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IT'S A CRUEL SUMMER:
HOUSEHOLD RESPONSES TO REDUCTIONS IN GOVERNMENT NUTRITION ASSISTANCE

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ABSTRACT

The appropriate size and scope of government nutrition assistance programs is a regular source of debate among policy-makers, and with calls to reduce government benefits, a clear understanding of household responses to any proposed benefit reduction is critical. Exploiting the design of U.S. nutrition assistance programs, we examine how low-income households reallocate their budgets following an exogenous reduction in nutrition assistance benefits. The magnitude of our results suggests that the budget for an average low-income household with children is severely inflexible and likely unable to absorb more than a $2 to $3 reduction in nutrition benefits per child per week.

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1 Introduction

A variety of state and federal nutrition assistance programs are currently available for U.S. households meeting the relevant eligibility criteria, including the Supplemental Nutrition Assistance Program (SNAP), the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), the National School Lunch Program (NSLP), and the School Breakfast Program (SBP). The largest of these programs is SNAP, formerly known as the Food Stamp Program. As of 2016, over 44.2 million individuals participated in SNAP at a total estimated cost of approximately $71 billion.[1] Additional benefits may be available through WIC for households with infants, young children, and pregnant or postpartum women, and households with school-age children (SAC) may also have access to free or reduced-price school meals through the NSLP and SBP. Collectively, across these and other nutrition assistance programs, spending in 2016 totalled nearly $100 billion.

Many households participate in one or more programs concurrently, and as such, policy changes in one program will naturally influence the effectiveness of other programs. For example, children of SNAP households automatically qualify for in-school nutrition assistance programs (Hoynes & Schanzenbach, 2015). SNAP benefit levels (or allotments) are also determined solely by household size and net income, and otherwise unchanged within a given year. As a result, households with SAC who also participate in SNAP will receive additional benefits via in-school nutrition assistance programs during the school year, and these additional benefits are suspended during the summer. Such households must therefore pay for additional meals with the same SNAP allotments during extended school breaks.

The current paper exploits this interaction between NSLP/SBP and SNAP in order to identify household responses to reductions in the overall generosity of government nutrition assistance programs. For example, how do households reallocate their budgets

[1] Data available at www.fns.usda.gov.

when confronted with an increased (out-of-pocket) food burden? Can households absorb a decrease in nutrition assistance benefits, or are budgets sufficiently constrained such that there is little to no flexibility to maintain pre-existing food expenditures? In answering these questions, our analysis contributes to the growing literature on the effects of government nutrition assistance; however, rather than studying the extensive margin effects of program *participation*, we are interested in the intensive margin of changes in overall generosity of government nutrition assistance. We are also interested in the overall household response across several expenditure categories rather than the change in a single area of expenditures.

Our analysis is based on data from the Consumer Expenditure Survey (CE), which allows for a longitudinal analysis of household expenditures. To exploit the exogenous change in overall benefit generosity during the summer months and to identify effects on the intensive margin, we must limit our sample to households participating in NSLP/SBP and some other nutrition assistance program(s). Since the CE does not provide data on NSLP/SBP participation directly, we limit our sample to SNAP-eligible households with SAC and SNAP-participating households with SAC, as such households are automatically eligible for NSLP/SBP. We estimate the effects of an increased food burden during the summer months using standard fixed effects (FE) regression models as well as fractional multinomial logit (FMlogit) models, the latter of which account for the inherent correlation in expenditure shares across different categories for a given household (Papke & Wooldridge, 1996; Mullahy, 2011). We also consider the influence of potential misreporting of SNAP participation with a Monte Carlo study in which SNAP-eligible households who do not report receiving SNAP benefits are randomly assigned as SNAP participants.

