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Benefit changes and SNAP participation and expenditures among low-income seniors

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Abstract

This study examined changes in senior Supplemental Nutrition Assistance Program (SNAP) participation and household food and non-food expenditures following the 2009 American Recovery and Reinvestment Act (ARRA) expansion in SNAP benefits and the 2013 sunset of the benefit expansion. Using data from the 2008, 2010, 2012, and 2014 Food Security Supplements of the Current Population Survey, we find that senior SNAP participation increased significantly from 2008, prior to the implementation of the ARRA to 2010 post-ARRA, with the largest change among the oldest seniors aged 80 years and older. Seniors using meal services like home-delivered meals or congregate meals at senior centers saw larger increases in SNAP participation than those who did not use these services. There were no significant changes in senior SNAP participation following the 2013 sunset of the ARRA benefit expansion.

Expenditure data from the 2007-11 and 2012-14 Consumer Expenditure Surveys shows that, in contrast to younger adults, seniors did not appear to significantly alter their food expenditures in response to changes in SNAP benefits. Among non-food categories, the 2009 increase in benefits resulted in a significant increase of \$164 in transportation spending among seniors but also a decrease of \$87 in their spending on utilities. Unlike younger age groups, the benefit changes did not shift seniors' Engel curve for food-at-home spending suggesting that, on average, SNAP benefits are equivalent to cash income for seniors. Overall, our results verify that SNAP has spillover effects on transportation, utilities, healthcare and other spending among eligible adults, well beyond its stated goal of supporting food spending.

Executive Summary

Title: Benefit Changes and SNAP Participation and Expenditures Among Low-Income Seniors

PI: Geetha M. Waehrer

Objectives and Methods: This research examined (1) whether higher Supplemental Nutrition Assistance Program (SNAP) benefits were associated with increased SNAP participation among eligible seniors aged 60 years and older with incomes under 185% of federal poverty threshold, using data from the December Food Security Supplements (FSS) of the Current Population Survey and (2) the effects of changes in SNAP benefits on the food and non-food expenditures (healthcare, housing, transportation, other) of senior SNAP participants using data from the Quarterly Interview Surveys of the Consumer Expenditure Survey (CE). To estimate the effects of benefit changes, we exploited the natural experiments provided by the exogenous increase in SNAP benefits due to the 2009 American Recovery and Reinvestment Act (ARRA) and the decrease in 2013 following the sunset of this benefit expansion.

SNAP Benefits and Program Participation Among Eligible Seniors:

- The 2009 ARRA benefit increase was equivalent to a 30% increase in the average 2008 household benefit for seniors in one- or two-person households (over 75% of eligible seniors).
- Controlling for senior and household characteristics, the probability of SNAP participation was estimated to increase by 3 percentage points from 2008 prior to the implementation of the ARRA to 2010, post-ARRA benefit increase. This amounts to a 29% increase relative to 2008 SNAP participation of 11.2%. The oldest seniors aged 80 years and older were estimated to have the largest increase in SNAP participation of over

4 percentage points, equivalent to a 51% increase relative to the 2008 SNAP participation rate (7.2%) for this age group.

- Seniors using other meal services like home-delivered meals or congregate meals at senior centers saw larger increases in SNAP participation than those who did not use these services.
- The 2013 sunset of the benefit increase was equivalent to a 10% decrease in the average 2012 household benefit for seniors in one- or two-person households (over 75% of eligible seniors).
- SNAP participation did not change significantly following the benefit decrease.

Senior Expenditure Responses to SNAP Benefit Changes

- Our expenditure models show that seniors' expenditure responses to changes in SNAP benefits are different from those under 60 years. Specifically, in contrast to younger age groups, seniors did not appear to significantly alter their food expenditures in response to the ARRA benefit increase and the 2009 benefit increase did not result in an upward shift of the Engel curve for food at home spending.
- Among non-food categories, the increase in benefits resulted in a significant increase of \$164 in transportation spending among seniors but spending on utilities decreased by \$87.
- The 2009 benefit increase resulted in higher spending among younger adults aged 20-59 overall and for food at home, utilities, health services, and other spending. The 2013 reduction in benefits did not result in significant changes in senior spending but decreased health services spending among younger adults.

Policy Implications: Our results show that higher benefits could encourage SNAP participation by eligible seniors, with the greatest potential impact on the oldest old. Expanding outreach at other meal services like home-delivered meals or congregate meals at senior centers could also be another way to boost SNAP participation among the elderly. Our results show that, as predicted by traditional economic theory but unlike younger adults, seniors appear to treat changes in SNAP benefits as equivalent to a change in cash income. Our results suggest that findings from SNAP studies using younger age groups may not be easily applied to seniors who have different expenditure responses to SNAP benefits and merit separate consideration. Overall, SNAP is shown to have spillover effects on transportation, utilities, and healthcare spending among participating adults, well beyond its stated goal of supporting food spending.

Introduction

The Supplemental Nutrition Assistance Program (SNAP) is the largest domestic food assistance program in the U.S serving an average of 40 million individuals each month in 2018 (USDA, 2019), 14% of whom were aged 60 years and older (USDA, 2019). SNAP has been associated with increased food security and food spending among participants (Mabli et al., 2013; Ratcliffe et al., 2011; Nord, 2013). By increasing household budgets, SNAP can be especially important for low-income senior citizens who live largely off Social Security and spend almost half of their income on housing and health-related expenses (Johnson, 2015). Yet, eligible older Americans participate in SNAP at much lower rates than younger age groups. The low take-up of SNAP among the elderly is a persistent problem. SNAP participation among eligible low-income seniors was 32.9% in 2007 and rose to only 34% in 2009 during the Great Recession. By 2018, the SNAP participation rate was 48% for seniors compared to 83% for adults 18-59 years (Leftin et al., 2011; Lauffer and Vigil, 2021).

Low SNAP participation among the elderly is of concern given that a quarter of all seniors and almost half of low-income seniors aged 60 years and older were at least marginally food insecure in 2016 (Ziliak and Gunderson, 2018). Food-insecure seniors are more likely to have poorer dietary intake, nutrition and health status relative to food-secure seniors (Lee and Frongillo, 2001). Low-income seniors are also more likely to engage in cost-related medication non-adherence because of budgetary strictures with consequences for chronic disease and health outcomes (Berkowitz et al., 2014, Srinivasan and Pooler, 2018). Increasing participation in SNAP could improve food security and increase disposable income for both food and non-food expenditures resulting in an overall improvement in the health and financial well-being of low-income seniors.

This study examines whether higher SNAP benefits can increase SNAP participation among eligible seniors. Our research will explore whether there is an age differential in seniors' response to benefit changes and the relationship between programs such as home-delivered meals or congregate meals at senior centers and SNAP participation. Our study will also describe the expenditure patterns of elderly SNAP participants and non-participants and analyze their food and non-food expenditure responses to changes in benefits to show the full impact of SNAP on the economic wellbeing of low-income seniors.

Background

Under federal rules, senior households with net income at or below the federal poverty level (FPL) for their household size and assets under a certain threshold (e.g., \$3,500 in 2019) are eligible to receive SNAP benefits¹. The SNAP benefit for eligible households is calculated by subtracting 30% of household income net of six possible deductions, including those for medical expenses and excess shelter costs, from the maximum benefit for a given household size (which is pegged to the cost of the Thrifty Food Plan). SNAP benefits can be used to purchase food and non-alcoholic beverages from grocery stores and other authorized retailers for home consumption. SNAP cannot be used to cover purchases of hot foods, alcohol, tobacco, vitamins, and non-food items.

The decision to participate in SNAP involves a comparison of the expected benefits from participation with the costs of applying and remaining certified to receive benefits. Studies of SNAP participation have identified informational barriers related to eligibility for benefits, transaction costs of the application process, or stigma associated with receiving government benefits as factors that can depress participation (Moffitt, 1983; Bartlett et al., 2004;

¹ There is no gross income test for senior households.

Schanzenbach, 2009). Bartlett et al. (2004) and Wu (2009) found that confusion about eligibility was a factor among eligible non-applicants suggesting that outreach to inform potential participants of their eligibility for SNAP receipt could increase take-up in the program.

