectively; Participation is whether individuals enroll in SNAP while take-up is whether individuals eligible for SNAP enroll in SNAP. The District of Columbia and 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) are excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data are excluded as well. $*p < 0.10$ $**p < 0.05$ $***p < 0.01$.

Table A14 Event study estimates of the differential effects of Medicaid expansion on SNAP take-up and participation (age 65 plus or disabled)

Dependent Variable:	Participation				Take-up			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of clusters (state#cohort)	74	74	74	74	67	67	67	67
Mean of Dependent Variable	9.9%	9.9%	9.9%	9.9%	38.0%	38.0%	38.0%	38.0%
	0.298	0.298	0.298	0.298	0.4853	0.4853	0.4853	0.4853
lead6	-0.0142	-0.0143	-0.0055	-0.006	-0.0839	-0.0977**	-0.056	-0.0539
	0.0171	0.0168	0.0183	0.0184	0.056	0.0413	0.0564	0.0578
lead5	-0.0085	-0.0083	-0.0033	-0.0034	0.0032	-0.0121	-0.0202	-0.0195
	0.0129	0.0127	0.0108	0.0107	0.064	0.0478	0.0475	0.0468
lead4	-0.0128	-0.0125	-0.0117	-0.0113	-0.0178	-0.0397	-0.0561	-0.0564
	0.0096	0.0093	0.0077	0.0076	0.0553	0.0426	0.0400	0.0398
lead3	-0.0111	-0.0109	-0.0066	-0.0066	0.0079	-0.007	-0.0165	-0.017
	0.0096	0.0093	0.0081	0.0080	0.0603	0.0478	0.0440	0.0446
lead2	-0.0058	-0.0064	-0.0044	-0.0043	-0.1006*	-0.0497	-0.0477	-0.046
	0.0092	0.0096	0.0089	0.0088	0.0599	0.0452	0.0416	0.041
lead1	-0.0108	-0.011	-0.0102	-0.0102	-0.0565	-0.0349	-0.0318	-0.0307
	0.0071	0.0072	0.0081	0.0080	0.0475	0.0332	0.0319	0.0315
lag0	0.0051	0.0051	0.0016	0.0017	-0.0131	-0.0127	-0.0158	-0.0155
	0.0066	0.0066	0.0069	0.0068	0.0318	0.0312	0.0283	0.0279
lag1	-0.0079	-0.008	-0.0079	-0.0071	-0.0274	-0.0239	-0.0163	-0.0151
	0.0134	0.0134	0.0117	0.0115	0.0390	0.0409	0.0355	0.0350
State BBCE		0.0029	0.0044	0.0048		-0.1645***	-0.0971***	-0.0941***
		0.0048	0.0039	0.0039		0.0180	0.0146	0.0145
Age			-0.0031***	-0.0034***			-0.0071***	-0.0074***
			0.0002	0.0002			0.0004	0.0005
Female			0.0138***	0.0120***			0.0470***	0.0443***
			0.0022	0.0023			0.0067	0.0072

Black			0.0344***	0.0332***			0.0164*	0.0159*
			0.0042	0.0042			0.0094	0.0093
Other Races			0.0227**	0.0217**			0.0100	0.0077
			0.0086	0.0085			0.0148	0.0147
Less Than High School			0.0460***	0.0438***			0.0455***	0.0429***
			0.0041	0.0040			0.0074	0.0074
High School			-0.0034*	-0.0029			-0.0217***	-0.0204***
			0.0020	0.0020			0.0075	0.0076
Married			-0.0465***	-0.0445***			-0.0335***	-0.0326**
			0.0038	0.0039			0.0126	0.0125
Family Size			0.0384***	0.0367***			0.0552***	0.0535***
			0.0029	0.0028			0.004	0.0038
Household Income(log)-cpi			-0.0415***	-0.0403***			0.0250***	0.0255***
			0.0022	0.0022			0.0028	0.0028
SSI or SSDI Receipt			0.3220***	0.3118***			0.2236***	0.2150***
			0.0108	0.0108			0.0118	0.0117
Rural			-0.0018	-0.0017			-0.0120	-0.0122
			0.0034	0.0033			0.0094	0.0090
ADL				0.0121***				0.0107***
				0.0021				0.0031
IADL				0.0062***				0.0106***
				0.0018				0.0031
Proxy				-0.0194***				-0.0119
				0.0046				0.0135
R-squared	0.0225	0.0225	0.2561	0.259	0.0286	0.0358	0.1718	0.1741
N	125,531	125,531	125,531	125,531	31,897	31,897	31,897	31,897

Notes: For gender, race, education, marital status, residence status and proxy, the reference groups are male, white, more than high school, unmarried, urban, and self-report respectively; Participation is whether individuals enroll in SNAP while take-up is whether individuals eligible for SNAP enroll in SNAP. The District of Columbia and 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) are

excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data are excluded as well. *$p < 0.10$ **$p < 0.05$ ***$p < 0.01$.