We find significant increases in the share of household budgets spent on food at home during the summer. This effect exists for all households with SAC, but the largest effects occur for SNAP-eligible or SNAP-participating households. Among such households, we also estimate large reductions in expenditure shares on entertainment and

"other" expenditures. Collectively, the results comport with standard economic theory, wherein an exogenous reduction in nutrition assistance generosity leads to a reduction in expenditures among relative luxury goods (in this case, entertainment and "other" expenditures) and an increase in expenditures on food at home. However, the magnitudes of these effects are small, with less than a $2 per child per week increase in food expenditures at home during the summer months. Assuming that SNAP households are attempting to cover the cost of meals that would otherwise be provided through school meal programs, the small magnitude of this effect suggests that households cannot fully recover the cost of school meals from a reallocation in household budgets. Indeed, $2 per child per week falls well below the USDA's estimated minimum cost per week of a nutritious diet for a school-age child (over $30 per week),[2] and similarly below the $25 per child per week value of school breakfast and lunch programs (Almada & Tchernis, 2015).

While access to summer meal programs may help offset a reduction in benefits experienced during the summer, programs such as the Summer Food Service Program have historically only reached 17% of children participating in NSLP/SBP.[3] Households must instead absorb the benefit reduction through some other means. Recent research from Moffitt & Ribar (2016) suggests a form of intra-household nutritional transfers, by which the oldest children forego meals in order for younger children to maintain some level of food security. Households may also rely more heavily on debt in the form of credit cards or payday loans. For example, a 2012 survey from the Pew Charitable Trusts found that 69% of households using payday loans did so for a recurring expense, with 5% explicitly using the loan for food purchases.[4] The nature of our CE data do not allow a complete characterization of these different mechanisms; however, the magnitude of our estimated coefficient for expenditures on food at home is consistently small across a variety of specifications, which we interpret as evidence of a largely inflexible

[2]See Official USDA Food Plans, 2014.
[3]Data from the USDA, available at www.fns.usda.gov/sfsp/summer-meal-expansion.
[4]Survey results summarized at www.pewtrusts.org.

budget wherein households likely cannot maintain comparable levels of nutrition during periods of reduced government nutrition assistance.

Our analysis offers three important contributions to the existing literature and policy discussion. First, our results are not limited to a single government program but instead reflect responses to an overall reduction in generosity of benefits across possibly several nutrition assistance programs. As suggested in Millimet *et al.* (2010), nutrition assistance programs do not operate in a vacuum, and examining the isolated effect of a single program may offer misleading results.

Second, understanding how benefit *levels* (as opposed to program participation) affect overall household expenditures is highly relevant to current policy. For example, a recent Institute of Medicine report calls for "further research examining food security and access to a healthy diet among program participants and estimating the impact of SNAP benefits on these outcomes" (Caswell *et al.*, 2013). Our contribution to this literature is threefold: 1) causal estimates are more cleanly identified due to exogenous variation in benefit generosity induced by school breaks; 2) we consider other areas of household consumption that may also be affected when food budgets are (exogenously) tightened or loosened;[5] and 3) we estimate the response to a *decrease* in benefit generosity, which is arguably most relevant given current policy debates. Although our CE data do not allow a direct analysis of food security, our analysis of budget shares and household expenditures has implications for a household's ability to provide a healthy diet following a reduction in nutrition assistance.

Third, our analysis contributes directly to our understanding of SNAP-eligible and SNAP-participating household behaviors during summer months. As has been established in the literature, participation in NSLP/SBP tends to reduce food insecurity (Gundersen *et al.*, 2012), and conversely, food insecurity rates are higher and health

[5]Prior studies in this area focus largely on changes in *food* expenditures following an *increase* in SNAP benefits. In their survey article, Fraker (1990) estimate that households increase food expenditure by up to $0.47 on average for every dollar of SNAP benefits received. This upper bound has largely persisted in future work (Fox *et al.*, 2004).

outcomes lower for children during the summer (Nord & Romig, 2006; Franckle *et al.*, 2013; Baranowski *et al.*, 2014). Policies attempting to resolve these issues are actively being considered. For example, a recent USDA pilot program (Summer Electronic Benefit Transfer for Children) was specifically developed to test effects of increases in benefit levels among relevant SNAP households during summer break. But the full effects of these policies naturally depend on how households reallocate budgets during the summer months.