Though the SNAP application process has become more user-friendly, including the ability to submit online applications or participate in phone interviews for application verification and longer periods between recertification for seniors, application burdens can be especially troublesome for seniors who are more likely to have physical or cognitive disabilities (Herd, 2015). Mills et al. (2014) found that, compared to those in younger age groups, 30% more seniors temporarily lost SNAP benefits at recertification suggesting that paperwork burdens can be more daunting for this group.

At the same time, benefits are expected to be lower for households containing seniors who tend to live in smaller households compared to those households without seniors. In 2019, households with at least one member over 60 years received an average of \$120 per month compared to \$279 for a household with no seniors (USDA 2021).² In a qualitative study of 267 seniors, expected benefit amounts were deemed too low to overcome seniors' perceived costs of applying for SNAP (Levin et al., 2020). In 2009, elderly households received only 44% of the benefits they would have been eligible for, reflecting lower participation among those who would receive lower benefits (Leftin et al., 2011).

To our knowledge, only two studies have analyzed the effect of SNAP benefits on senior participation. Haider et al. (2003) find an age-gradient in SNAP participation among low-income seniors with those over 80 years being significantly less likely than those in their 60s to

² Even after adjusting for the larger average size of households with no seniors (2.3 household members, compared with an average of 1.2 members in households with seniors), these households receive higher benefits per person than those households with at least one senior.

participate in the program. Controlling for income and other characteristics, they found that higher expected benefits were negatively associated with participation suggesting that those with higher deductions for shelter and medical expenses (and therefore, higher expected benefits) may, all else equal, be less likely to participate. A more recent study by Wu (2009) found expected benefits to be positively and significantly associated with SNAP participation in cross-sectional data but not in panel data.

A large body of research finds that SNAP participation is associated with higher household food expenditures (see Fraker et al., 1990; Fox et al., 2004; Castner and Mabli, 2010; Beatty and Tuttle, 2015) but few studies focus on the elderly. Most estimates of the marginal propensity to spend on food from SNAP benefits range from 0.17 to 0.48 (Fraker et al., 1990), implying that SNAP also has an income effect on non-food expenditures. At the same time, estimates of the marginal propensity to spend on food out of cash income range from 0.03 to 0.17, lower than the propensity to spend out of SNAP benefits. Many of the earlier expenditure studies compared food spending between SNAP participants and low-income non-participants without controlling for the endogeneity of program participation, likely resulting in an upward bias in the estimated effect of the program on food spending.

More recent studies have used policy changes in SNAP to estimate quasi-experimental estimates of SNAP effects on spending. Hoynes and Schanzenbach (2009) used the initial rollout of the Food Stamp Program (as SNAP used to be called) across 3,000 counties between 1961 and 1975 and compared differences in food spending across counties over time. They found that the introduction of food stamps led to a decrease in out-of-pocket food spending and an increase in overall food spending with similar estimates for the marginal propensity to consume food out of food stamps versus cash income.

More recently, the 2009 American Recovery and Reinvestment Act (ARRA) expansion in SNAP benefits provided an opportunity to examine the change in senior SNAP participation and expenditures that would follow an exogenous change in SNAP benefits. Under the ARRA, SNAP benefits were increased in 2009 by a constant dollar amount equivalent to a 13.6% increase in the maximum allotment for a given household size, with proportionally greater increases for families receiving less than the maximum allotment. The temporary boost to the SNAP benefit ended on November 1, 2013, when SNAP reverted to its pre-ARRA practice of using the cost of the Thrifty Food Plan as the basis for benefit calculations. The average two-person household received a \$44 increase in benefits in 2009 and a \$20 cut in benefits in 2013 because of this change.

Nord and Prell (2011) found that SNAP participation in low-income households increased by 11% following the ARRA benefit increase and average food spending increased by 2.2%. Beatty and Tuttle (2015) confirmed that SNAP benefit increases in 2008 and 2009 led to increased food-at-home spending. In contrast to Hoynes and Schanzenbach, they estimated that higher benefits shifted the Engel curve upwards indicating a higher marginal propensity to consume food out of SNAP benefits than cash income. Kim (2016) found that higher SNAP benefits due to the 2009 stimulus increased spending both on food and non-food items like shelter, entertainment, and education expenditures among 20-64 year-olds in participating households. Similarly, Katare and Kim (2017) and Kim et al. (2019) found that lower SNAP benefits due to the sunset of the 2009 expansion reduced food security and food expenditures and increased transportation spending and hours worked among participating households.

However, these studies may not apply to the elderly whose expenditure patterns differ from those in younger age groups. Data on low-income Americans shows that food spending declines

with age while housing and healthcare expenditures account for higher expenditure shares for seniors despite their coverage via Medicare and Medicaid (Castner and Mabli, 2010; Kaiser Family Foundation, 2019). More generally, Aguiar and Hurst (2013) find that the hump-shaped life-cycle profile of overall consumption expenditures is driven by food, non-durable transportation, and clothing categories, spending on which rises from age 25 to a peak at middle age, before falling sharply at older ages.³ Despite these differences in spending profiles few studies of SNAP effects focus on seniors even though they accounted for 1 of every 7 SNAP recipients in 2018 (USDA, 2019).

Similar to studies cited earlier (e.g., Nord and Prell, 2011; Beatty and Tuttle, 2015; Kim et al., 2019), we will examine the impact of the 2009 ARRA-related increase in SNAP benefits and the decrease in 2013 following the sunset of this benefit expansion on senior food and non-food expenditures.

Data

To analyze benefit-related changes in senior SNAP participation, we use data from the December 2008, 2010, 2012 and 2014 Food Security Supplements (FSS) of the Current Population Survey (CPS) which is the primary source of labor force data in the US with information on demographics, household characteristics, income, and employment of the civilian, non-institutionalized population. The FSS is a supplement to the December CPS with data on food security, household spending, participation in food assistance programs and use of other programs such as home-delivered meals. Data from the 2008 and 2010 FSS were combined

³ The hump-shaped life-cycle profile of consumption expenditure has been well documented in the literature going back several decades. Aguiar and Hurst report that spending on the three categories driving this profile - food, non-durable transportation and clothing - accounted for 60% of total non-housing nondurable expenditure and 40% of such expenditure including housing.

to examine whether the 2009 ARRA SNAP benefit expansion was associated with an increase in SNAP participation in 2010 versus 2008 among program-eligible seniors aged 60 years and older. Similarly, data from the 2012 and 2014 FSS were used to examine whether the phasing out of the benefit expansion in November 2013 was associated with a reduction in SNAP participation. Note that seniors aged 60 years and older do not face a gross income test for eligibility, could potentially claim larger deductions for excessive medical expenses and shelter costs, and are allowed higher asset limits, all of which would tend to increase the gross incomes of senior SNAP households relative to the younger population. Therefore, for SNAP participation models, we define program-eligible seniors as those who either report gross income under 185% of the federal-poverty threshold or who report running short of money for food or trying to make “food money go further” in the FSS.

To assess how changes in SNAP benefits affect senior expenditures on food and non-food items, we use expenditure data from the Consumer Expenditure Survey (CE) (BLS 2022). The CE is a representative source of comprehensive data on consumer expenditures of the US civilian non-institutionalized population; CE expenditure data is used to provide weights for calculating the Consumer Price Index. The analysis focused on the Interview component of the CE which collects information from consumer units once every three months⁴, over five consecutive quarters, with approximately 7,000 households interviewed each quarter. The Interview survey asks respondents to provide data for the previous three months on recurring expenditures or those that are large enough to remember, including large purchases of property/automobiles; recurring purchases such as rent or utility payments, and continuing expenses on food, education, clothing,

⁴ Consumer units refer to single families in a household, financially independent single persons living with others, or two or more unrelated persons living together making joint expenditure decisions (BLS 2022). I use “consumer unit” and “household” interchangeably in this paper.

etc. Data on income and SNAP were collected in the 2nd and 5th interviews and referred to the prior 12 months. We analyze the effect of higher SNAP benefits due to the 2009 ARRA using 2007-2011 CE data and the effect of the decrease in benefits in November 2013 using the 2012-2014 CE data.

Similar to the participation models, we analyze SNAP effects on expenditures using the sample of seniors likely to be eligible for SNAP. Unlike the participation models, we cannot include measures of food distress in our definition of program eligibility because this information is not available in the CE. Therefore, we classify seniors with gross incomes under 185% of the federal poverty threshold as program-eligible for the expenditure analyses. As in Castner and Mabli (2010), we used information from the 2nd through 5th interviews for each consumer unit resulting in an adequately sized sample to analyze the expenditures of low-income seniors. We excluded outliers with total expenditures above the 99th percentile and below the 1st percentile of the eligible sample. As a further check on the quality of expenditure data, we restricted observations to those reporting positive values for quarterly food-at-home spending.