Table A15 Event study estimates of the differential effects of BBCE on SNAP take-up and participation (all samples)

Dependent Variable:	Participation			Take-up		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Number of clusters (state#cohort)	136	136	136	108	108	108
Mean of Dependent Variable	6.6%	6.6%	6.6%	42.4%	42.4%	42.4%
	0.2487	0.2487	0.2487	0.4941	0.4941	0.4941
lead4	0.0123**	0.0081	0.0085	0.0216	0.0172	0.0186
	0.0062	0.0082	0.0080	0.0169	0.0149	0.0149
lead3	0.0052	0.0023	0.0022	0.0060	0.0009	0.0002
	0.0041	0.0042	0.0042	0.0171	0.0149	0.0148
lead2	-0.0072**	-0.0070***	-0.0071***	-0.0085	-0.0129	-0.0136
	0.0032	0.0027	0.0026	0.0135	0.0122	0.0120
lead1	-0.0004	0.0006	0.0006	-0.0054	-0.0042	-0.0032
	0.0019	0.0018	0.0018	0.0103	0.0100	0.0101
lag0	0.0068	0.0034	0.0032	-0.1117***	-0.0684***	-0.0678***
	0.0067	0.0058	0.0057	0.0309	0.0234	0.0229
lag1	0.0159**	0.0111*	0.0108*	-0.1262***	-0.0803***	-0.0794***
	0.0066	0.0060	0.0059	0.0236	0.0215	0.0211
lag2	0.0104	0.0052	0.0050	-0.1415***	-0.0960***	-0.0944***
	0.0076	0.0070	0.0070	0.0245	0.0228	0.0228
lag3	0.0145	0.0116	0.0115	-0.1112**	-0.0657*	-0.0653
	0.0088	0.0073	0.0074	0.0430	0.0393	0.0398
lag4	0.0392***	0.0302***	0.0303***	-0.0535	-0.0139	-0.0151
	0.0085	0.0086	0.0083	0.0641	0.0623	0.0615
lag5	0.0408***	0.0370***	0.0368***	0.0113	0.0286	0.0275
	0.0046	0.0046	0.0046	0.0296	0.0277	0.0283
lag6	0.0091*	0.0172***	0.0175***	-0.0738*	-0.0193	-0.0185

	0.0054	0.0049	0.0048	0.0376	0.0360	0.0369
Age		-0.0015***	-0.0018***		-0.0074***	-0.0077***
		0.0001	0.0001		0.0004	0.0004
Female		0.0070***	0.0054***		0.0459***	0.0426***
		0.0013	0.0014		0.0071	0.0075
Black		0.0374***	0.0358***		0.0137*	0.0131*
		0.0033	0.0032		0.0077	0.0075
Other Races		0.0040	0.0030		-0.0419***	-0.0444***
		0.0064	0.0063		0.0146	0.0148
Less Than High School		0.0402***	0.0380***		0.0527***	0.0508***
		0.0024	0.0023		0.0080	0.0081
High School		0.0052***	0.0055***		0.0315***	0.0319***
		0.0016	0.0016		0.0097	0.0096
Married		-0.0458***	-0.0441***		-0.0489***	-0.0484***
		0.0026	0.0026		0.0101	0.0101
Family Size		0.0318***	0.0307***		0.0490***	0.0482***
		0.0020	0.0020		0.0031	0.0030
Household Income(log)-cpi		-0.0325***	-0.0316***		0.0194***	0.0197***
		0.0013	0.0013		0.0029	0.0029
SSI or SSDI Receipt		0.3450***	0.3326***		0.2118***	0.2005***
		0.0121	0.0116		0.0128	0.0120
Rural		0.0066***	0.0060**		0.0091	0.0064
		0.0025	0.0024		0.0132	0.0131
ADL			0.0152***			0.0161***
			0.0020			0.0039
IADL			0.0053***			0.0095***
			0.0013			0.0031
Proxy			-0.0151***			-0.0246***
			0.0029			0.0092

R-squared	0.0182	0.2126	0.2163	0.0394	0.1360	0.1390
N	494,034	494,034	494,034	85,726	85,726	85,726

Notes: For gender, race, education, marital status, residence status and proxy, the reference groups are male, white, more than high school, unmarried, urban, and self-report respectively; Participation is whether individuals enroll in SNAP while take-up is whether individuals eligible for SNAP enroll in SNAP. The District of Columbia and 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) are excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data are excluded as well. *p < 0.10 **p < 0.05 ***p < 0.01.

Table A16 Event study estimates of the differential effects of BBCE on SNAP take-up and participation (below age 60)

Dependent Variable:	Participation			Take-up		
	(1)	（2）	(3)	（4）	（5）	（6）
Number of clusters (state#cohort)	112	112	112	67	67	67
Mean of Dependent Variable	6.9%	6.9%	6.9%	53.1%	53.1%	53.1%
	0.2549	0.2549	0.2549	0.4991	0.4991	0.4991
lead4	-0.0063	-0.0094	-0.0076	-0.0447	-0.0615	-0.0427
	0.0116	0.0110	0.0101	0.0479	0.0435	0.0437
lead3	0.0066	0.0053	0.0048	0.0593*	0.0521*	0.0489*
	0.0082	0.0072	0.0071	0.0338	0.0290	0.0281
lead2	-0.0052	-0.0054	-0.0067	0.1379***	0.1251***	0.1041***
	0.0049	0.0054	0.0052	0.0362	0.0372	0.0346
lead1	-0.0028	-0.0045	-0.0044	-0.0218	-0.0170	-0.0167
	0.0050	0.0049	0.0048	0.0289	0.0259	0.0266
lag0	0.0139	0.0092	0.0089	-0.0090	-0.0072	-0.0103
	0.0110	0.0104	0.0103	0.0545	0.0563	0.0570
lag1	0.0212	0.0142	0.0136	-0.0635	-0.0536	-0.0537
	0.0137	0.0133	0.0133	0.0473	0.0481	0.0480
lag2	0.0372***	0.0377***	0.0344***	-0.0535	-0.0560	-0.0616
	0.0130	0.0124	0.0120	0.0492	0.0500	0.0486
lag3	0.0213	0.0219	0.0191	-0.0818	-0.0989	-0.1005
	0.0205	0.0203	0.0213	0.1658	0.1627	0.1653
lag4	0.0533*	0.0579**	0.0508**	0.1159	0.1052	0.0803
	0.0293	0.0257	0.0241	0.1845	0.1876	0.1812
lag5	0.0029	0.0034	0.0002	-0.1664	-0.1902*	-0.1921*

