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**Heat and Eat:
The Impact of the Low Income Home Energy Assistance Program on
Household Supplemental Nutrition Assistance Program Participation**

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Abstract:

The Low Income Energy Assistance Program (LIHEAP) and Supplemental Nutrition Assistance Program (SNAP) are linked in some states through ‘heat and eat’ (H&E) legislation that allows household to receive higher levels of SNAP benefits with nominal LIHEAP payments. H&E policy impacts on SNAP participation are estimated using variations in the year of state implementation of H&E legislation and household panel data on SNAP and LIHEAP participation from the Survey of Income and Program Participation. Households in H&E states show a 0.36 percentage point higher propensity to participate in SNAP, which translates into \$776 million in additional SNAP outlays over 10 years.

Keywords: SNAP, LIHEAP, household response, program bundling

JEL: I38, H31, D10

Introduction

The Supplemental Nutrition Assistance Program, SNAP, is the largest federal food assistance program in the United States and an important component of the U.S. social safety net. The goal of SNAP is to improve food security among low-income households. In 2015 SNAP assisted 46 million individuals, up from 21 million participants a decade earlier, and provide \$70 billion in benefits. The Low-Income Home Energy Assistance Program, LIHEAP, is a considerably smaller component of the social safety net, but is the primary household energy assistance program in the United States. LIHEAP assists low-income households by paying part of their home energy bills and is a federal block grant program. The LIHEAP annual budget has varied between two and five billion dollars over the past decade. In 2016 LIHEAP assisted 6.8 million households with a total program budget of \$3.4 billion.

Research has shown that heating shocks and home energy shortfalls reduce food consumption and food security as households divert resources from food consumption and nutrition to pay utility bills (Bhattacharya et al, 2003; Nord and Kantor, 2006). The SNAP and LIHEAP programs explicitly address linkages between household food security and household energy security in the LIHEAP provision of the Food Security Act of 1985 affecting food stamp benefits, which states that:

"If a State agency elects to use a standard utility allowance that reflects heating or cooling costs, it shall be made available to households receiving a payment, or on behalf of which a payment is made, under the Low-Income Home Energy Assistance Act of 1981 (42 U.S.C. 8621 et seq.) or other similar energy assistance program, provided that the household still incurs out-of-pocket heating or cooling expenses"¹ (Public Law 99-198, 1985).

The provision specifically allows states to provide the highest Standard Utility Allowance (SUA) in SNAP benefit calculations for low-income households receiving LIHEAP payments. Recognizing that the maximum SUA allowance results in higher SNAP benefits for low-income households whose heating and cooling expenses were not calculated in their shelter deductions, some states began issuing nominal LIHEAP benefits as low as \$1 a year to allow households to receive higher monthly SNAP payments.² This additional SNAP benefit arguably allows low-income households to avoid reallocating food purchases to pay for energy expenses. The practice that allows these states to automatically determine SNAP benefits with the maximum SUA based on nominal LIHEAP payments has come to be known as "Heat and Eat" (H&E); whereas states implementing this policy are known as H&E states.

USDA has identified fifteen states and Washington D.C. - hereinafter referred to as the 16 H&E states - that coordinate LIHEAP and SNAP programs to provide additional SNAP benefits with nominal LIHEAP payments. The states are California, Connecticut, Delaware, District of Columbia, Maine, Massachusetts, Michigan, Montana, New Jersey, New York, Oregon, Pennsylvania, Rhode Island, Vermont,

Washington and Wisconsin. Years of adoption of H&E provisions range from Maine in 1995 to California in 2013 and are listed in Table 1.

H&E states use state block grants to fund nominal LIHEAP payments in order to leverage additional SNAP benefits that are fully funded by the federal government, and the practice has generated significant political debate. Anti-poverty advocates support the H&E policy, as it protects low-income families and mitigates H&E trade-offs by increasing their food purchasing power. Those focused on fiscal restraint see the H&E practice as a loophole that is misused by state governments to boost federal program transfers to low-income households.

The Farm Bill of 2014 introduces a change in H&E policy. States are no longer allowed to award nominal LIHEAP payments such as \$1 a year, but must now receive greater than \$20 annually in LIHEAP payments in order to qualify for the maximum SUA deduction under SNAP. The Congressional Budget Office has estimated that completely removing the SNAP-LIHEAP link through SUAs will affect roughly 850,000 households, which will receive on average \$90 less per month of SNAP benefits – the average value of the additional SNAP benefit triggered by the maximum SUA³. This policy change, in aggregate, may save about \$9 billion in government spending over 10 years (CBO, 2013)⁴. However, these projections do not account for household and state behavioral responses to the closing of the SNAP-LIHEAP link. There is a concern that the elimination of the LIHEAP provision in SNAP could decrease SNAP participation and exacerbate both food and energy insecurity among low-income households.

Household SNAP participation has been shown to respond to general changes in the economy and to SNAP rules and benefit sizes (Burstein, Patrabanish, Hamilton and Siegel, 2009). However, little research has analyzed the potential impacts of policies that link LIHEAP payments to SNAP benefit levels to understand their effect on household SNAP participation. Differential SNAP participation propensities emanating from state variations in the SNAP-LIHEAP link are of policy interest both for evidence of how changes in program linkages affect the wellbeing of low-income households and for implications for federal social assistance program budgets.