SNAP Participation: We define SNAP participants as those reporting household receipt of SNAP benefits in the past 12 months. As with other survey data, there is substantial under-reporting of SNAP receipt in the CPS-FSS and the CE (e.g., Meyer 2009, Mabli et al., 2013, FRAC 2011).

Expenditure Data: We analyze quarterly expenditures in six broad categories as well as selected components: Food at home (including food and non-alcoholic beverages purchased from groceries or convenience stores for home consumption); Food away from home (excluding alcoholic beverages, and including food consumed at restaurants, fast food establishments, and

catered events⁵); Housing (including shelter, utilities, household equipment and maintenance; we exclude rent as pay from these expenditures); Out-of-pocket healthcare services dollars (including spending on prescription drugs, medical services and supplies); Transportation (including vehicle finance, insurance, gasoline, public transportation); and Other (including entertainment, apparel, personal care, miscellaneous). Note that the CE instructs households to include food paid for with SNAP in their food expenditures. Data on some categories of miscellaneous expenditures were only collected in the fifth interview. To make expenditures comparable across interviews, we excluded this component from the Total Expenditure and Other Expenditure calculations. We use the CPI to analyze all expenditure data in 2009 dollars.

Post period: The ARRA became effective on April 1, 2009 and sunset of the ARRA benefit expansion went into effect on November 1, 2013. Therefore, for the analysis of the SNAP participation, Post=1 (0) for data from the 2010 (2008) December FSS for the ARRA benefit increase and Post=1 (0) for data from December 2014 (2012) for the sunset of the benefit expansion.

For analyzing the expenditure response to the ARRA, Post=0 for those elderly with CE interviews from April 2007 till April 2009 covering expenditures from January 2007 through March 2009, and Post=1 for those interviewed from August 2009 till June 2011, covering expenditures from May 2009 to May 2011.⁶ Similarly, for the analysis of 2013 benefit cuts, Post=0 for those with interviews from April 2012 through November 2013 covering expenditures from January 2012 through October 2013, and Post=1 for those interviewed from

⁵ The food away from home in the CE also includes school meals, however this is not likely to be a factor for the seniors in our study.

⁶ The ARRA was implemented in April 2009 so in this paper, “post-ARRA” refers to the period after April 2009.

February 2014 through December 2014 with expenditure data from November 2013 till November 2014.

Other Variables: Models also control for respondent age (60-64, 65-69, 70-74, 75-79, 80+ years), sex, race/ethnicity (Black, White, Hispanic, Other), educational attainment (less than high school, high school or GED completion, some college, college graduate), marital status (married with spouse present, other), employment or disability status (employed, unemployed, disabled, not in labor force), as well as household-level covariates including household size, whether children under 18 are in the household, household income to poverty ratio and ratio squared, region of residence, and interview year and month (for expenditure models). SNAP participation models also include a dummy variable for past 30-day use of prepared meal programs like home-delivered meals or congregate meals at senior centers to explore how use of these programs is associated with participation in SNAP which assumes more food preparation at home.

Research Design

To examine whether ARRA-related changes in benefits were associated with SNAP participation, we estimate a logit model of SNAP participation among program-eligible households as a function of individual and household characteristics listed above and the benefit changes as follows:

$$\text{SNAP} = f(\alpha + \beta X_i + \gamma \text{Post}_i) \quad (1)$$

where $\text{Post}=1$ (0) indicates the year after (before) benefit changes and X is a vector of the other variables listed above. We use survey weights and analyze the 2009 benefit increases separately from the 2013 benefit cuts. Interaction of the post-change dummy with age categories indicate whether there are cohort differences in the participation response to higher benefits. Similarly,

interaction with use of other meal programs will indicate whether changes in participation vary between users and non-users of such services.

To analyze expenditure responses to SNAP benefits we exploit the “natural experiment” provided by the exogenous increase in benefits in April 2009 and the decrease in benefits in November 2013. Note that food prices were extremely volatile during the Great Recession with large increases during the early part of the recession, followed by a decline in 2009 (Nord and Prell, 2011). To control for changes in these non-ARRA related factors that could also impact expenditures independently of the changes in benefits, we compare pre-post changes in expenditures of SNAP participants to those of a comparison group of SNAP-eligible non-participants using a standard difference-in-difference (DD) model :

$$E(\text{Expenditure}_i) = f(\alpha + \beta X_i + \gamma \text{Post}_i + \delta \text{SNAP}_i + \theta \text{Post} * \text{SNAP}_i) \quad (2)$$

Assuming that the change in expenditures would be similar for both program non-participants and participants in the absence of the benefit changes, the difference-in-difference, θ , estimates the effect of changes in benefits on expenditures. Similar to the participation models, we use weights and analyze the 2009 benefit increases separately from the 2013 benefit cuts. Our expenditure data can be quite skewed because a large number of people may have very low or zero spending in some expenditure categories (especially at the component level) and a few may have high spending. Therefore, we use generalized linear model (GLM) based on gamma distributions to accommodate skewed expenditure data. For some categories with zero reported expenditures, we also estimate two-part or hurdle models of expenditure (e.g., Deb and Norton, 2018) with a first stage logit model for zero or non-zero expenditures and a GLM for the second stage model of positive expenditures.

We test the DD assumption of parallel trends by estimating a second model of expenditures with interactions of interview quarter dummies with an indicator for SNAP eligibility (e.g., Waehrer et al., 2015). Specifically, for positive expenditures, we estimate the following:

$$E(\text{Expenditure}_i) = f(a + bX_i + c \text{SNAP}_i + \sum_{j=2}^{16} d_j Q_{ji} + \sum_{j=2}^{16} f_j Q_{ij} * \text{SNAP}_i) \quad (3)$$

In equation (3), Q_{ji} are 15 dummy variables indicating the quarter of the sample period from the first quarter in 2007 to the second quarter in 2011. The coefficient d_j represents the change in spending by quarter while f_j represents differences in this trajectory between SNAP-participants and non-participants. A joint test of these differences in the pre-ARRA period, $\sum_{j=2}^8 f_j = 0$ (covering expenditures through March 2009), will indicate the validity of the parallel trend assumption underlying the DD model for benefit increases. A similar model with 11 quarterly dummies will test the parallel trends assumption for the 2012-2014 DD analysis of expenditure responses to the SNAP benefit cuts.⁷

Finally, following Beatty and Tuttle (2015), we estimate similar GLM models of budget shares for food-at-home and food-away-from home as in (2) that also include logged total expenditure in a Working-Leser specification of the Engel curve. Controlling for total expenditures, a significant DD coefficient would indicate a shift in the Engel curve following the changes in SNAP benefits suggesting a different propensity to spend on food-at-home out of SNAP dollars than cash income.

Results

Senior SNAP Participation and Benefits:

⁷ Specifically, a joint test of the spending differences between SNAP participants and non-participants in the pre-sunset period, $\sum_{j=2}^7 f_j = 0$ (covering expenditures through October 2013), will indicate the validity of the parallel trend assumption underlying the 2012-14 analysis.

There were 15,483 program-eligible seniors across the 2008 and 2010 FSS, including 1,859 reporting past-year SNAP participation, and 17,365 eligible seniors from the 2012 and 2014 FSS including 2,953 SNAP participants. Table 1 reports participation rates among low-income seniors by demographics and household characteristics for the 2008-10 and 2012-14 years. Senior SNAP participation increased from 12.8% in 2008-10 to 17.8% in 2012-14. SNAP participation patterns in 2012-14 were similar to 2008-2010 ; SNAP participation fell with age from 15.5% among 60-65-year-olds to 9.8% for the oldest seniors 80 years and older in 2008-10 and a similar pattern was found in 2012-14. Black and Hispanic low-income seniors were twice as likely to participate in SNAP as White seniors. SNAP participation rates among seniors who did not complete high school were over twice that of seniors with at least a high school education. Employed seniors were less likely to participate in SNAP relative to those unemployed, disabled or not in the labor force, possibly reflecting the lower expected SNAP benefit for those with higher incomes. SNAP participation was highest among disabled seniors, but more than half of these seniors did not participate in the program. Seniors living in households with children under 18 years were more likely to report SNAP participation than those in households without children. Seniors in one- or two-person households participated in SNAP at lower rates compared to those in larger households while those living in the West had the lowest SNAP participation rates compared to those living in other regions of the US.