	(1)	(2)	(3)	(4)	(5)	(6)
	0.0206	0.0170	0.0166	0.1099	0.1105	0.1104
lag6	-0.0006	0.0005	-0.0033	-0.1376	-0.1217	-0.1312
	0.0148	0.0157	0.0156	0.1135	0.1142	0.1132
Age		-0.0018***	-0.0019***		-0.0039***	-0.0046***
		0.0004	0.0004		0.0015	0.0015
Female		0.0039*	0.0011		0.0492***	0.0358***
		0.0021	0.0022		0.0111	0.0112
Black		0.0446***	0.0427***		0.0594***	0.0592***
		0.0035	0.0037		0.0113	0.0122
Other Races		-0.0135***	-0.0143***		-0.0904***	-0.0929***
		0.0050	0.0051		0.0314	0.0315
Less Than High School		0.0627***	0.0585***		0.0273*	0.0250*
		0.0052	0.0052		0.0140	0.0137
High School		0.0236***	0.0233***		0.0222	0.0219
		0.0033	0.0033		0.0189	0.0195
Married		-0.0639***	-0.0622***		-0.0181	-0.0222
		0.0046	0.0044		0.0143	0.0140
Family Size		0.0315***	0.0313***		0.0245***	0.0278***
		0.0022	0.0022		0.0040	0.0041
Household Income(log)-cpi		-0.0303***	-0.0278***		0.0217***	0.0225***
		0.0015	0.0014		0.0028	0.0028
Rural		0.0023	0.0006		0.0132	0.0108
		0.0036	0.0035		0.0193	0.0199
ADL			0.0300***			0.0312***
			0.0035			0.0087
IADL			0.0373***			0.0363***
			0.0060			0.0082
Proxy			-0.0195***			-0.1442***
			0.0056			0.0439

R-squared	0.0394	0.1554	0.1677	0.0664	0.1101	0.1226
N	132,453	132,453	132,453	14,377	14,377	14,377

Notes: For gender, race, education, marital status, residence status and proxy, the reference groups are male, white, more than high school, unmarried, urban, and self-report respectively; Participation is whether individuals enroll in SNAP while take-up is whether individuals eligible for SNAP enroll in SNAP. The District of Columbia and 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) are excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data are excluded as well. *p < 0.10 **p < 0.05 ***p < 0.01.

Table A17 Event study estimates of the differential effects of BBCE on SNAP take-up and participation (age 60-64)

Dependent Variable:	Participation			Take-up		
	(1)	(2)	(3)	(4)	(5)	(6)
Number of clusters (state#cohort)	106	106	106	50	50	50
Mean of Dependent Variable	4.0%	4.0%	4.0%	31.4%	31.4%	31.4%
	0.1952	0.1952	0.1952	0.4640	0.4640	0.4640
lead4	-0.0063	-0.0052	-0.0043	-0.0148	-0.0110	-0.0053
	0.0046	0.0042	0.0040	0.0185	0.0164	0.0161
lead3	-0.0013	0.0001	0.0004	-0.0606	-0.0495	-0.0572
	0.0044	0.0046	0.0047	0.0450	0.0422	0.0394
lead2	-0.0083**	-0.0072**	-0.0067**	-0.0021	-0.0106	-0.0117
	0.0033	0.0030	0.0030	0.0166	0.0188	0.0187
lead1	-0.0031	-0.0044	-0.0047	-0.0171	-0.0221	-0.0185
	0.0039	0.0039	0.0038	0.0241	0.0245	0.0274
lag0	0.0304***	0.0262***	0.0263***	0.0457	0.0371	0.0327
	0.0080	0.0075	0.0074	0.0469	0.0457	0.0460
lag1	0.0370***	0.0315***	0.0317***	0.0292	0.0145	0.0138
	0.0108	0.0106	0.0103	0.0746	0.0709	0.0697
lag2	0.0341**	0.0250	0.0242	-0.0456	-0.0115	-0.0162
	0.0162	0.0151	0.0153	0.0516	0.0446	0.0439
lag3	0.0497***	0.0374***	0.0385***	-0.4191***	-0.3537***	-0.3496***
	0.0176	0.0113	0.0115	0.1236	0.0891	0.0789
lag4	0.0450***	0.0397***	0.0404***	-0.2554***	-0.1664**	-0.1356**
	0.0095	0.0086	0.0089	0.0898	0.0624	0.0539
lag5	0.0984***	0.0854***	0.0827***			
	0.0197	0.0214	0.0205			
lag6	0.0110	-0.0137	-0.0166*			

	(1)	(2)	(3)	(4)	(5)	(6)
	0.0169	0.0088	0.0085			
Age		-0.0013***	-0.0012***		-0.0068	-0.0059
		0.0004	0.0004		0.0051	0.0049
Female		0.0090***	0.0069***		0.0791***	0.0600***
		0.0022	0.0023		0.0163	0.0169
Black		0.0378***	0.0364***		0.0731**	0.0706**
		0.0065	0.0063		0.0312	0.0313
Other Races		0.0113	0.0104		-0.059	-0.0651
		0.0097	0.0092		0.0562	0.0549
Less Than High School		0.0308***	0.0264***		0.0221	0.0240
		0.0039	0.0038		0.0205	0.0216
High School		0.0109***	0.0101***		0.0213	0.0186
		0.0029	0.0030		0.0276	0.0286
Married		-0.0517***	-0.0503***		-0.1076***	-0.0961***
		0.0048	0.0045		0.0231	0.0231
Family Size		0.0291***	0.0285***		0.0658***	0.0701***
		0.0027	0.0027		0.0117	0.0116
Household Income(log)-cpi		-0.0208***	-0.0194***		0.0166***	0.0177***
		0.0020	0.0019		0.0039	0.0041
Rural		0.0030	0.0026		-0.0402	-0.0459
		0.0037	0.0037		0.0432	0.0457
ADL			0.0247***			0.0286*
			0.0042			0.0152
IADL			0.0157***			0.0328**
			0.0048			0.0151
Proxy			-0.0109**			-0.1619***
			0.0043			0.0336
R-squared	0.0231	0.1068	0.1162	0.0610	0.1296	0.1445
N	76,415	76,415	76,415	5,118	5,118	5,118