This paper examines SNAP participation responses to state variations over time in SNAP-LIHEAP program linkages using a household fixed effect model with data from the 2008 panel of the Survey of Income and Program Participation (SIPP). The alternative impacts of H&E elimination and complete H&E adoption across all states are then simulated to estimate associated changes in federal spending and to inform the current H&E policy debate.

The paper next reviews SNAP and LIHEAP programs, eligibility criteria, and the household participation trends. Section 3 lays out the conceptual and empirical frameworks for the analysis. Section 4 describes data and empirical specification, section 5 presents the results, and section 6 discusses and concludes.

SNAP and LIHEAP Programs

Commonly known as food stamps, SNAP is a federal entitlement program where the USDA establishes SNAP eligibility for households (or individuals) annually based on income and asset thresholds. Currently, households with an income at or below 130 percent of the poverty line are eligible to receive SNAP benefits. States, however, have some prerogative to alter federal participation and eligibility rules.⁵ Households that already receive other federal entitlement benefits, such as Supplemental Security Income (SSI) or Temporary Assistance for Needy Families (TANF) can also receive SNAP benefits.

An important, but often overlooked, part of SNAP benefits is the Standard Utility Allowance (SUA). In 2016, 47 states have mandatory SUAs, where a household utility cost deduction is set annually. As a household deduction, the SUA reduces calculated household income, which in turn can increase SNAP benefits. SUA amounts vary by state. For the continental US, 2016 SUA deductions average \$428, with a minimum of \$271 in Georgia and a maximum of \$787 in Vermont⁶.

Unlike SNAP, which is an entitlement program, LIHEAP is a federally funded state block grant program that does not guarantee LIHEAP benefits to all eligible households who apply. LIHEAP targets households that spend a high proportion of their income on energy and most states distribute benefits on a first-come, first-serve basis. LIHEAP benefits are not sufficient nor intended to cover total household energy expenses. Households with incomes at or below 150 percent of the poverty line or 60 percent of the state median income, whichever is higher, are eligible to apply for LIHEAP benefits. However, states have the flexibility to set their income eligibility level as low as 110 percent of the poverty line.⁷ The program provides heating and cooling expense assistance, emergency assistance to protect against utility shutoffs and fuel supply shortages, along with home weatherization assistance for efficiency improvements and other energy-related minor home repairs; but 90 percent of outlays are for energy expense assistance.

LIHEAP allows considerable flexibility for states to use program monies to address household energy insecurity. Typically, local administering agencies make energy bill payments directly to the primary energy source vendor, such as the gas or electric utility company. Few payments are made directly to households. States use the previous year's participation rate to forecast average LIHEAP benefit size to avoid situations where applicants are denied LIHEAP heating and cooling benefits because of lack of funds. The program has low overhead costs; states are instructed to spend no more than 10 percent of allocated funds on program administration.

Under the Food Security Act of 1985, the SUA provides three ways to link household LIHEAP participation to SNAP benefit levels. Households can qualify for the maximum SUA deduction under SNAP by: 1) showing proof of home utility expenses (separate from rent) and meeting state specific criteria; 2) deliberately participating in LIHEAP and showing proof of LIHEAP receipt in the previous 12

months; or, 3) participating in SNAP in an H&E state. Prior to changes in the 2014 Farm Bill, in an H&E state any household receiving LIHEAP benefits in the past year, independent of the amount, qualified for the maximum SUA deduction and associated increases in SNAP benefits.

To discourage states from providing nominal LIHEAP benefits to increase SNAP benefits in H&E states, Section 4006 of Title IV of the Agriculture Act of 2014 sets a minimum threshold. Households that receive payments of less than \$20 per year are no longer entitled to the maximum SUA. The legislative change took effect March 7, 2014 for new SNAP applicants, but states could delay implementation for up to five months. For current SNAP recipients, changes took effect when households reapplied for benefits at the end of their current certification period. Since the enactment of the H&E reform three states –Michigan, New Jersey and Wisconsin – have discontinued issuing nominal LIHEAP benefits. The rest of the states have committed to increasing LIHEAP payments to meet the minimum threshold, generally to \$20.1 or \$21.

Besides H&E, several states employ categorical eligibility for LIHEAP where a person who participates or has family members who participate in SNAP are automatically eligible for LIHEAP. Since SNAP and LIHEAP have different eligibility requirements, categorical eligibility makes some otherwise LIHEAP-ineligible households eligible without the burden of having to prove eligibility. In practice, 12 states (Alaska, Arkansas, Kentucky, Montana, New York, Ohio, Oklahoma, South Dakota, Virginia, Washington, West Virginia, and Wisconsin) and Washington D.C. apply categorical eligibility to LIHEAP.

SNAP and LIHEAP Participation

From 2000 to 2010, approximately 50 to 65 percent of eligible households participated in SNAP, making uptake of SNAP an important policy issue for the USDA (Wolkwitz, 2007). After the great recession, SNAP participation rate among those eligible increased significantly. In 2014, 88 percent of eligible households participated in SNAP (Gray and Cunyningham, 2016). Studies show that benefit level is an important determinant of household SNAP participation. Households who are eligible for higher benefit levels are more likely to participate. In 2014, the participation rate was 97 percent among households eligible for 51 to 99 percent of the maximum SNAP benefit levels, compared to 47 percent participation among households eligible for benefits between 1 and 50 percent of the maximum benefit level (Gray and Cunyningham, 2016). If household participation is responsive to benefit levels, then households in H&E states should have higher levels of SNAP participation *ceteris paribus*.