Table 2 presents senior participation in SNAP and other food assistance or meal service programs in the 2008-10 FSS, by age group.⁸ Seniors aged 80 years or older were more than twice as likely to use prepared meal services compared with the youngest seniors – 13% of those 80 and older reported past-30-day use of home-delivered/senior center meals compared to only

⁸ Excepting the youngest 60-64-year-olds, 75% of seniors lived in one- or two-person households and half of the oldest old aged 80 years and above lived alone.

4.8% of 60-65-year-olds and 6.5% of 65-69-year-olds. Relative to all low-income seniors, SNAP participation was higher among those who received home-delivered meals (27%) or ate prepared meals at a senior center (18%), with a bigger boost to participation among younger seniors in their 60s. At the same time, four out of five low-income seniors using these meal services did not report past-year SNAP participation indicating potential for improvement in program outreach. Only 5.5% of seniors lived in households that participated in nutrition assistance programs directed at children (e.g., free or reduced-price school meals, WIC) and this rate fell with age reflecting the smaller households of older seniors. At the same time, SNAP participation was also high among senior households that accessed such child nutrition services and participation rose with age in such households, from 39.5% for those aged 60-64 years to 53% for those aged 80 years or older. The rate of food bank use also fell with age, with such use reported by 4.8% of seniors 80 years and older compared to 8% for those between 60 and 70 years. Finally, 22% of low-income seniors reported that they needed to spend more just to meet the food needs of their households but this share also fell with age suggesting that declining food needs may play a role in low rates of SNAP participation among older seniors.

Table 3a presents the average increase in SNAP benefit afforded to participating senior households by the ARRA expansion and Table 3b presents estimated changes in SNAP participation post-ARRA from a logit model of SNAP participation using 2008-2010 FSS data. The average SNAP dollars received by a senior SNAP household in 2008 ranged from \$79 a month for a one-person household to \$150 for a four-person household, well below the maximum benefit for households of that size. Accordingly, while the ARRA increased benefits by 13.6% of the maximum benefit, this increase was equivalent to over 30% increase in the monthly SNAP benefit for the 75% of seniors living in one-or two-person households.

SNAP participation rates among eligible seniors increased from 11.2% in 2008 prior to the passage of the ARRA to 14.3% in 2010, post-benefit increase, an unadjusted 3.1 percentage point increase. Multivariate logit models estimate the marginal 2008 to 2010 increase in the probability of SNAP participation for seniors with similar characteristics to also be 3 percentage points (Table 3b). Note that while the SNAP benefit increase is likely associated with some of this increase in participation there may also be changes due to factors not controlled for in our model. Logit models including age interactions with the post-ARRA indicator showed the largest absolute 2008-2010 increase in SNAP participation of over 4 percentage points for the oldest seniors aged 80 years and above, equivalent to a 51% increase relative to the low baseline SNAP participation rate (7.2%) for this age group. Models interacting the post dummy with the use of senior meal services show that SNAP participation increased by 48% in 2010 (relative to 2008 rate) for those using these services compared to 28% for those seniors who did not suggesting that home-delivered meal and congregate meal services are complements to SNAP.

Senior SNAP Participation and the 2013 Benefit Decrease:

The average SNAP dollars for a participating senior household in the 2012 FSS ranged from \$111 a month for a one-person household to \$258 for a four-person household (Table 4a). For the majority of seniors living in one-or two-person households, the sunset of the ARRA benefit expansion reduced benefits by approximately \$10 per person per month, equivalent to over 10% reduction in the monthly SNAP benefit. Weighted SNAP participation rates, while higher than 2008 levels, remained relatively stable at approximately 17%, both in 2012 and 2014, respectively before and after the phasing out of the SNAP expansion. Multivariate logit models of SNAP participation (Table 4b) found that the estimated 2012 to 2014 change in SNAP participation was not significant for seniors with similar characteristics suggesting that, among

other factors, the November 2013 changes to SNAP benefits may not have been large enough to significantly affect seniors' participation decisions. Interactions with age group also did not reveal any statistically significant differences by age group. However, despite the benefit reduction, use of meal services like MOW or congregate meals at senior centers was associated with a statistically significant 4 percentage point increase in SNAP participation in 2014 suggesting that these programs could be fruitful areas to promote SNAP.

Effects of SNAP Benefit Changes on Senior Expenditures:

Data from the 2007-11 CE Interview yielded 15,619 eligible seniors with incomes less than 185% FPL including 1,254 who reported receiving SNAP benefits in the previous 12 months. Table 5 presents the characteristics of SNAP participants and eligible non-participants, pre- and post-ARRA increase. There were significant pre-ARRA differences between SNAP participants and non-participants in almost all dimensions⁹. Approximately 11% of pre-ARRA participants were 80 years and older, while this group accounted for a quarter of non-participants. SNAP participants were more likely to be women, less likely to be married with a spouse present, and more likely to live in larger households with children under 18 years. Almost 60% of pre-ARRA SNAP participants had not completed high school, twice the rate of eligible non-participants. Pre-ARRA SNAP participants were more than five times as likely as non-participants to be disabled and only half as likely to report employment. Over half of SNAP participants were retired versus almost three-quarters of non-participants.

Table 5 also shows that the composition of SNAP participants and non-participants remained relatively stable following the 2009 benefit increase. Among the statistically significant changes, both SNAP participants and non-participants had larger households with a child under 18 in the

⁹ We do not indicate these statistically significant pre-ARRA differences between participants and non-participants in Table 5 to reduce visual clutter.

household in the post- compared to pre-ARRA period. SNAP participants were more likely to have completed high school and eligible non-participants also had significantly more educational attainment post-ARRA compared to the earlier period with fewer high school dropouts and more college attendance. SNAP participants were less likely to be disabled post-ARRA compared to pre-ARRA and both participants and non-participants were more likely to be unemployed in the post-ARRA period.

Table 6a presents a simple difference-in difference (DD) comparison of mean quarterly expenditures between senior SNAP participants and eligible non-participants, pre- and post-ARRA for the broad expenditure categories and selected sub-categories. Quarterly expenditures were lower for SNAP participants than non-participants for all spending categories excepting rent. However, the gap between participants and non-participants in most expenditures narrowed post-ARRA, resulting in a marginally significant net increase of \$77 in food-at-home expenditures, and more significant increases in spending on rent (\$182) and transportation (\$251).

Note that a significant percentage of seniors have zero expenditures in some categories (Table 6b). Pre-ARRA, over half of SNAP participants and a third of low-income non-participants do not report any quarterly spending on food away from home. SNAP participants are more likely to report spending on rent rather than owned homes while non-participants are more likely to spend on other non-food expenditure categories. Difference-in difference comparisons of the average rate of zero spending shows that the ARRA benefit increase was not significantly associated with spending decisions at the extensive margin for any of the expenditure categories.

Table 6c presents mean expenditure shares for senior SNAP participants and eligible non-participants, pre- and post-ARRA. Housing expenditures account for the largest budget share for both groups, followed by food-at-home, other expenses, out-of-pocket (OOP) healthcare expenses, transportation, and food-away-from home. SNAP participants devote a larger budget share to necessities such as food at home (22% versus 16%) and housing (46% versus 38% pre-ARRA) compared to non-participants, and a smaller share for OOP healthcare spending (7% versus 14%) or luxuries such as food away from home (3% versus 5%). Comparison of the pre- and post-difference in mean expenditure shares between participants and non-participants shows that the ARRA is associated with a significant increase in the share of total expenditure for transportation and a significant decrease in the share for utilities.

Table 7 reports the DD coefficients from the GLM models for total, food at home and overall housing expenditures which have either no or very low proportion of zero values, and DD coefficients from two-part models for the remaining categories. Controlling for senior and household characteristics, the ARRA benefit expansions in SNAP did not have a statistically significant effect on senior spending on food, whether at home or away from home. However, the benefit expansion was associated with a statistically significant change in quarterly spending on non-food items at the intensive margin and an overall \$164 increase in transportation spending (treatment effect on the treated calculated using both parts of the two-part model), \$148 increase in spending on rent, but also an \$87 decrease in spending on utilities.¹⁰

¹⁰ While the benefit expansion was associated with significant increase in senior spending on rent, the rejection of the pre-ARRA parallel trends assumption means this cannot be interpreted as the casual effect of the increase in SNAP benefits for this age group. A similar rejection of pre-ARRA parallel trends is seen for housing/shelter and food away from home for younger adults in Table 7 and for other expenditures for younger adults in Table 8.