Notes: For gender, race, education, marital status, residence status and proxy, the reference groups are male, white, more than high school, unmarried, urban, and self-report respectively; Participation is whether individuals enroll in SNAP while take-up is whether individuals eligible for SNAP enroll in SNAP. The District of Columbia and 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) are excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data are excluded as well. *p < 0.10 **p < 0.05 ***p < 0.01.

Table A18 Event study estimates of the differential effects of BBCE on SNAP take-up and participation (age 65 plus or disabled)

Dependent Variable:	Participation			Take-up		
	(1)	(2)	(3)	(4)	(5)	(6)
Number of clusters (state#cohort)	151	151	151	123	123	123
Mean of Dependent Variable	7.4%	7.4%	7.4%	40.5%	40.5%	40.5%
	0.2613	0.2613	0.2613	0.4909	0.4909	0.4909
lead4	0.0075**	0.0072**	0.0071**	0.0212	0.0200	0.0212
	0.0034	0.0032	0.0032	0.0184	0.0165	0.0164
lead3	-0.0015	-0.0036	-0.0037	0.0207	0.0039	0.0025
	0.0027	0.0025	0.0024	0.0168	0.0133	0.0133
lead2	-0.0063*	-0.0068**	-0.0068**	-0.0079	-0.0176	-0.0181
	0.0032	0.0028	0.0027	0.0145	0.0155	0.0157
lead1	-0.0048**	-0.003	-0.0029	-0.0064	-0.0085	-0.0072
	0.0021	0.0020	0.0021	0.0121	0.0102	0.0104
lag0	0.0015	-0.0009	-0.001	-0.1781***	-0.1192***	-0.1172***
	0.0055	0.0051	0.0051	0.0281	0.0208	0.0205
lag1	0.0133**	0.0099**	0.0094*	-0.1810***	-0.1196***	-0.1170***
	0.0063	0.0049	0.0049	0.0248	0.0216	0.0211
lag2	-0.0011	-0.0047	-0.0046	-0.1615***	-0.1182***	-0.1149***
	0.0075	0.0064	0.0064	0.0287	0.0198	0.0196
lag3	0.0037	0.0031	0.0032	-0.1465***	-0.0818***	-0.0768***
	0.0095	0.0072	0.0073	0.0260	0.0224	0.0221
lag4	0.0372***	0.0197***	0.0203***	-0.1642***	-0.1085***	-0.1073***
	0.0087	0.0053	0.0052	0.0322	0.0254	0.0255
lag5	0.0469***	0.0460***	0.0464***	-0.0167	0.0291	0.0311

	(1)	(2)	(3)	(4)	(5)	(6)
	0.0055	0.0043	0.0041	0.0280	0.0244	0.0248
lag6	0.0314***	0.0509***	0.0520***	0.0366	0.0892**	0.0943**
	0.0078	0.0082	0.0084	0.0451	0.0399	0.0401
Age		-0.0022***	-0.0024***		-0.0064***	-0.0065***
		0.0001	0.0001		0.0004	0.0004
Female		0.0102***	0.0093***		0.0531***	0.0525***
		0.0017	0.0018		0.0092	0.0098
Black		0.0274***	0.0259***		-0.0121	-0.0125
		0.004	0.0039		0.0081	0.008
Other Races		0.0160**	0.0146*		-0.0169	-0.0185
		0.0076	0.0075		0.0157	0.0157
Less Than High School		0.0312***	0.0294***		0.0598***	0.0581***
		0.0025	0.0024		0.0073	0.0071
High School		-0.0068***	-0.0065***		0.0132	0.0138
		0.0020	0.0021		0.0117	0.0117
Married		-0.0393***	-0.0379***		-0.0298***	-0.0297***
		0.0027	0.0027		0.0111	0.0111
Family Size		0.0363***	0.0349***		0.0523***	0.0510***
		0.0025	0.0024		0.0029	0.0028
Household Income(log)-cpi		-0.0414***	-0.0404***		0.0283***	0.0288***
		0.0018	0.0017		0.0036	0.0036
SSI or SSDI Receipt		0.3328***	0.3243***		0.2202***	0.2140***
		0.0114	0.0109		0.0128	0.0124
Rural		0.0093***	0.0089***		0.0168	0.0159
		0.0032	0.0030		0.0143	0.0141
ADL			0.0121***			0.0137***
			0.0024			0.0045
IADL			0.0027**			0.0023
			0.0012			0.0029

	(1)	(2)	(3)	(4)	(5)	(6)
Proxy			-0.0077**			-0.0026
			0.0033			0.0090
R-squared	0.0166	0.2530	0.2555	0.0446	0.1611	0.1628
N	342,776	342,776	342,776	58,254	58,254	58,254

Notes: For gender, race, education, marital status, residence status and proxy, the reference groups are male, white, more than high school, unmarried, urban, and self-report respectively; Participation is whether individuals enroll in SNAP while take-up is whether individuals eligible for SNAP enroll in SNAP. The District of Columbia and 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) are excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data are excluded as well. *p < 0.10 **p < 0.05 ***p < 0.01.