The remainder of the paper is organized as follows. Section 2 briefly reviews the relevant literature and provides additional details on the structure of SNAP as well as school breakfast and lunch programs. We discuss our data in Section 3, with econometric methods and results in Section 4. Section 5 concludes.

2 Background and Identification Strategy

Identification of the effects of SNAP and other programs is typically complicated due to endogenous and potentially misreported SNAP participation. We avoid these issues by: 1) exploiting exogenous changes in nutrition assistance levels due to the underlying design of U.S. nutrition assistance programs (specifically SNAP and SBP/NSLP); and 2) focusing on effects on the intensive margin among existing program participants. Specifically, we focus on SNAP-eligible and SNAP-participating households with SAC, which are automatically eligible to receive up to two free meals per day as part of the NSLP and SBP. We define "SNAP-eligible" as households with incomes below 185% FPL. Such households, even if not SNAP participants, are also eligible to receive free or reduced-price school meals. Notably, receipt of these additional food resources during the school year does not impact the amount of SNAP benefits allotted to these households.

The SBP, established as a temporary program by the Child Nutrition Act of 1966 and permanently authorized in 1975, is a federally funded program administered by in-

dividual states and overseen by the United States Department of Agriculture (USDA).[6] The program initially provided categorical grants to schools and was replaced with a per-meal subsidy in 1973. For 2014-2015, participating schools received a federal cash subsidy of $1.62 per free breakfast, $1.32 per reduced-price breakfast, and $0.28 per paid breakfast.[7]

The NSLP was officially established by the National School Lunch Act of 1946, although similar efforts have been in place since the Great Depression. Like the SBP, the NSLP provides federal support for school lunches; however, the NSLP includes both commodity support as well as a federal cash subsidy. In 2014-2015, schools received a cash subsidy of $2.98 per free lunch, $2.58 per reduced-price lunch, and $0.28 per paid lunch. Schools may also adopt a universal free breakfast and lunch program under the Community Eligibility Provision (CEP).[8] Funding levels are further increased by $0.02 per meal if a school's NSLP participation rate exceeds 60%, with additional support if the meals meet certain nutritional guidelines.

Under both the SBP and NSLP, students are eligible for free or reduced-price meals if their family incomes are below 130% of the FPL or between 130% and 185% of the FPL, respectively, and children of SNAP-participating households are automatically eligible for free school meals without any additional application or verification.[9] For some sense of the monetary values of school meals, Almada & Tchernis (2015) estimate that school meals can increase household food budgets by approximately $100 per child during a typical month in the school year. Comparatively, Nord & Prell (2011) and Beatty & Tuttle (2015) each examine variations in SNAP benefits following the 2009

[6]Our discussion of the SBP and NSLP is adapted largely from Hoynes & Schanzenbach (2015).

[7]Per-meal payments are $0.31 higher if a sufficiently high percentage of the school's population is eligible for free breakfasts.

[8]Details of a school's eligibility for CEP are discussed in Hoynes & Schanzenbach (2015). Importantly, schools seeking eligibility through the CEP must provide free breakfast and lunch to all students.

[9]Although SNAP-participating households are automatically eligible to receive free school meals, it is feasible that not all such households necessarily participate in NSLP/SBP. Nonetheless, Bartfeld (2013) reports that 90% of school-age children who receive SNAP benefits also participate in NSLP, with 72% participating in both NSLP and SBP.

American Reinvestment and Recovery Act (ARRA), which increased SNAP benefits by approximately $80 per month for a family of four. The monetary value of meals provided by school breakfast and lunch programs therefore far exceeds the temporary increase in benefits legislated by the ARRA.

Since SNAP households are automatically eligible for SBP and NSLP, the presence of school breaks acts as an exogenous (albeit anticipated) change in nutrition assistance benefits among SNAP-participating households with SAC. We exploit this exogenous reduction to identify the intensive margin effects of government nutrition assistance. Our focus on the intensive margin is similar to that of Almada & Tchernis (2015); however, they rely on variation in the proportion of SAC within households as a proxy for variation in SNAP benefit levels. Our identification strategy instead exploits variation in benefits during summer break, without a need for changes in household demographics.