By contrast, LIHEAP reached a record high level of participation in 2010, assisting 8.1 million households with a total budget of \$5.1 billion. Since then the LIHEAP budget has declined and participation levels have dropped. In 2016, LIHEAP had a budget of \$3.4 billion and served 6.8 million households. More broadly, over the history of the program, LIHEAP participation rates among those eligible have

declined. When LIHEAP started in 1981 it assisted about 36 percent of eligible households, yet by 2010, it served about 17 percent of eligible households (HHS, Division of Energy Assistance, 2010; LIHEAP Clearinghouse, 2015). Unlike with SNAP, increasing household LIHEAP participation has not been a program priority. Further, fixed funding levels and LIHEAP's status as a block grant generate a direct tradeoff for States between participation levels and benefit levels.

Studies that have looked at SNAP participation find that households consider benefit size, likelihood of improving (or worsening) of the household's economic conditions, cost of participation, and stigma associated with welfare dependence (Burstein, Patrabanish, Hamilton and Siegel, 2009). Household characteristics also matter, as single female-headed households, additional children, and a Black household head are associated with a higher probability of participating in SNAP (Shaefer and Gutierrez, 2013; Daponte, Saunders and Taylor, 1999). Studies have also shown that participation in SNAP is associated with the length of application process (Bhataria, Duffy, and Raymond 2005), difficulty in getting to the SNAP office, and uncertainty on program eligibility (Bartlett & Burstein, 2004a). Lack of information on SNAP, viewing the application process as too burdensome; feeling social stigma associated with SNAP participation; not wanting to depend on government assistance; and having previous bad experiences with SNAP or other programs have been listed as reasons for non-participation (Cunnyngham and Castner, 2009). Externalities, such as national and local economic conditions and changes to SNAP rules and procedures that affect eligibility and benefit size, also significantly affect SNAP participation (e.g. Ratcliffe, McKernan, and Finegold 2008).

The most common triggers for SNAP entry are a decline in a household member's income, recently unemployment of a family member, and a change in household composition (Burstein, 1993; Cody et. al., 2007, Leftin, et. al., 2014). Mabli and colleagues (2011) find that individuals experiencing employment transitions are more likely to enter or exit SNAP if they are less accustomed to undergoing employment fluctuations.

The tendency for low-income households to participate in multiple assistance programs and collect both cash and non-cash program benefits has been well documented in the economics literature (e.g. Keane and Moffit, 1998; Trenkamp and Wiseman, 2007, Moffitt, 2014). Linkages between SNAP and cash-assistance programs such as Temporary Assistance to Needy Families (TANF)⁸ are found to increase the probability of being on SNAP (Huffman and Jensen, 2005). Among households receiving TANF, 98 percent receive Medicaid, 81 percent receive SNAP, and 14 percent receive housing assistance (Zedlewski 2012). Further, increasing benefits in one program increases propensities of participation in the other (Fraker & Moffitt, 1988). Similarly, SNAP and TANF are bundled in program exits (Mills et al., 2001). Changes in other policies, like an increase in minimum wage and higher EITC, reduce SNAP participation (Ratcliffe, McKernan and Finegold, 2008).

Few studies have examined SNAP and LIHEAP program interactions. Higgins and Lutzenhiser (1995) find that having received food stamps in the previous year is a strong predictor of LIHEAP participation. Exploring LIHEAP participation, Murray and Mills (2014) find supporting evidence of “bundled assistance”; almost 60 percent of households receiving LIHEAP also receive non-cash benefits, compared to 25 percent of eligible non-participants. We know of no study that explicitly examines LIHEAP participation impacts on household SNAP participation, but the relationship is likely to be strongly influenced by state policies linking program application and benefits.

Conceptual and Empirical Framework

In a utility maximizing framework households participate in SNAP if the utility from participation exceeds that from non-participation. If participation is costless, information is complete and benefits are positive, utility from SNAP participation will always exceed the utility from non-participation among eligible households. However, participants derive utility from program benefits and disutility from program costs. Program benefits consist of SNAP monthly payments, while program costs broadly include transaction costs and stigma from program participation (Moffitt 1983; Gundersen and Oliviera, 2001). A household will also trade off program benefits and reductions of benefits from increased employment income (Fitzgerald 1995; Keane and Moffit, 1998; Nam 2005). When participation in multiple social protection programs is bundled, households may take advantage of shared program participation costs and increase program participation propensities (Huffman and Jensen, 2005).

The utility from participation in SNAP can be specified as a function of non-program income (I), SNAP benefits (B), and SNAP costs (C).

$$(1) \quad U = U \{I, B_{SNAP}, C_{SNAP}\}$$

Costs include initial enrollment costs and program re-certification costs. Household utility from SNAP increases with benefits and decreases with program participation costs. Thus, participation can be increased by expanding eligibility for SNAP and by either increasing SNAP benefits or by reducing participation costs. Conditional upon eligibility, a household will decide to participate if:

$$(2) \quad U\{I, B_{SNAP}, C_{SNAP}\} > U\{I\}$$

Program benefits are a function of household characteristics that influence benefit levels (denoted by HH), local economic conditions (denoted by EC), and state policies (SP); whereas participation costs are a function of state policies (SP) and household characteristics (HH) that affect stigma and application costs (Burstein, Patrabanish, Hamilton and Siegel, 2009). In the case of SNAP, participation is also influenced by LIHEAP participation through state policies that link the programs and, thereby, influence both SNAP benefits and costs.