Table A19 Event study estimates of the differential effects of Both policies verses BBCE only on SNAP take-up and participation (all samples)

Dependent Variable:	Participation				Take-up			
	(1)	（2）	（3）	(4)	(5)	（6）	（7）	(8)
Number of clusters (state#cohort)	65	65	65	65	59	59	59	59
Mean of Dependent Variable	9.4%	9.4%	9.4%	9.4%	39.5%	39.5%	39.5%	39.5%
	0.2921	0.2921	0.2921	0.2921	0.4887	0.4887	0.4887	0.4887
lead6	-0.0007	-0.0041	-0.0009	-0.0017	-0.1033***	-0.0926*	-0.0558	-0.0538
	0.0144	0.0120	0.0129	0.0127	0.0380	0.0491	0.0600	0.0616
lead5	-0.0008	-0.0024	0.0002	-0.0004	0.0013	0.0005	-0.0030	-0.0028
	0.0107	0.0103	0.0084	0.0082	0.0474	0.0370	0.0335	0.0326
lead4	-0.0019	-0.0025	-0.0033	-0.0034	-0.0101	-0.0174	-0.0312	-0.0327
	0.0092	0.0081	0.0066	0.0066	0.0419	0.0357	0.0342	0.0342
lead3	0.0011	0.0003	0.0012	0.0007	0.0189	0.0151	0.0070	0.0048
	0.0094	0.0083	0.0072	0.0072	0.0522	0.0444	0.0413	0.0417
lead2	0.0052	0.0005	0.0016	0.0011	-0.0759	-0.0362	-0.0290	-0.0293
	0.0073	0.0087	0.0086	0.0084	0.0493	0.0389	0.0372	0.0364
lead1	-0.0066	-0.0086	-0.0074	-0.0076	-0.0471	-0.0299	-0.0276	-0.0276
	0.0051	0.0053	0.0057	0.0057	0.0371	0.0246	0.0236	0.0234
lag0	-0.0018	-0.0017	-0.0052	-0.0049	-0.0349	-0.0358	-0.0325	-0.0322
	0.0071	0.0071	0.0068	0.0068	0.0261	0.0258	0.0231	0.0227
lag1	-0.0026	-0.0034	-0.0042	-0.0038	-0.0182	-0.0176	-0.0104	-0.0101
	0.0148	0.0144	0.0111	0.0110	0.0327	0.0349	0.0289	0.0284
State BBCE		0.0150***	0.0118***	0.0122***		-0.1170***	-0.0670***	-0.0640***
		0.0038	0.0035	0.0034		0.0155	0.0135	0.0133
Age			-0.0021***	-0.0024***			-0.0084***	-0.0088***
			0.0001	0.0001			0.0005	0.0004
Female			0.0102***	0.0078***			0.0340***	0.0302***

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			0.0014	0.0014			0.0047	0.005
Black			0.0450***	0.0434***			0.0432***	0.0425***
			0.0036	0.0035			0.0071	0.0071
Other Races			0.0185***	0.0176***			-0.0054	-0.0081
			0.0064	0.0062			0.0114	0.0111
Less Than High School			0.0614***	0.0585***			0.0455***	0.0419***
			0.0040	0.0039			0.0087	0.0088
High School			0.0080***	0.0083***			-0.0185***	-0.0172***
			0.0019	0.0018			0.0064	0.0063
Married			-0.0548***	-0.0526***			-0.0510***	-0.0498***
			0.0021	0.0022			0.0093	0.0091
Family Size			0.0334***	0.0323***			0.0470***	0.0462***
			0.0021	0.0020			0.0041	0.0039
Household Income(log)-cpi			-0.0320***	-0.0309***			0.0187***	0.0192***
			0.0021	0.0021			0.0018	0.0018
SSI or SSDI Receipt			0.3342***	0.3193***			0.2114***	0.1977***
			0.0116	0.0117			0.0110	0.0111
Rural			-0.0008	-0.0008			-0.0074	-0.0077
			0.0026	0.0025			0.0079	0.0074
ADL				0.0178***				0.0171***
				0.0016				0.0029
IADL				0.0066***				0.0120***
				0.0016				0.0030
Proxy				-0.0259***				-0.0239**
				0.0033				0.0109
R-squared	0.0257	0.0259	0.2108	0.2149	0.0240	0.0233	0.1390	0.1430
N	200,833	200,833	200,833	200,833	47,473	47,473	47,473	47,473

Notes: For gender, race, education, marital status, residence status and proxy, the reference groups are male, white, more than high school, unmarried, urban, and self-report respectively; Participation is whether individuals enroll in SNAP while take-up is whether individuals eligible for SNAP enroll in SNAP. The District

of Columbia and 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) are excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data are excluded as well. *p < 0.10 **p < 0.05 ***p < 0.01.

Table A20 Event study estimates of the differential effects of Both policies verses BBCE only on SNAP take-up and participation (Below age 60)