For comparison, the bottom panel of Table 7 presents analogous results for those aged 20-59 years whose positive expenditure responses to higher benefits have been reported in Kim (2016) and Beatty and Tuttle (2015) using the CE data. Note that for this younger age group, the parallel trends assumption does not hold for overall expenditures, food away from home, or utilities. In contrast to senior SNAP participants but consistent with the literature, the ARRA was estimated to significantly increase quarterly spending by \$436 overall, \$113 for food at home, \$64 on utilities and by a marginally significant \$18 and \$64 respectively for OOP health services spending and other expenditures.

Table 8 reports DD estimates of senior expenditure responses to the 2013 sunset of the SNAP benefit expansion. Controlling for senior and household characteristics, SNAP benefit cuts had a statistically insignificant effect on seniors' total expenditures and on food and the other categories. The bottom panel of Table 8 also shows statistically insignificant reductions in overall and food spending for younger 20-59-year-olds except OOP health services spending which fell by \$23 because of the SNAP benefit cuts.

Table 9 reports results DD estimates from a GLM model of budget shares for food at home and food away from home. As Engel's law predicts, budget shares for food at home, a necessity, fell with increases in total expenditure, while those for luxuries such as food away from home rose with total expenditure. However, controlling for total expenditures, the DD coefficients were statistically insignificant indicating that the 2009 benefit increase did not result in a shift in the Engel curve. This suggests that on average, as predicted for infra-marginal consumers by traditional economic theory, seniors treated in-kind SNAP benefits as equivalent to cash income. In contrast to seniors, the 2009 benefit increase did result in a significant upward shift in the Engel curve for 20-59-year-olds indicating a higher propensity to spend on food at home from

SNAP dollars than from cash. The bottom panel of Table 9 shows insignificant changes in food at home expenditure shares for both age groups, consistent with the lack of a food expenditure response to SNAP benefit cuts in 2013. Note that for both seniors and younger adults, controlling for total expenditures, the SNAP benefit changes did not result in shifts in the Engel curve for food away from home. This is unsurprising because SNAP benefits cannot be used to purchase food at restaurants or fast-food establishments.

Sensitivity Analyses:

Underreporting of SNAP Participation: SNAP participation is underreported in the CE – on average, annual SNAP receipt is estimated to be 62% of the administrative totals from 2004-2010 (Mabli et al., 2013) and the CE is estimated to pick up 42% fewer SNAP recipients than administrative data (Meyer, 2009). To the extent that SNAP recipients are wrongly classified as eligible non-participants, our results will understate the true impact of changes in SNAP benefits on expenditures. Therefore, we check our results using the sample of SNAP-eligible seniors from the CPS Food Security Supplements described earlier in our analysis of senior SNAP participation. While SNAP participation is also underreported in the CPS compared to administrative data, the problem is smaller than in the CE for the period of interest (FRAC, 2011). At the same time, food expenditure information in the CPS FSS is only collected at one point in time for the previous week and therefore may not be as comprehensive or informative as the quarterly expenditure information from the quarterly CE Interview.

We define food at home expenditure as the total amount of money spent in the previous week on purchases from grocery stores and supermarkets minus the amount spent on non-food purchases from grocery stores and supermarkets for seniors who report a past-week visit to a grocery or supermarket. To more closely match the time frame of this expenditure data, we

define “past 30-day SNAP participants” who reported SNAP benefit receipt either in December or, for November recipients, between November 14 and 30.¹¹ Table 10 shows the DD coefficients from GLM models for food-at-home expenditures using the CPS. Similar to CE results, SNAP benefits increases do not have a significant effect on food at home spending among senior SNAP participants.

Definition of Program Eligibility: We also re-estimate models for a sample of seniors with incomes less than 130% of the federal poverty threshold to check if our estimates of insignificant senior food expenditure response to the ARRA increase in SNAP benefits were robust to a stricter definition of program eligibility. Similar to the higher income sample, the 2009 benefit expansion did not have a significant effect on the food spending of SNAP participants but resulted in a significant increase in transportation spending and a decrease in spending on utilities (results available upon request).

Discussion

This study analyzed the changes in senior SNAP participation and expenditures following the 2009 ARRA expansion of SNAP benefits and the 2013 sunset of this benefit increase. Results show that increases in SNAP benefits are associated with higher SNAP participation by eligible seniors. While seniors aged 80 years or older had the lowest participation rates among eligible seniors, they also had the largest marginal increase in SNAP participation in 2010 following the April 2009 ARRA benefit increase. SNAP participation was higher among users of meal services like home-delivered meals or congregate meals at senior centers suggesting that these programs may have helped to boost SNAP participation among the oldest seniors who were also more

¹¹ Nord and Prell (2011) report an interview date of December 14 for the 2008 FSS. We use this date for 2010, 2012, and 2014 FSS supplements.

likely to use these services. Meal service users were also more likely to participate in SNAP following the November 2013 sunset of the ARRA benefit expansion which was not associated with a significant change in SNAP participation. At the same time, approximately 80% of home-delivered meal or congregate meal users are not enrolled in SNAP indicating that there is potential to leverage these programs to boost program participation. SNAP participation was also high among senior households that accessed nutrition services like school meals, and in these households participation rose with age. Such a pattern is consistent with multigenerational households that are more likely to experience food insecurity and participate in SNAP than single-generation households (Ziliak and Gunderson, 2016; Do et al., 2015).

Our expenditure models show that seniors' expenditure responses to changes in SNAP benefits are different from those of adults under 60 years. Specifically, senior SNAP participants did not appear to significantly alter their food expenditures in response to the ARRA benefit increases. However, the 2009 increase in benefits resulted in positive spillover effects for non-food spending on transportation among senior SNAP participants, but a decrease in spending on utilities. This latter change may reflect the effect of new SNAP participants taking advantage of the Low Income Home Energy Assistance Program which makes direct payments to utility companies on behalf of low-income renters or owners and gives priority to funding seniors (USHHS, 2022).

In contrast to seniors, younger SNAP participants recorded significant increases in food at home expenditures in response to the 2009 increase in the SNAP benefit. Among non-food categories, younger participants also saw significantly higher spending on shelter costs for owned rather than rental dwellings and marginally higher out-of-pocket spending on health services and other expenditures following the increase in SNAP benefits. Our results for younger

SNAP participants are consistent with Kim (2016) who estimated that higher SNAP benefits also resulted in a significant increase in spending on shelter, education and entertainment among younger adults.¹²

The proportionally smaller 2013 decrease in SNAP benefits had no significant effect on senior expenditures in any category and a negative effect on health services spending for younger adults. These results stand in contrast to Kim et al. (2019) who report significant decreases in food at home spending and increases in transportation spending and hours worked in response to the 2013 benefit cut. Note that this latter study uses a fixed effects estimation approach where identification of SNAP effects relies on spending changes in the months surrounding the 2013 benefit cut while our results refer to changes over a longer period of time.

The different expenditure responses to the SNAP benefit changes between seniors and younger adults extends to models of food expenditure shares. Specifically, we find that the 2009 benefit increase resulted in an upward shift of the Engel curve for spending on food at home for younger SNAP participants but not for seniors. These results suggest that in contrast to Beatty and Tuttle's study including younger ages, seniors may be more likely to treat SNAP benefits as equivalent to cash income. At the same time, our results are consistent with Hoynes and Schanzenbach (2009) analysis of early food stamp recipients suggesting that there may be cohort differences in the use of in-kind benefits.

Despite prior findings of a negative cross-sectional association between SNAP participation and cost-related medication non-adherence (CRN) among low-income seniors in Srinivasan and Pooler (2018), we did not find significant effects of SNAP benefits on seniors' OOP health

¹² ¹² Shelter spending for younger adults was also significantly higher following the 2009 benefit increase. However, the rejection of the parallel trends assumption means we should not interpret this change as causal effect of the benefit increase.

services spending. A possible reason could be that senior SNAP participants may have more access than higher income non-participants to Medicare Savings Programs that help qualified seniors pay deductibles and copayments for medical services and prescription drugs. The relative responsiveness of younger adults' healthcare spending to the changes in SNAP benefits provides some support for this idea.