$$(3) \quad P_{SNAP}\{I, B_{SNAP}(HH, EC, SP, P_{LIHEAP}(SP)), C_{SNAP}(HH, SP, P_{LIHEAP}(SP))\}$$

Household characteristics such as earned income, assets, household structure and size directly influence whether a household meets SNAP eligibility requirements, as well as if there is a perceived need for assistance. Employment is related to eligibility criteria and contributes to household earned income. Employment instability has been associated with events that trigger SNAP participation (Mabli and Ohls, 2012; Cody et al., 2007). Changes in household composition also play a significant role in triggering SNAP entries and exits (Cody et al., 2007; Mabli et al., 2011)

Local economic conditions influence general levels of social protection program need in low-income households. Measures of local economic conditions such as state unemployment rate and state per capita income are generally used in econometric models as proxies for the state of the local economy in determining SNAP participation (Kornfeld, 2002). A significant source of economic stress during the great economic recession was the housing market. Thus, state foreclosure rates are also likely to be a strong indicator of local economic conditions and economic distress stemming from the housing market crisis in the study period.

SNAP benefit eligibility criteria and payment levels are defined at federal level and state policies have no direct effect on these program parameters. However, SNAP is administered by states and state policies influence SNAP accessibility and application costs (see Bartlett et al., 2004b). Lenient vehicle exemption policies, longer recertification periods, expanded categorical eligibility and outreach efforts are found to increase SNAP household participation (Rosenbaum, 2000; Kabbani and Wilde 2003; Bartlett et al., 2004b ; Ratcliffe, et. al, 2008; Mabli, 2015; Burstein et al. 2009).

Crucial to this study, State policies affect SNAP linkages with other programs. H&E increases SNAP benefits by providing nominal LIHEAP benefits to SNAP-eligible households that make them eligible for the maximum SUA and, hence, higher SNAP monthly benefits. In this context, H&E has a distinct effect on SNAP participation different from that of LIHEAP participation generally. H&E increases SNAP benefits at no additional cost to the individual household participating in SNAP and with no significant level of LIHEAP benefits.

General household LIHEAP participation (with real energy assistance payments) increases SNAP benefits, but with additional LIHEAP benefits and with the cost of LIHEAP application. Household LIHEAP participation also likely increases SNAP participation through the bundling of certain components of program participation costs. Most notably, welfare stigma is an important factor in the SNAP participation decision. Empirical work has shown that among households eligible for SNAP, about 44 percent cite factors related to stigma as a reason for their decision not to participate (Coe, 1983). However, Keane and Moffit suggested that marginal stigma is small (to zero) for additional program participation after one participates in any

welfare program (1998). In the context of the current analysis, categorical eligibility is also a deliberate effort to bundle application costs of SNAP and LIHEAP.

Data and Empirical Model Specification

The main dataset employed in the analysis is the 2008 panel of Survey of Income and Program Participation (SIPP), a multi-panel longitudinal survey. The SIPP is nationally representative and collects detailed information on individual and household income, labor force activity, and social protection program participation. The survey uses a two-stage stratified sample, with oversampling of lower income households to provide information on income and assistance program participation. Weights are then employed to make the sample nationally representative.

The 2008 SIPP panel started with approximately 52,000 households. The panel observes the same households for a time span ranging from two-and-a-half to four years. The sample in each wave consists of four rotation groups, each interviewed in different months. The reference person for each panel household is asked once per wave about their activities during the preceding four months. This study employs waves 1-14 of the 2008 SIPP panel, or 56 interview months covering the period May 2008 to December 2012. The unit of observation is the household.

Data on state implementation of categorical eligibility and H&E are based on USDA's Food and Nutrition Services identification in data provided by the Heritage Foundation (2014). The analysis also uses state foreclosure rate data from the Mortgage Bankers Association National Delinquency Survey (via Haver Analytics), heating and cooling degree data from National Weather Service, and state per capita income data from U.S. Bureau of Economic Analysis.

Variables

A brief description of the study variables and summary statistics is provided in table 3. The dependent variable, SNAP participation, is a binary indicator equal to one if the household received SNAP benefits during the observation month. The dependent variable mean suggests that the household SNAP participation rate is 12.3 percent across 1,864,282 monthly household observations.

Heat & Eat is an indicator variable denoting household residence in a state implementing H&E policies in the observation month. These households represent 25 percent of sample observations. As discussed, H&E is expected to increase household SNAP participation propensities, *ceteris paribus*. As expected, the data suggest H&E nominal payments are not reported as LIHEAP payments by households; essentially no (0.001 percent) LIHEAP participants report payments under \$20. The lack of reporting of nominal LIHEAP payments allows us to isolate the impact of additional SNAP benefits under H&E from other impacts associated with LIHEAP participation.

Time variant household characteristics in the analysis include total household earned income, number of persons in the households, number of children under 18 in the households, and a binary indicator for employment of the household's reference person. Higher income and employment are both expected to decrease SNAP participation propensities.⁹ Increases in total household size and in number of children are likely to increase SNAP needs and benefits relative to application costs and show a positive association with SNAP participation.

State-level time-variant variables in the study are state per capita income, state foreclosure rates, and state measures of heating and cooling degree days. Higher state per-capita incomes and lower foreclosure rates are expected to be positively correlated to local economic conditions and, thus, be negatively and positively related to SNAP participation, respectively. The number of heating and cooling degree-days by month in each state are included to account for energy demand.¹⁰ The two variables are derived from measurements of outside air temperature over a base of 65^F. Home heating requirements for a location are assumed to be directly proportional to the number of heating degree-days at that location, while cooling degree-days reflect cooling needs. Increases in both measures may increase SNAP participation, as households are stressed to meet both heating and food needs.