Dependent Variable:	Participation				Take-up			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of clusters (state#cohort)	56	56	56	56	43	43	43	43
Mean of Dependent Variable	10.4%	10.4%	10.4%	10.4%	49.5%	49.5%	49.5%	49.5%
	0.3058	0.3058	0.3058	0.3058	0.5000	0.5000	0.5000	0.5000
lead6	0.0459**	0.0392***	0.0327**	0.0293**				
	0.0177	0.0142	0.0141	0.0137				
lead5	0.0184	0.0166	0.0159	0.0120	0.1166*	0.1038	0.1259	0.1019
	0.0171	0.0143	0.0134	0.0130	0.0636	0.0806	0.0780	0.0876
lead4	0.0200	0.0218*	0.0193*	0.0168	0.0070	-0.0111	-0.0046	-0.0095
	0.0143	0.0117	0.0107	0.0109	0.0603	0.0609	0.0584	0.0590
lead3	0.0276*	0.0285**	0.0256*	0.0225*	0.0784	0.0718	0.0977	0.0851
	0.0155	0.0132	0.0131	0.0131	0.0798	0.0795	0.0763	0.0751
lead2	0.0322**	0.0247*	0.0240*	0.0193	-0.0100	0.0072	0.0214	0.0088
	0.0130	0.0139	0.0141	0.0144	0.0613	0.0557	0.0542	0.0549
lead1	0.0042	0.0025	0.0044	0.0020	-0.0581	-0.0494	-0.0501	-0.0568
	0.0148	0.0138	0.0124	0.0121	0.0385	0.0372	0.0379	0.0363
lag0	-0.0068	-0.0057	-0.0151	-0.0168	-0.0690	-0.0699	-0.0602	-0.0643
	0.0183	0.0188	0.0160	0.0160	0.0467	0.0462	0.0435	0.0431
lag1	0.0183	0.0169	0.0048	0.0022	-0.0126	-0.0142	0.0016	-0.0076
	0.0255	0.0249	0.0198	0.0197	0.0459	0.0460	0.0425	0.0434
State BBCE		0.0310***	0.0213***	0.0205***		-0.0721***	-0.0542**	-0.0542**
		0.0069	0.0060	0.0061		0.0244	0.0249	0.0247
Age			-0.0016***	-0.0019***			-0.0045***	-0.0053***
			0.0005	0.0005			0.0015	0.0015
Female			0.0104***	0.0075***			0.0277**	0.0198*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			0.0024	0.0023			0.0109	0.0105
Black			0.0547***	0.0518***			0.0754***	0.0753***
			0.0051	0.0051			0.0145	0.0147
Other Races			0.0130**	0.0103			-0.0096	-0.0126
			0.0063	0.0062			0.0153	0.0154
Less Than High School			0.0947***	0.0895***			0.0454***	0.0387**
			0.0056	0.0055			0.0165	0.0166
High School			0.0223***	0.0219***			-0.0207	-0.0203
			0.0038	0.0038			0.0132	0.0130
Married			-0.0863***	-0.0849***			-0.0591***	-0.0601***
			0.0049	0.0048			0.0192	0.0188
Family Size			0.0337***	0.0333***			0.0263***	0.0275***
			0.0018	0.0017			0.0040	0.0041
Household Income(log)-cpi			-0.0273***	-0.0249***			0.0231***	0.0241***
			0.0025	0.0024			0.0020	0.0020
Rural			0.0066	0.0069			0.0171	0.0189
			0.0046	0.0047			0.0178	0.0188
ADL				0.0356***				0.0373***
				0.0037				0.0061
IADL				0.0324***				0.0270***
				0.0065				0.0077
Proxy				-0.0155***				-0.0470
				0.0052				0.0370
R-squared	0.0353	0.0360	0.1530	0.1636	0.0282	0.0295	0.0760	0.0849
N	53,019	53,019	53,019	53,019	10,430	10,430	10,430	10,430

Notes: For gender, race, education, marital status, residence status and proxy, the reference groups are male, white, more than high school, unmarried, urban, and self-report respectively; Participation is whether individuals enroll in SNAP while take-up is whether individuals eligible for SNAP enroll in SNAP. The District of Columbia and 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) are excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data are excluded as well. $*p < 0.10$ $**p < 0.05$ $***p < 0.01$.

Table A21 Event study estimates of the differential effects of Both policies verses BBCE only on SNAP take-up and participation (age 60-64)

Dependent Variable:	Participation				Take-up			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of clusters (state#cohort)	55	55	55	55	35	35	35	35
Mean of Dependent Variable	7.1%	7.1%	7.1%	7.1%	37.5%	37.5%	37.5%	37.5%
	0.2562	0.2562	0.2562	0.2562	0.4843	0.4843	0.4843	0.4843
lead6	0.0133	0.0099	0.0004	-0.0021	-0.2805***	-0.2864***	-0.2323***	-0.2411***
	0.0152	0.0131	0.0120	0.0111	0.0419	0.0417	0.0491	0.0487
lead5	0.0124	0.0111	0.0072	0.0049	0.0741	0.0703	0.0740	0.0752
	0.0132	0.0118	0.0111	0.0108	0.0467	0.0517	0.0470	0.0492
lead4	0.0093	0.0088	0.0085	0.0068	0.0766**	0.0661*	0.0293	0.0396
	0.0156	0.0142	0.0124	0.0120	0.0367	0.0388	0.0350	0.0355
lead3	0.0124	0.0112	0.0098	0.0082				
	0.0149	0.0142	0.0140	0.0138				
lead2	0.0096	0.0029	-0.0026	-0.0040	-0.0474	-0.0383	-0.0198	-0.0312
	0.0134	0.0126	0.0130	0.0131	0.0513	0.0535	0.0612	0.0595
lead1	0.0164	0.0143	0.0089	0.0080	0.0267	0.0280	0.0354	0.0292
	0.0148	0.0137	0.0123	0.0124	0.0521	0.0530	0.0515	0.0528
lag0	-0.0190	-0.0197	-0.0167	-0.0154	-0.0827	-0.0829	-0.0705	-0.0686
	0.0185	0.0184	0.0175	0.0171	0.0755	0.0755	0.0711	0.0692
lag1	-0.0134	-0.0149	-0.004	-0.0045	-0.0110	-0.0110	-0.0186	-0.0178
	0.0200	0.0196	0.0189	0.0189	0.0688	0.0688	0.0630	0.0641
State BBCE		0.0235***	0.0184**	0.0207***		-0.0200	-0.0116	-0.0064
		0.0080	0.0072	0.0069		0.0224	0.0242	0.0246
Age			-0.0032***	-0.0034***			-0.0143***	-0.0146***
			0.0007	0.0007			0.0044	0.0045