3 The Consumer Expenditure Survey

Our data are drawn from multiple waves of the Consumer Expenditure Survey (CE) spanning 1996-2014. The CE is a two-component nationally representative sample of the U.S. civilian non-institutional population administered by the Bureau of Labor Statistics that provides detailed information on the spending behavior of all members of a household who make joint spending decisions, or consumer units (henceforth referred to as households). We use data from the Interview Survey (IS) component, which is a quarterly survey designed to collect information on relatively large expenditures, such as housing, transportation, major durable goods, and other categories of expenditures over the past three months. The CE consists of a rotating panel of over 7,000 households interviewed for five consecutive quarters. In addition to information on expenditures, the CE also collects data on household socio-demographic characteristics including household size, number of children in the household, age of the respondent

and of the children in the household, indicators for race, gender, marital status, current employment status, and household income, as well as the respondent's level of education. Lastly, the CE collects information on household welfare program participation, including SNAP receipt.

We are specifically interested in the longitudinal aspect of the quarterly Interview Survey. The five consecutive quarterly interviews consist of an initial intake survey primarily used to collect household demographic characteristics as well as up to four additional surveys used to collect information on household expenditures. We use these follow-up quarterly surveys to construct a panel of expenditure categories for each household. We use the month of interview to identify households that report expenditures during summer and non-summer quarters. For example, we can identify household expenditures during the months of May, June, and July by examining survey interviews conducted in the month of August. Similarly, households interviewed in September report their expenditures for the past three months (that is, expenditures during June, July, and August). The benefit of the longitudinal aspect of the CE data is that it allows us to compare expenditures for the same household during periods when children are mostly attending school to periods when children are mostly out of school.

Table 1 provides demographic summary statistics for the full sample and four subsamples of CE respondents who were observed during both summer and non-summer quarters. In this setting, the full sample (column 1) corresponds to all respondents who were interviewed in August (summer consisting of May, June, and July) and at least one non-summer quarter.[10] Our four subsamples include: (1) households with school-age children (SAC); (2) households with SAC who were at or below 185% of the federal poverty line (FPL) over the entire panel; (3) households with SAC who

[10]For some schools, particularly in the north, summer break extends from mid-June to early September. However, summer break for most schools in the south and west begins in late May or early June and extends through early or mid-August. Including August as a summer month generates significant spikes in Education expenditures during the summer, which suggests that school-age children of most households in our sample returned to school in August.

reported participating in SNAP over the entire panel; and (4) households who reported participating in SNAP and who were at or below 185% FPL over the entire panel. Although the low-income sample (at or below 185% FPL) includes many households who are not receiving SNAP benefits, school-age children from households at or below 185% FPL are eligible to receive reduced-priced school meals, and school-age children from households at or below 130% FPL are eligible to receive free school meals. Note also that our measure of household income incorporates all sources of income, including SNAP benefits. Not surprisingly, we note from Table 1 that low-income households with SAC and SNAP households with SAC have lower incomes, larger households with more children, are more likely to be headed by a female, are non-white, and are less educated compared to the full sample of households or all households with SAC.

Table 1

Our study considers several categories of quarterly household expenditures covering both food and non-food related goods and services. Specifically, we construct the following ten categories of expenditure: (1) Food at Home (which includes SNAP expenditures); (2) Food away from Home; (3) Education and Enrichment; (4) Entertainment; (5) Housing; (6) Utilities; (7) Transportation; (8) Health Care; (9) Alcohol and Tobacco; and (10) All Other Expenditures. Table 2 provides a more detailed description of each expenditure category.

Table 2

Tables 3 and 4 provide seasonally-adjusted household expenditure and budget share summary statistics, respectively, for each of the ten expenditure categories. Note that, since our identification strategy exploits the summer school break as an exogenous change in generosity of government nutrition benefits, we cannot adjust for seasonality simply by including indicator variables for each season in our overall regression analysis.