Recall delay is a categorical variable that records the number of months elapsed between the time of survey interview and reference month for which the information on SNAP participation is collected. This variable varies between 1 and 4 months. A positive sign is expected if households are less willing to admit current than past SNAP participation due to stigma.

The sample mean for LIHEAP participation is 2.3 percent (table 2). Since LIHEAP payments are identified as energy assistance payments directly to utility companies, fuel dealers or landlords, household LIHEAP participation is likely underreported. This underreporting should not influence state-level relationships between H&E implementation and household SNAP participation. But inclusion of the LIHEAP participation indicator in alternative model specifications provides a robustness check to rule out the possibility that H&E impacts are due to higher propensities to participate in LIHEAP in H&E states.

Categorical eligibility is a binary variable for residence in a state where SNAP participants are automatically eligible for LIHEAP. As noted, 12 states and Washington D.C. have categorical eligibility policies and there is no time variation during the study period in adoption or disadoption of categorical eligibility policies. Categorical eligibility increases assistance benefits through provision of LIHEAP at little or no cost to the household. Thus, this state policy variable is expected to attenuate the positive impact of LIHEAP participation on SNAP participation when included in an interaction term with LIHEAP in model specifications. Finally, year and month indicators are included as control variables.

Econometric Model

The empirical focus of the study is on H&E policy impacts on household SNAP participation. A Linear Probability Model with household fixed effects is employed to estimate the impact of state H&E policies on SNAP participation, while controlling for time-invariant household heterogeneity. We start with Model (1) focused on the impact of state H&E policies and add complexity in additional specifications.

$$(1) \quad SNAP_{ist} = \beta_0 + \beta_1 H\&E_{st} + \beta_2 income_{ist} + \beta_3 hh_characteristics + \beta_4 employed_{ist} + \beta_5 per_capita_{st} + \beta_6 foreclosure_rate_{st} + \beta_7 heating_{st} + \beta_8 cooling_{st} + \beta_9 recall_delay_{ist} + \beta_{10} year_i + \beta_{11} month_{it} + a_i + u_{ist} \quad t = 1, 2, \dots, 56$$

The specification in Model 1 compares within household changes in SNAP status, before and after H&E policy adoption, for households whose state changes H&E status during the survey against changes in status for all other households who do not experience a change in state policy in the same time period. In this setting, β_1 identifies the conditional probability of a transition into SNAP with the introduction of H&E. The variable a_i is the household specific fixed effect and u_{ist} represents the remaining heterogeneity in the error term. Robust standard errors are estimated to account for heteroscedasticity inherent in Linear Probability Model estimation with binary dependent variables.

In Model (2) an indicator for household LIHEAP participation is added to capture the effect of household LIHEAP participation on household SNAP participation.¹¹ The parameter associated with the household LIHEAP participation variable ($LIHEAP_{ist}$) captures the influence of household transitions into (out of) LIHEAP on transitions into (out of) SNAP. The expected sign of this parameter (β_{12}) is positive because LIHEAP benefits allow for the maximum SUA allowance and increased SNAP benefits, while on the cost side low-income households can bundle programs costs.

$$(2) \quad SNAP_{ist} = \beta_0 + \beta_1 H\&E_{st} + \beta_2 income_{ist} + \beta_3 hh_characteristics + \beta_4 employed_{ist} + \beta_5 per_capita_{st} + \beta_6 foreclosure_rate_{st} + \beta_7 heating_{st} + \beta_8 cooling_{st} + \beta_9 recall_delay_{ist} + \beta_{10} year_i + \beta_{11} month_{it} + \beta_{12} LIHEAP_{ist} + a_i + u_{ist} \quad t = 1, 2, \dots, 56$$

As noted, household LIHEAP participation may be underreported in the data and the impact of LIHEAP on SNAP participation may be underestimated. However, inclusion of household LIHEAP participation decisions serves as an important check when examining the robustness of the H&E policy impacts estimated in Model (1) by controlling for the possibility that H&E impacts on SNAP participation are due to more abundant LIHEAP participation and associated benefit levels in H&E states.

Model (3) presents a more comprehensive specification of possible LIHEAP impacts on SNAP participation by introducing interaction terms between household

participation in LIHEAP and state H&E and categorical eligibility policies that affect both programs.

$$(3) \quad SNAP_{ist} = \beta_0 + \beta_1 H\&E_{st} + \beta_2 income_{ist} + \beta_3 hh_characteristics + \beta_4 employed_{ist} + \beta_5 per_capita_{st} + \beta_6 foreclosure_rate_{st} + \beta_7 heating_{st} + \beta_8 cooling_{st} + \beta_9 recall_delay_{ist} + \beta_{10} year_i + \beta_{11} month_{it} + \beta_{12} LIHEAP_{ist} + \beta_{13} LIHEAP_{ist} \times H\&E_{st} + \beta_{14} LIHEAP_{ist} \times Cat_Elig_s + a_i + u_{ist} \quad t = 1, 2, \dots, 56$$

The parameter estimate β_{13} is interpreted as the additional propensity to participate in SNAP when on LIHEAP in an H&E state, above and beyond the impact of being on LIHEAP and being in an H&E state separately. Categorical eligibility is time invariant and its effect on household SNAP participation is captured through its interaction with LIHEAP household participation ($LIHEAP_{ist} \times Cat_Elig_s$). A positive parameter estimate indicates that households that transition into LIHEAP in states with categorical eligibility have differentially higher propensities to transition into SNAP compared to those who transition into LIHEAP in other states. These interaction terms control for the impacts that state H&E and categorical eligibility have on SNAP participation through LIHEAP participation, leaving the H&E parameter to again measure the direct impact of H&E on SNAP participation through associated SUA benefits.