Female			0.0132***	0.0114***			0.0360**	0.0301**
			0.0028	0.0030			0.0144	0.0139
Black			0.0436***	0.0422***			0.0874***	0.0863***
			0.0084	0.0082			0.0231	0.0227
Other Races			0.0092	0.0062			-0.0174	-0.0282
			0.0089	0.0082			0.0238	0.0227
Less Than High School			0.0618***	0.0561***			0.0265	0.0226
			0.0056	0.0055			0.0254	0.0261
High School			0.0148***	0.0141***			0.0240	0.0252
			0.0050	0.0051			0.0219	0.0221
Married			-0.0619***	-0.0605***			-0.0586***	-0.0549***
			0.0051	0.0049			0.0214	0.0200
Family Size			0.0376***	0.0369***			0.0548***	0.0559***
			0.0028	0.0027			0.0093	0.0093
Household Income(log)-cpi			-0.0252***	-0.0232***			0.0173***	0.0181***
			0.0017	0.0017			0.0024	0.0023
Rural			-0.0049	-0.0047			-0.0057	-0.0045
			0.0052	0.0052			0.0252	0.0249
ADL				0.0328***				0.0302***
				0.0038				0.0094
IADL				0.0175***				0.0154
				0.0048				0.0113
Proxy				-0.0031				-0.0272
				0.0054				0.0313
R-squared	0.0379	0.0385	0.1368	0.1473	0.0476	0.0476	0.1049	0.1110
N	27,231	27,231	27,231	27,231	4,152	4,152	4,152	4,152

Notes: For gender, race, education, marital status, residence status and proxy, the reference groups are male, white, more than high school, unmarried, urban, and self-report respectively; Participation is whether individuals enroll in SNAP while take-up is whether individuals eligible for SNAP enroll in SNAP. The District

of Columbia and 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) are excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data are excluded as well. *p < 0.10 **p < 0.05 ***p < 0.01.

Table A22 Event study estimates of the differential effects of Both policies verses BBCE only on SNAP take-up and participation (age 65 plus or disabled)

Dependent Variable:	Participation				Take-up			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of clusters (state#cohort)	61	61	61	61	53	53	53	53
Mean of Dependent Variable	9.5%	9.5%	9.5%	9.5%	36.5%	36.5%	36.5%	36.5%
	0.2937	0.2937	0.2937	0.2937	0.4813	0.4813	0.4813	0.4813
lead6	-0.0201	-0.0218	-0.0137	-0.0142	-0.1379**	-0.1255***	-0.0788	-0.0769
	0.0169	0.0163	0.0175	0.0176	0.0519	0.0368	0.0525	0.0539
lead5	-0.0122	-0.0131	-0.0070	-0.0068	-0.0341	-0.0320	-0.0378	-0.0366
	0.0141	0.0144	0.0125	0.0124	0.0682	0.0488	0.0482	0.0475
lead4	-0.0148	-0.0154	-0.0145*	-0.0141	-0.0493	-0.0539	-0.0669	-0.0671
	0.0103	0.0100	0.0085	0.0085	0.0547	0.0440	0.0413	0.0411
lead3	-0.0120	-0.0126	-0.0095	-0.0096	-0.0083	-0.0109	-0.0199	-0.0206
	0.0105	0.0102	0.0090	0.0090	0.0604	0.0483	0.0443	0.0449
lead2	-0.0045	-0.0067	-0.0045	-0.0044	-0.1139*	-0.0534	-0.0540	-0.0524
	0.0098	0.0109	0.0101	0.0099	0.0612	0.0461	0.0424	0.0417
lead1	-0.0154**	-0.0166**	-0.0143	-0.0141	-0.0711	-0.0422	-0.0408	-0.0395
	0.0075	0.0081	0.0088	0.0087	0.0514	0.0354	0.0335	0.0331
lag0	0.0042	0.0041	0.0009	0.0012	-0.0182	-0.0181	-0.0203	-0.0196
	0.0074	0.0074	0.0080	0.0080	0.0332	0.0327	0.0300	0.0297
lag1	-0.0078	-0.0081	-0.0091	-0.0083	-0.0271	-0.0276	-0.0232	-0.0217
	0.0140	0.0139	0.0122	0.0121	0.0389	0.0418	0.0356	0.0352
State BBCE		0.0064	0.0073*	0.0077**		-0.1592***	-0.0866***	-0.0835***
		0.0046	0.0038	0.0037		0.0172	0.0138	0.0137
Age			-0.0030***	-0.0033***			-0.0073***	-0.0075***
			0.0002	0.0002			0.0005	0.0005

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female			0.0128***	0.0110***			0.0442***	0.0410***
			0.0022	0.0023			0.0071	0.0076
Black			0.0343***	0.0329***			0.0233**	0.0229**
			0.0038	0.0038			0.0089	0.0089
Other Races			0.0269***	0.0260***			0.0103	0.0080
			0.0085	0.0083			0.0147	0.0145
Less Than High School			0.0451***	0.0430***			0.0542***	0.0513***
			0.0042	0.0041			0.0069	0.0070
High School			-0.0037*	-0.0033*			-0.0161**	-0.0147*
			0.0020	0.0019			0.0078	0.0078
Married			-0.0413***	-0.0393***			-0.0356***	-0.0345**
			0.0036	0.0037			0.0131	0.0130
Family Size			0.0356***	0.0340***			0.0547***	0.0532***
			0.0030	0.0029			0.0040	0.0039
Household Income(log)-cpi			-0.0418***	-0.0406***			0.0219***	0.0225***
			0.0024	0.0023			0.0025	0.0025
SSI or SSDI Receipt			0.3239***	0.3138***			0.2302***	0.2218***
			0.0119	0.0120			0.0120	0.0122
Rural			-0.0037	-0.0036			-0.0146	-0.0147
			0.0033	0.0032			0.0095	0.0090
ADL				0.0130***				0.0130***
				0.0020				0.0030
IADL				0.0052***				0.0085***
				0.0018				0.0032
Proxy				-0.0213***				-0.0205
				0.0044				0.0139
R-squared	0.023	0.023	0.2579	0.2608	0.0214	0.0289	0.1724	0.1749
N	119,755	119,755	119,755	119,755	30,737	30,737	30,737	30,737