Our analysis of expenditure responses to benefit cuts in 2013 may also be complicated by the Affordable Care Act in 2014 which expanded Medicaid coverage to low-income 60-65-year-olds and also increased Medicare coverage for older seniors for prescription drugs and certain preventive services. To the extent that these changes reduced out-of-pocket healthcare expenses for seniors this new coverage could allow them to shift resources from healthcare towards food and other non-health expenditures, cushioning the impact of SNAP benefit cuts for these items. Similarly, the reduction in younger households' OOP healthcare spending following the 2013 benefit cuts may also reflect the impact of the Medicaid expansion for low-income adults under 65 years.

This study has several limitations. As noted earlier, compared to administrative data, SNAP participation is underreported in the CPS and the CE with more severe problems in the latter data. Sensitivity analysis using food spending data from the CPS confirmed our results using the CE. However, if underreporting is a more serious problem among senior SNAP participants, this may account for the different expenditure responses between seniors and younger age groups.

It is important to note that the CE data on expenditures do not track consumption. For example, Aguiar and Hurst (2013) report that reduced spending on food at home at older ages does not reflect a reduction in actual consumption but rather an increase in time spent on home production of food including grocery shopping and meal preparation for retirees with a lower

opportunity cost of time. In addition, food expenditure data will not capture food provided free of charge or food that is wasted. Housing expenditures for seniors are also likely to understate housing consumption since over 60% of seniors own their homes without a mortgage (Fisher et al., 2007). Finally, CE healthcare spending data only includes out-of-pocket outlays and is unlikely to be a good comprehensive measure of all the health services consumed by seniors.

As noted by Nord and Prell (2011), the 2009 increase in the SNAP benefit could have induced participation by those who may have been program-eligible prior to the ARRA but were dissuaded by the time costs of application and certification. To the extent that induced participants are less food needy and have different consumption and spending patterns than pre-ARRA participants our results may reflect the change in the composition of SNAP participants and non-participants following benefit changes. However, examination of the characteristics of SNAP participant and non-participants in Table 5 shows that the composition of these groups remained stable following the 2009 benefit increase.

Conclusion

The results of this study show that higher benefits could encourage SNAP participation by eligible seniors, with the greatest potential impact on the oldest old. Leveraging other meal services like home-delivered meals or congregate meals at senior centers could be another way to boost SNAP participation among the elderly. On the expenditure front, this study highlights the expenditure responses to SNAP for senior participants who have not been the focus of most prior research on this subject. Food expenditures of seniors do not appear to be as responsive to SNAP benefits as they are for younger adults. SNAP is shown to have spillover effects on senior non-food spending including on utilities and transportation, and also on healthcare spending and other expenditures of younger adults, well beyond its stated goal of supporting food spending. As

predicted by traditional economic theory and in contrast to younger adults, seniors appear to treat changes in SNAP benefits as equivalent to a change in cash income. Overall, our results suggest that studies of SNAP expenditure responses among younger age groups are not applicable to the elderly whose food and spending patterns may be different enough to warrant separate consideration.

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Appendix

Table 1: SNAP participation rate (%), by demographics and household characteristics, among low-income older adult households, FSS

	2008 & 2010	2012 & 2014
<i>N</i>	15,483	17,365
<i>All</i>	12.8	17.8
<i>Age Categories</i>		
60-64	15.5	21.4
65-69	13.6	18.6
70-74	13.6	15.0
75-79	10.0	17.3
80+	9.8	14.0
<i>Gender</i>		
Female	14.0	19.4
Male	10.9	15.4
<i>Race/Ethnicity</i>		
White	9.6	13.5
Black	22.0	30.5
Hispanic	19.4	26.3
Other	17.0	18.0
<i>Marital Status</i>		
Married w Spouse Present	7.4	10.4
Other	17.2	24.1
<i>Education</i>		
<HS	19.8	27.7
HS/GED	10.7	15.2
Some College	9.7	15.1
College Graduate	6.7	10.1
<i>Employment Status</i>		
Employed	6.5	10.1
Unemployed	12.1	25.8
Retired	11.4	15.6
Disabled	31.0	40.7
<i>Household Size</i>		
1 person	12.6	19.1
2 people	8.5	11.8
>=3	21.5	26.7
<i>Child Under 18 yrs in HH</i>		
Yes	27.3	33.5
No	11.5	16.2
<i>Income to Poverty Ratio</i>		
<=1	29.4	34.8
>1 & <=1.3	11.9	21.5

	2008 & 2010	2012 & 2014
<i>N</i>	15,483	17,365
<i>All</i>	12.8	17.8
>1.3	5.6	9.0
<i>Region</i>		
Northeast	15.7	22.9
Midwest	12.6	16.1
South	13.6	17.7
West	9.0	15.3
Metropolitan	12.7	18.0
Non-Metro	13.0	17.0

Weighted means. Sample comprised of seniors 60 years and older with household incomes \leq 185% FPL or those who report food distress from CPS Food Security Supplements (FSS).

Table 2: Food Assistance by Age, Low-Income Seniors in 2008-2010 FSS (N=15,483)

	Overall	Age Categories				
		60-64 years	65-69 years	70-74 years	75-79 years	80+ years
<i>Past-year SNAP %</i>	12.8	15.5	13.6	13.6	10.0	9.8
<i>Home-Delivered/Congregate Meals</i>	8.0	4.8	6.5	7.7	9.0	13.2
- % with past-year SNAP	20.9	33.6	25.4	19.2	17.9	14.9
<i>Home-Delivered Meals</i>	3.6	2.2	2.6	3.9	3.3	6.5
- % with past-year SNAP	26.9	41.3	30.4	21.5	27.5	21.6
<i>Congregate Meals</i>	5.2	3.0	4.4	4.8	6.6	8.2
- % with past-year SNAP	18.1	31.0	23.4	16.2	15.4	11.7
<i>HH with School meals/WIC</i>	5.5	8.5	6.5	4.3	4.4	2.5
- % with past-year SNAP	41.1	39.5	38.6	42.6	40.8	53.0
<i>Food Bank</i>	7.0	7.9	8.1	7.4	6.5	4.8
- % with past-year SNAP	41.2	47.1	39.8	36.2	39.3	39.0
<i>Would need to spend more to meet food needs</i>	22.4	28.0	22.8	23.2	19.5	16.2
- % with past-year SNAP	23.4	25.6	25.3	22.9	18.3	20.9

Weighted means. Sample comprised of seniors 60 years and older with household incomes \leq 185% FPL or those who report food distress from 2008 and 2010 CPS Food Security Supplements.

Table 3a: % Change in Average Monthly Benefits for Senior SNAP Households, by Household Size, 2008

Household Size	Maximum Benefits	Avg Benefits ¹	ARRA Increase	% Increase
1	\$176	\$79	\$24	30%
2	\$323	\$138	\$44	32%
3	\$463	\$148	\$63	43%
4	\$588	\$150	\$80	53%

¹ Weighted mean from 2008 FSS

Table 3b: Estimated Change in SNAP participation from 2008 to 2010 (FSS 2008, 2010) N=15,483

	Change (Percentage Points)	% Change Relative to 2008 Baseline
<i>Overall</i> ^a	3.1***	29%
<i>By Age</i> ^b		
60-64 years	3.5***	26%
65-69 years	2.2*	26%
70-74 years	3.0**	29%
75-79 years	2.3	21%
80+ years	4.3***	51%
<i>By Home-Delivered/Congregate Meals</i> ^c		
Yes	7.9***	48%
No	2.7***	28%

^a Estimated change in probability from multivariate logit model of SNAP participation including dummies for post ARRA, age categories, sex, race/ethnicity, marital status, education, employment and disability status, household size, presence of children in household, income to poverty ratio categories, use of home-delivered or congregated meals from senior center, region and metropolitan status.

^b From logit model with explanatory variables from footnote a and post-period interaction with age categories.

^c From logit model with explanatory variables from footnote a and post-period interaction with home-delivered or congregated meals.

Significance levels: * < 10%, ** < 5%, *** < 1%.