Results

Estimation results for the three model specifications are presented in table 4. Of immediate note, the H&E parameter estimate is positive and significant in all three model specifications. Model (1) results for the Linear Probability Model show that SNAP participation propensity increases by 0.36 percentage points when a state adopts the H&E policy. Since this model does not include a household LIHEAP participation variable, this result is “uncontaminated” by possible time-variant heterogeneity in the household LIHEAP participation decision and provides a clear reduced-form effect of the H&E state policy on SNAP participation. Results for other variables are, in general, as expected. Household income and employment show negative associations with the probability of SNAP participation, but the effect is small. A ten thousand dollar increase in household income is associated with a 1.6 percentage point decrease in the probability of entering SNAP.¹² Employment status also shows an expected negative sign. Compared to the baseline case of an unemployed reference person, moving into employment is associated with a 4.0 percentage point decrease in the probability of SNAP participation. A one person increase in the total number household members is associated with 4.0 percentage points increase in the probability of SNAP, while the additional increase if the person is a child under 18 is of 0.7 percentage points.

In terms of changes in local economic conditions, a ten thousand-dollar increase in state per capita income is associated a 1.5 percentage point decrease in the probability of SNAP participation. A one percent increase in state foreclosure rates is associated with an additional 0.29 percentage point increase in the probability of

SNAP participation. Heating degree-days has an unexpected sign. An increase in heating degree-days represents increased demand for energy in colder months but a thousand heating degree days increase is associated with a 0.23 percentage point decrease in the probability of SNAP participation. The effect of cooling degree-days on household SNAP participation is not significant.

The recall delay variable suggests that a one month increase in the time-gap between interview and reference period increases reported SNAP participation by 0.11 percentage points. This suggests that households are less likely to report current SNAP participation than past participation, possibly due to stigma. As for year effects, the probability of a household transitioning into SNAP is significantly higher each year from 2009 to 2012, in comparison to the baseline year, 2008. For seasonality effects, compared to the base month of January, October, November and December households have 0.54, 0.70, and 0.89 percentage point higher probabilities of SNAP participation (see appendix A for results).

Turning to Model (2) results, which include the explicit indicator of household LIHEAP participation, the H&E effect remains stable. This suggests that different levels of LIHEAP participation in H&E states are not driving estimated H&E impacts on SNAP participation. Rather, increased SNAP participation rates in H&E states are due to SNAP SUA benefits. It is also worth noting that the probability that a household will transition to SNAP as they transition into LIHEAP is 7.4 percentage points. The large positive association between SNAP and LIHEAP transitions is a reflection of bundling of program use by households.

Model (3) includes interaction terms between LIHEAP participation and H&E and categorical eligibility State policies to examine if the policies increase the probability of joint program use. The H&E coefficient estimate decreases in this specification and we now see a 0.26 percentage point increase in SNAP participation in H&E states, which is about 0.1 percentage points lower than in the previous models. Household SNAP participation propensities are 5.9 percentage points higher for LIHEAP participants in states that do not use H&E or categorical eligibility. The H&E \times LIHEAP interaction term is associated with an additional increase in SNAP participation of 3.6 percentage points with LIHEAP participation. The fact that state H&E policies continue to have a positive and significant impact on SNAP participation even after controlling for augmented SNAP participation among LIHEAP participants in H&E states provides further evidence that the H&E provisions drive additional SNAP participation through SNAP SUA benefits, rather than through program bundling. Similarly, transitioning into LIHEAP in a state that uses categorical eligibility policy generates an additional 1.1 percentage point probability of SNAP participation compared to States without categorical eligibility. The parameter estimates for other variables in Model (2) and Model (3) remain similar to those in Model (1).

Discussion and Conclusions

The results consistently indicate that adopting H&E policies at the state level generate a small but significant increase in the probability that households participate in SNAP. Further, H&E effects appear to stem mainly from increased SNAP SUA benefits rather than from bundling of LIHEAP and SNAP program application and recertification costs or other factors. This interpretation is reinforced by the fact that survey households do not report nominal levels of LIHEAP benefits in the survey.

The study results also imply that the well-known tendency to bundle SNAP and TANF program benefits also applies to SNAP and LIHEAP. Households are more likely to transition into (or out of) SNAP in the same month that they make a LIHEAP transition. This joint program effect increases with policies that bundle costs and amplify joint program benefits, as the odds of jointly transitioning into SNAP with LIHEAP participation are higher in H&E states and in states that use categorical eligibility. The lack of previous research on the SNAP-LIHEAP interaction and the effect of the H&E policies on SNAP participation do not allow comparison of our results with previous research. It is also worth noting that household LIHEAP participation parameter estimates in general and through interactions with H&E and categorical eligibility policy regimes are a reflection of household program participation decisions. SNAP and LIHEAP participation decisions may be jointly influenced by other time variant factors and, as such, do not reflect the causal impact of LIHEAP on SNAP. Estimates of household LIHEAP participation impacts on SNAP participation should also be viewed with caution due to likely underreporting of receipt of LIHEAP.