Notes: For gender, race, education, marital status, residence status and proxy, the reference groups are male, white, more than high school, unmarried, urban, and self-report respectively; Participation is whether individuals enroll in SNAP while take-up is whether individuals eligible for SNAP enroll in SNAP. The District of Columbia and 6 states (California, New Jersey, Connecticut, Minnesota, Vermont, Massachusetts) are excluded as they expanded Medicaid prior to the Affordable Care Act's expansion. For each wave, states with fewer than 10 individuals in the HRS data are excluded as well. *$p < 0.10$ **$p < 0.05$ ***$p < 0.01$.

Figure A1 Event study estimates of the differential effects of BBCE on SNAP take-up and participation

Notes: Participation is whether individuals enroll in SNAP while take-up is whether individuals eligible for SNAP enroll in SNAP. Below age 60 = individuals under 60 years of age and without disabilities; age 60-64 = individuals between ages 60 and 64 without disabilities; age 65 plus or disabled = individuals 65 years of age or older or with disabilities. Panel A and E present results of model 4 and model 1 in Table A15, respectively. Panel B and F present results of model 4 and model 1 in Table A16, respectively. Panel C and G present results of model 4 and model 1 in Table A17, respectively. Panel D and H present results of model 4 and model 1 in Table A18, respectively. The vertical axes display the differential effects, in percentage points, of a given wave (horizontal axes) relative to the wave prior to BBCE.
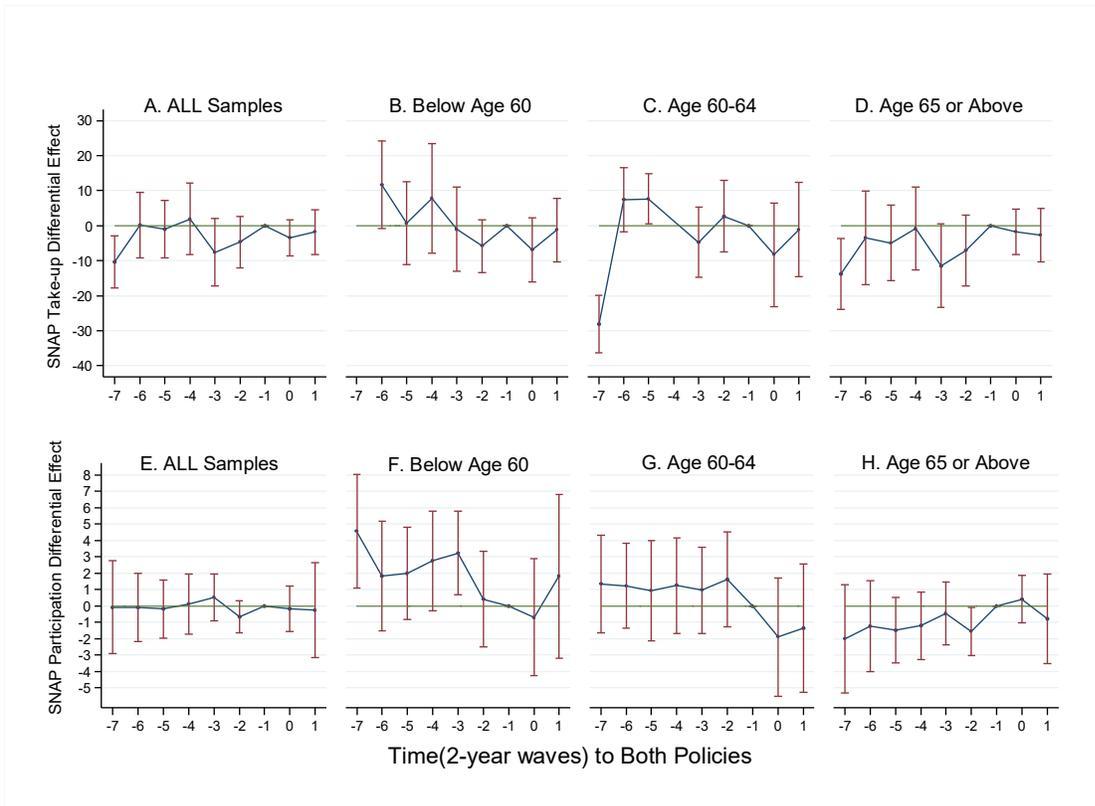
Figure A2 Event study estimates of the differential effects of BBCE and Medicaid expansions verses BBCE only on SNAP take-up and participation

Notes: Participation is whether individuals enroll in SNAP while take-up is whether individuals eligible for SNAP enroll in SNAP. Below age 60 = individuals under 60 years of age and without disabilities; age 60-64 = individuals between ages 60 and 64 without disabilities; age 65 plus or disabled = individuals 65 years of age or older or with disabilities. Panel A and E present results of model 5 and model 1 in Table A19, respectively. Panel B and F present results of model 5 and model 1 in Table A20, respectively. Panel C and G present results of model 5 and model 1 in Table A21, respectively. Panel D and H present results of model 5 and model 1 in Table A22, respectively. The vertical axes display the differential effects, in percentage points, of a given wave (horizontal axes) relative to the wave prior to the implementation of the both policies.