Table 4a: % Change in Average Monthly Benefits for Senior SNAP Households, by Household Size, 2012

Household Size	Maximum Benefits	Avg EBT\$ ¹	ARRA Sunset	% Reduction
1	\$200	\$111	-\$11	-10%
2	\$367	\$149	-\$20	-13%
3	\$526	\$180	-\$29	-16%
4	\$668	\$258	-\$32	-12%

¹ Weighted mean from 2012 FSS

Table 4b: Estimated Change in SNAP participation from 2012 to 2014 (FSS 2012, 2014; N=17,365)

	Change (Percentage Points)	% Change Relative to 2012 Baseline
<i>Overall^a</i>	0.5	3%
<i>By Age^b</i>		
60-64 years	0.3	1%
65-69 years	0.9	5%
70-74 years	-1.1	-7%
75-79 years	0.5	3%
80+ years	1.5	11%
<i>By Home-Delivered/Congregate Meals^c</i>		
Yes	4.4*	13%
No	0.00	1%

^a Estimated change in probability from multivariate logit models including dummies for post-ARRA sunset, age categories, sex, race/ethnicity, marital status, education, employment and disability status, household size, presence of children in household, income to poverty ratio categories, use of home-delivered or congregated meals from senior centers, region and metropolitan status.

^b From logit model with explanatory variables from footnote a and post period interactions with age categories.

^c From logit model with explanatory variables from footnote a and post period interactions with use of home-delivered or congregated meals.

Significance levels: * < 10%, ** < 5%, *** < 1%.

Table 5: Characteristics of Senior SNAP Participants and Eligible Non-Participants, pre- and post-ARRA (CE 2007-2011)

Variable	SNAP (N=1,254)		Non-SNAP (N=14,365)	
	Pre-ARRA	Post-ARRA	Pre-ARRA	Post-ARRA
<i>Age</i>				
60-64 years	0.30	0.34	0.22	0.22
65-69 years	0.22	0.21	0.18+	0.19+
70-74 years	0.22	0.19	0.17+++	0.15+++
75-79 years	0.15	0.16	0.17	0.16
>=80 years	0.11	0.10	0.26	0.27
<i>Female</i>				
	0.70	0.71	0.61	0.60
<i>Marital Status</i>				
Married w Spouse				
Present	0.18	0.21	0.39	0.39
Other	0.82	0.79	0.61	0.61
<i>Race/Ethnicity</i>				
White	0.53++	0.47++	0.78	0.78
Black	0.28	0.27	0.12	0.12
Hispanic	0.14++	0.19++	0.07	0.07
Other	0.06	0.07	0.04	0.04
<i>Education</i>				
< High School	0.59	0.55	0.29+++	0.26+++
High School				
Graduate/GED	0.18++	0.23++	0.33	0.34
Some College	0.17	0.17	0.22+	0.24+
College Graduate	0.07	0.04	0.15	0.15
<i>Family Size</i>				
	1.79++	2.00++	1.66++	1.71++
<i>Child Under 18yrs in HH</i>				
	0.10++	0.15++	0.04+++	0.05+++
<i>Employment Status</i>				
Employed	0.11	0.12	0.22++	0.20++
Unemployed	0.01++	0.03++	0.002+++	0.01+++
Disabled	0.37++	0.31++	0.07	0.07
Not in Labor Force	0.52	0.55	0.71	0.72
N	514	740	7,091	7,274

Weighted means. Sample comprised of seniors 60 years and older with household incomes <= 185% FPL and positive total and food at home expenditures from CE 2007-2011.

+++<1%, ++<5%, and +<10% indicate the significance level of the pre- to post-ARRA difference, conditional on SNAP participation. Post-ARRA refers to period after April 2009. SNAP refers to SNAP participants and Non-SNAP refers to income-eligible non-participants.

Table 6a: Quarterly Expenditures by SNAP, pre- and post-ARRA (CE 2007-2011)

Expenditure Category	Pre-ARRA		Post-ARRA		Diff-in-Diff
	Non-SNAP	SNAP	Non-SNAP	SNAP	
<i>Total Quarterly Exp</i>	\$6,841	\$4,100	\$6,642	\$4,203	\$302
<i>Food at Home</i>	\$896	\$770	\$887	\$838	\$77*
<i>Food Away From Home</i>	\$336	\$117	\$297	\$87	\$9
<i>Housing excl Rent as Pay</i>	\$2,503	\$1,712	\$2,448	\$1,692	\$35
Shelter excl Rent as Pay	\$1,446	\$962	\$1,397	\$1,002	\$88
Owned	\$946	\$394	\$932	\$281	-\$99
Rent excl Rent-as-Pay	\$414	\$560	\$385	\$714	\$182***
Utilities	\$759	\$633	\$765	\$565	-\$73
<i>Transportation</i>	\$959	\$411	\$847	\$550	\$251**
<i>OOP Healthcare incl</i>					
Insurance	\$846	\$278	\$869	\$303	\$1
OOP Health Services	\$286	\$79	\$285	\$84	\$6
<i>Other</i>	\$1,279	\$723	\$1,273	\$669	-\$47
<i>N</i>	7,091	514	7,274	740	

Significance levels: * < 10%, ** < 5%, *** < 1%.

Weighted means. Sample comprised of seniors 60 years and older with household incomes <= 185% FPL and positive total and food at home expenditures from CE 2007-2011. OOP refers to Out-of-Pocket. Post-ARRA refers to period after April 2009. SNAP refers to SNAP participants and Non-SNAP refers to income-eligible non-participants.

Table 6b: Percentage of Low-Income Seniors with Zero Expenditures, by SNAP and ARRA (CE 2007-2011)

Expenditure Category	Pre-ARRA		Post-ARRA		Diff-in-Diff
	Non-SNAP	SNAP	Non-SNAP	SNAP	
Total Quarterly Exp	0%	0%	0%	0%	-
Food at Home	0%	0%	0%	0%	-
Food Away From Home	34%	56%	34%	59%	0.033
Housing excl Rent as Pay	0%	0%	0%	0%	-
Shelter excl Rent as Pay	3%	3%	2%	4%	0.011
Owned	26%	68%	24%	66%	0.002
Rent excl Rent-as-Pay	76%	36%	78%	38%	0.007
Utilities	2%	1%	2%	2%	0.011
<i>Transportation</i>	13%	28%	12%	24%	-0.030
<i>OOP Healthcare incl Insurance</i>	9%	22%	9%	23%	0.008
OOP Health Services	26%	35%	20%	32%	0.030
<i>Other</i>	3%	2%	3%	2%	.001
<i>N</i>	7,091	514	7,274	740	

Weighted means. Sample comprised of seniors 60 years and older with household incomes $\leq 185\%$ FPL and positive total and food at home expenditures from CE 2007-2011. OOP refers to Out-of-Pocket. Post-ARRA refers to period after April 2009. SNAP refers to SNAP participants and Non-SNAP refers to income-eligible non-participants.

Table 6c: Expenditure Shares for Low-Income Seniors, by SNAP and ARRA (CE 2007-2011)

Expenditure Category	Pre-ARRA		Post-ARRA		Diff-in-Diff
	Non-SNAP	SNAP	Non-SNAP	SNAP	
<i>Food at Home Share</i>	16%	22%	16%	22%	0.004
<i>Food Away From Home Share</i>	5%	3%	4%	2%	-0.001
<i>Housing Share excl Rent as Pay</i>	38%	46%	38%	44%	-0.019
Shelter Share excl Rent as Pay	21%	27%	21%	26%	-0.004
Utilities Share	14%	16%	14%	15%	-0.019**
<i>Transportation</i>	12%	8%	11%	9%	0.016*
<i>OOP Healthcare Share</i>	14%	7%	14%	7%	0.005
<i>Other Expenses Share</i>	16%	15%	17%	16%	0.000
<i>N</i>	7,091	514	7,274	740	

Significance levels: * < 10%, ** < 5%, *** < 1%.

Sample comprised of seniors 60 years and older with household incomes <= 185% FPL and positive total and food at home expenditures from CE 2007-2011. OOP refers to Out-of-Pocket. Post-ARRA refers to period after April 2009. SNAP refers to SNAP participants and Non-SNAP refers to income-eligible non-participants.