Policy Implications

In response to the 2014 Farm Bill H&E debate, this paper sheds light on the effect of breaking the H&E link between SNAP and LIHEAP on monthly SNAP household participation. Since the start of the H&E practice, two opposing views have dominated the policy discussion. Opponents of the H&E policy have called it a legal ‘loophole’ that should be closed to save federal government funds. Proponents of the policy consider H&E to be an additional layer of the safety net for low-income households that generates added incentives for SNAP participation. Supporting one argument or the other is beyond the scope of this analysis, but estimates of household SNAP participation responses to H&E do allow us to calculate the federal budget implication of two broad scenarios - if the H&E practice was completely eliminated and if the policy was implemented nation-wide.

Previous estimates of costs associated with removing all H&E policies only reflect the maximum SUA that incumbent SNAP users stand to lose. Specifically, the CBO (2013) estimates that breaking the SNAP-LIHEAP link would affect 850,000 households and would save about \$9 billion in government spending over 10 years. The CBO estimates only account for SNAP benefit changes triggered by the maximum SUA deductions with nominal LIHEAP payments, and not household participation responses.

Households in states adopting H&E show an additional increase of 0.36 percentage points in household SNAP participation. If the H&E states were to discontinue the use of the policy, cutting H&E would also generate a reduction in SNAP participation of around 23,000 households. With an average household monthly SNAP benefit of \$278,¹³ according to the USDA, this would save about \$78 million in SNAP benefits annually. These costs are not reflected in naïve estimates that account for the benefits from loss of SUA deductions for nominal LIHEAP payments, but not the participation response to that change. On the other hand, if all states introduce the H&E policy, SNAP participation will increase by around 57,000 households. This will raise SNAP spending by around \$191 million annually. Thus, eliminating H&E will save an additional \$776 million above CBO estimates in the next 10 years from reduced SNAP participation. On the other hand, implementation of H&E in every state will cost another \$2 billion over 10 years from increased SNAP participation.

Endnotes

¹ Public Law 99-198-Dec. 23,1985. Deductions From Income Sec. 1511, Section 5(E) of The Food Stamp Act of 1977 (7 U.S.C. 2014(E))

² As an extreme case, California provided LIHEAP nominal benefits of \$0.1 a year.

³ “See Supplemental Nutrition Assistance Program (SNAP): A Primer on Eligibility and Benefits, by Randy Alison Aussenberg (2014). <https://www.fas.org/sgp/crs/misc/R42505.pdf>

⁴ Congressional Budget Office, Cost Estimate: S. 3240 Agriculture Reform, Food, and Jobs Act of 2012, May 24, 2012.

⁵ For variations in state policies see USDA (2016).

⁶ These calculations exclude Alaska and Hawaii. Alaska has a much higher SUA (\$1,014) and Hawaii does not report a SUA. SUA amounts for 2016 can be found at: <http://www.fns.usda.gov/snap/standard-utility-allowances-0>

⁷ For further details on income eligibility criteria see: <http://www.acf.hhs.gov/programs/ocs/resource/liheap-statute-and-regulations>

⁸ Prior to 1997 the program was called Aid to Families with Dependent Children (AFDC) Program.

⁹ A small share of households have negative incomes due to business losses.

¹⁰ Heating degree-day and cooling degree-days measure energy needs to heat or cool a building. See: http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/cdus/degree_days/

¹¹ Previous studies have not looked at the potentially endogenous impact of LIHEAP on SNAP participation. However, a number of methods have been employed to account for endogeneity in other assistance program choices; including simultaneous equation binary choice models (Gundersen & Oliveira, 2001); bivariate probits with instrumental variables (Yen et al, 2008; Ratcliffe, McKernan & Zhang, 2011; Schaefer & Gutierrez, 2013); correlated random effects models (Atasoy, Mills, & Parmeter, 2010); natural experiments (Borjas, 2004; Nord and Prell, 2011) and endogenous treatment effect models with instruments (Mykerezi and Mills, 2010). These methods require an instrumental variables that are difficult to theoretically and empirically identify, particularly in secondary datasets. Alternatively, with panel data and time-invariant household heterogeneity can be completely removed through household fixed effects models (e.g. Wilde and Nord, 2005; Li et al, 2014).

¹² Variables “earned income” and “state per capita income” are scaled down by 10,000 and heating and cooling degree-days are scaled down by 1,000 in estimation.

¹³ The present calculations use the average monthly 2012 SNAP benefits and do not account for the additional SNAP benefits triggered by the maximum SUA.

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Table 1: Timing of Heat and Eat Adoption by State

	State	Year adopted H&E
1	California	2013
2	Connecticut	2009
3	Delaware	2009
4	DC	2011
5	Maine	1995
6	Massachusetts	2007
7	Michigan	2009
8	Montana	2009
9	New Jersey	2009
10	New York	2008
11	Oregon	2008
12	Pennsylvania	2010
13	Rhode Island	2008
14	Vermont	2010
15	Washington	2009
16	Wisconsin	2009

Table 2: Program Participation by Poverty Ratio

	Income to Poverty ratio <2.5		Income to Poverty ratio <2		Income to Poverty ratio <1.5	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
SNAP	0.20	0.35	0.21	0.36	0.23	0.37
LIHEAP	0.03	0.12	0.04	0.13	0.04	0.13

Table 3: Variable Definitions and Descriptive Statistics

Variable	Description	Mean	Std. Dev.	Min	Max
SNAP part	Participation in SNAP=1	0.123	0.328	0	1
Heat&Eat	H&E state=1	0.250	0.433	0	1
Earned Income	Total household monthly earned income (dollars)	3,987.26	5,406.29	-50,000	128,790
# of hh members	Total number of persons in household	2.528	1.496	1	22
# of kids	Total number of children under 18	0.609	1.055	0	12
Employed	Employed =1	0.621	0.485	0	1
Per capita income	State per capita income (annual)	40,754	5,904	29,569	74,710
Foreclosure rate	State foreclosure rate (annual)	8.352	1.800	2.484	14.545
Heat day	Heating degree days	353.886	386.786	0	2019
Cool day	Cooling degree days	114.280	163.757	-288	753
Recall Delay	Months between interview and reference month	2.518	1.118	1	4
LIHEAP part	Participation in LIHEAP=1	0.023	0.150	0	1
Cat. Eligibility	Categorical eligibility state=1	0.245	0.430	0	1

Table 4: Linear Probability Regression Model Results

	Model 1	Model 2	Model 3
Heat&Eat	0.0036*** (0.0009)	0.0037*** (0.0009)	0.0026** (0.0009)
Earned Income (1:10,000)	-0.0158*** (0.0004)	-0.0156*** (0.0004)	-0.0156*** (0.0004)
# of hh members	0.0399*** (0.0006)	0.0398*** (0.0006)	0.0398*** (0.0006)
# of kids under 18	0.0068*** (0.0008)	0.0066*** (0.0008)	0.0066*** (0.0008)
Employed	-0.0401*** (0.0010)	-0.0395*** (0.0010)	-0.0395*** (0.0010)
Per capita income (1:10,000)	-0.0154*** (0.0028)	-0.0153*** (0.0028)	-0.0154*** (0.0028)
Foreclosure rate	0.0029*** (0.0002)	0.0029*** (0.0002)	0.0029*** (0.0002)
Heating DD (1:1,000)	-0.0023* (0.0009)	-0.0035*** (0.0009)	-0.0035*** (0.0009)
Cooling DD (1:1,000)	0.0033 (0.0019)	0.0022 (0.0019)	0.0019 (0.0019)
Recall Delay	0.0011*** (0.0001)	0.0011*** (0.0001)	0.0011*** (0.0001)
Year 2009	0.0096*** (0.0006)	0.0096*** (0.0006)	0.0096*** (0.0006)
Year 2010	0.0233*** (0.0007)	0.0233*** (0.0007)	0.0234*** (0.0007)
Year 2011	0.0352*** (0.0008)	0.0353*** (0.0008)	0.0353*** (0.0008)
Year 2012	0.0431*** (0.0010)	0.0433*** (0.0010)	0.0433*** (0.0010)
LIHEAP part		0.0737*** (0.0020)	0.0585*** (0.0026)
LIHEAP*H&E			0.0359*** (0.0044)
LIHEAP*Cat Elig			0.0109* (0.0047)
Constant	0.0522*** (0.0111)	0.0504*** (0.0111)	0.0511*** (0.0111)
No. of Obs.	1,778,057	1,778,057	1,778,057

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ indicate significance levels in two-tailed t-tests
Standard errors are in parentheses.

Table 5: Simulated Impacts of No H&E and H&E in All States

Stimulated Impacts of H&E on SNAP Participation and Spending			
	2012 Base	No H&E	H&E All States
Number of participating SNAP households in H&E states	6,460,267		
Number of participating SNAP HH households in non-H&E	15,869,446		
Coefficient of reduced/additional SNAP participation	0.0036		
Monthly households SNAP benefit size	\$278		
Changes in the number of households participating in SNAP		-23,257	+57,130
Annual total savings/expenses from reduced/increased SNAP participation		\$77,585,223	-\$190,585,699
Additional SNAP savings/spending in the next 10 years		\$775,852,226	-\$1,905,856,987

Source: Author calculations

APPENDIX A

Seasonal Effect	Model 1	Model 2	Model 3
February	0.0007 (0.0007)	0.0006 (0.0007)	0.0006 (0.0007)
March	0.0010 (0.0008)	0.0007 (0.0008)	0.0007 (0.0008)
April	0.0010 (0.0009)	0.0007 (0.0009)	0.0007 (0.0009)
May	0.0010 (0.0011)	0.0007 (0.0011)	0.0008 (0.0011)
June	0.0009 (0.0013)	0.0008 (0.0013)	0.0009 (0.0013)
July	0.0011 (0.0014)	0.0011 (0.0014)	0.0012 (0.0014)
August	0.0019 (0.0014)	0.0018 (0.0014)	0.0019 (0.0014)
September	0.0036** (0.0012)	0.0034** (0.0012)	0.0034** (0.0012)
October	0.0054*** (0.0009)	0.0051*** (0.0009)	0.0051*** (0.0009)
November	0.0070*** (0.0008)	0.0068*** (0.0008)	0.0068*** (0.0008)
December	0.0089*** (0.0007)	0.0089*** (0.0007)	0.0088*** (0.0007)

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ indicate significance levels in two-tailed t-tests
Standard errors are in parantheses.

Heat and Eat:

The Impact of the Low Income Home Energy Assistance Program on Household Supplemental Nutrition Assistance Program Participation

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