Table 7: Coefficients and Standard Errors of SNAP*Post-ARRA Interactions from DD Model of Quarterly Expenditures (CE 2007-2011, PIR<=1.85 FPL)^a

Dependent Variable	Total Quarterly Expenditure	Food Home	Food Away	Housing ^b	Shelter ^b	Rent ^b	Utilities	Transport	OOP Health Services	Other
Seniors (N=15,489)										
% Zero Expenditure	0.00%	0.00%	36.27%	0.04%	2.64%	74.21%	1.62%	13.64%	23.99%	2.60%
<i>Logit</i> Exp>0	-	-	-0.12	-	-0.46	-0.01	-0.83	0.05	-0.25	-0.22
	-	-	0.17	-	0.51	0.24	0.53	0.24	0.18	0.43
Positive										
<i>GLM</i> Exp \$	0.03	0.04	-0.07	-0.02	0.06	0.23***	-0.14**	0.37**	0.02	0.05
	0.05	0.04	0.10	0.06	0.08	0.08	0.07	0.15	0.14	0.09
<i>Estimated Change for SNAP Recipients Post-ARRA^c</i>	\$136	\$30	-\$14	-\$34	\$42	\$148**	-\$87**	\$164**	-\$6	\$32
<i>Test of Parallel Trends Pre-ARRA (p-value)^d</i>	0.17	0.32	0.60	0.52	0.65	0.04	0.31	0.58	0.70	0.59
20-59 yrs (N=31,238)										
% Zero Expenditure	0.00%	0.00%	24.25%	0.40%	4.06%	49.69%	3.21%	7.16%	54.95%	0.72%
<i>Logit</i> Exp>0	-	-	0.04	-	0.29	-0.12	0.41*	0.09	0.13	0.09
	-	-	0.09	-	0.18	0.12	0.25	0.14	0.09	0.38
Positive										
<i>GLM</i> Exp \$	0.07***	0.10***	0.01	0.09***	0.08**	0.03	0.09***	-0.02	0.18	0.07*
	0.02	0.02	0.04	0.03	0.04	0.04	0.03	0.07	0.13	0.04
<i>Estimated Change for SNAP Recipients Post-ARRA^c</i>	\$436***	\$113***	\$5	\$205***	\$124***	\$0	\$64***	-\$9	\$18*	\$64*
<i>Test of Parallel Trends Pre-ARRA (p-value)^d</i>	0.90	0.25	0.03	0.06	0.00	0.00	0.74	0.07	0.91	0.73

Significance levels: * < 10%, ** < 5%, *** < 1%.

^a Weighted models also include dummies for post-ARRA, SNAP, age categories, sex, race/ethnicity, marital status, education, employment and disability status, presence of children, household size, region, income to poverty ratio and ratio-squared, and year and interview month. Models restricted to those with non-missing information on all covariates. Expenditures are in \$2009.

^b Excluding rent as pay

^c Combined ATT for two-part models.

^d Parallel trend models estimated using positive expenditures.

Table 8: Coefficients and Standard Errors of SNAP*Post-ARRA Interactions from DD Model of Quarterly Expenditures (CE 2012-2014, PIR<=1.85 FPL)^a

Dependent Variable		Total Quarterly Expenditure	Food Home	Food Away	Housing ^b	Shelter ^b	Rent ^b	Utilities	Transport	OOP Health Services	Other
Seniors (N=10,818)											
% Zero Expenditure		0.00%	0.00%	34.99%	0.06%	2.94%	73.40%	1.76%	12.26%	15.89%	2.82%
<i>Logit</i>	Exp>0	-	-	-0.15	-	1.24**	-0.05	0.41	0.03	-0.07	-0.93*
	Positive	-	-	0.18	-	0.57	0.24	0.49	0.25	0.20	0.54
<i>GLM</i>	Exp \$	-0.01	-0.01	-0.02	0.06	0.07	-0.01	0.06	0.04	-0.15	-0.10
		0.05	0.05	0.13	0.06	0.08	0.08	0.06	0.13	0.23	0.09
<i>Estimated Change for SNAP Recipients Post-Reduction^c</i>		-\$63	-\$11	-\$11	\$115	\$121	-\$15	\$41	\$19	-\$18	-\$73
<i>Test of Parallel Trends Pre-ARRA (p-value)^d</i>		0.47	0.63	0.99	0.70	0.93	0.66	0.75	0.24	0.04	0.15
20-59 yrs (N=19,395)											
% Zero Expenditure		0.00%	0.00%	24.85%	0.46%	4.06%	46.23%	3.79%	7.40%	54.06%	1.16%
<i>Logit</i>	Exp>0	-	-	-0.19*	-	-0.06	0.26**	0.00	-0.14	-0.10	-0.38
	Positive	-	-	0.10	-	0.21	0.13	0.27	0.17	0.10	0.36
<i>GLM</i>	Exp \$	-0.03	-0.01	0.02	-0.02	-0.01	-0.06*	-0.04	0.11	-0.26*	-0.14***
		0.03	0.02	0.06	0.03	0.04	0.03	0.03	0.09	0.15	0.05
<i>Estimated Change for SNAP Recipients Post-Reduction^c</i>		-\$152	-\$15	-\$10	-\$42	-\$20	-\$6	-\$29	\$90	-\$23**	-\$148***
<i>Test of Parallel Trends Pre-ARRA (p-value)^d</i>		0.14	0.75	0.05	0.91	0.51	0.36	0.26	0.43	0.45	0.01

Significance levels: * < 10%, ** < 5%, *** < 1%.

^aWeighted models also include dummies for post-ARRA, SNAP, age categories, sex, race/ethnicity, marital status, education, employment and disability status, presence of children, household size, region, income to poverty ratio and ratio-squared, and year and interview month. Models restricted to those with non-missing information on all covariates. Expenditures are in \$2009.

^b Excluding rent as pay

^c Combined ATT for two-part models.

^d Parallel trend models estimated using positive expenditures.

Table 9: GLM Model of Quarterly Food Expenditures Shares

	Food at Home Share	Food Away From Home Share
ARRA Benefit Expansion, CE 2007-2011		
<i>Low-Income Seniors (N=15,489)</i>		
SNAP*Post-ARRA	0.03 (0.03)	-0.10 (0.11)
Log (Total Expenditure)	-0.61***(0.01)	0.20***(0.03)
<i>Low-Income 20-59 year olds (N=31,238)</i>		
SNAP*Post-ARRA	0.07***(0.02)	-0.05 (0.04)
Log (Total Expenditure)	-0.56***(0.01)	0.05*** (0.02)
Sunset of ARRA benefit expansion, CE 2012-2014		
<i>Low-Income Seniors (N=10,818)</i>		
SNAP*Post-Sunset	-0.01 (0.03)	-0.01 (0.11)
Log(Total Expenditure)	-0.59***(0.01)	0.19***(0.03)
<i>Low-Income 20-59 year olds (N=19,395)</i>		
SNAP*Post-Sunset	-0.00 (0.02)	-0.04 (0.05)
Log (Total Expenditure)	-0.58***(0.01)	0.01 (0.02)

Significance levels: * < 10%, ** < 5%, *** < 1%.

^a Standard errors in parentheses. Weighted models also include dummies for post-ARRA, SNAP, age categories, sex, race/ethnicity, marital status, education, employment and disability status, presence of children, household size, region, income to poverty ratio and ratio-squared, and year and interview month. Expenditures are in \$2009.

Table 10: DD Estimates of SNAP Benefit Effects on Food at Home Expenditures from CPS FSS^{a,b}

	Benefit Increase, FSS 2008 & 2010	Benefit Decrease, FSS 2012 & 2014
<i>SNAP-Eligible Seniors, >=60 years</i>	N=12,556	N=14,045
SNAP*post	0.04 (0.05)	-0.06 (0.04)
<i>SNAP-Eligible 20-59 year-olds</i>	N=42,942	N=41,283
SNAP*post	0.04* (0.02)	-0.02 (0.02)

Significance levels: * < 10%, ** < 5%, *** < 1%.

^a Standard errors in parentheses. SNAP-eligibility defined using both income threshold and reports of food distress collected in the FSS. Weighted models also include dummies for post-ARRA/post-sunset, age categories, sex, race/ethnicity, marital status, education, employment and disability status, household size, presence of children in household, income to poverty ratio categories, region and metropolitan status. Expenditures are in \$2009.

^b Sample includes those with past-week visit to grocery or supermarket.