As an alternative, we form seasonally adjusted expenditures from a first-stage regression of expenditures on fixed effects for each season, which we estimate using non-SNAP eligible households. We then adjust observed expenditures for all households (including SNAP households) net of these predicted seasonal effects, which reflects a seasonally adjusted expenditure level. We perform this process separately for each of the ten categories of expenditures.

Table 3

In dollars of expenditures, we observe that low-income households and SNAP households spend less across all expenditure categories compared to all households with SAC. We also observe small decreases in expenditures on food at home among households with SAC, but small increases among SNAP-participating households. Expenditure on education and enrichment is significantly higher during summer months for all households with SAC, but lower among low-income households. Similarly, spending on entertainment is significantly lower during the summer for low-income and SNAP households, while the full sample of households with SAC spends significantly more on entertainment during the summer versus non-summer.

Table 4

In terms of budget shares, Table 4 shows a significantly higher share of household budgets spent on food at home among SNAP-participating households relative to all other households, with similar relative differences on shelter, utilities, and education/enrichment. Conversely, "other" expenditures constitute a much larger budget share among all households with SAC relative to low-income and SNAP-participating households. Differences between summer and non-summer months are also more pronounced when examining budget shares versus raw expenditures. Here, we observe increases in the expenditure share of food at home during summer versus non-summer

across all sample groups, with particularly large increases for low-income and SNAP households. Conversely, the expenditure share for food away from home decreases during the summer for all groups considered. We also observe a significant decrease in the share of expenditures on entertainment for low-income and SNAP households, with a significant increase among all households with SAC.

4 Effects of Benefit Generosity on Expenditures

We are broadly interested in the effect of changes in nutrition assistance benefits on the distribution of expenditures for a household. To estimate this response more formally, we first consider several fixed effects models with expenditures or budget shares as our outcome of interest. This analysis treats each category of expenditures separately but easily accommodates unobserved, time-invariant household factors. We then extend this analysis to allow for the inherent correlation across categories of expenditure shares; however, incorporating household fixed effects into this analysis is less straightforward. Details of these estimators and the results are discussed throughout the remainder of this section.

4.1 Fixed Effects Analysis

Denoting our outcome of interest by y_{it}, our fixed effects regression models are of the form

$$y_{it} = \beta x_{it} + \gamma b_{it} + \nu_i + \varepsilon_{it}, \tag{1}$$

where x_{it} denotes a vector of time-varying household characteristics, ν_i represents a household fixed effect, and b_{it} denotes an indicator variable set to 1 if the expenditures cover summer months and 0 otherwise. We estimate equation 1 separately for each category of household expenditures, where we classify summer expenditures as those during the months of May, June, and July ($b_{it} = 1$ if individual i was interviewed in

August).[11]

Estimates of γ for expenditure in dollars (logged) and budget shares are presented in Tables 5 and 6, respectively.[12] In both tables, column 1 presents results among all households with school-aged children (SAC), column 2 reflects results among households with SAC and with incomes below 185% of the FPL, results specifically for SNAP households with SAC are presented in column 3, and column 4 further restricts the sample to SNAP households also with incomes below 185% of the FPL. All of our regressions include controls for age, household size, number of children (0-17 years of age), employment status, logged income and logged income squared, as well as year indicators. Standard errors are clustered at the household level.

Table 5

The results examining seasonally-adjusted logged expenditures (Table 5) reveal statistically insignificant increases in food at home expenditures during the summer across all samples. Although statistically insignificant, this estimated effect increases dramatically as we consider low-income households (1.1% increase), SNAP households (2.9% increase), and low-income SNAP households (3.9% increase). We also find that expenditures on education and enrichment decrease substantially across all sample groups, with particularly large decreases for SNAP households (decreases from 21% to 19%). Expenditures on entertainment fall by 5.9% for low-income households and by nearly 15% for SNAP households during summer months. Interestingly, we find that alcohol and

[11] An alternative analysis could consider all households with an interaction between SNAP participation and summer months. This type of analysis, however, is subject to at least two central concerns: 1) SNAP participation is known to be heavily misreported, and we can mitigate to some extent the effects of misreporting by focusing our analysis solely on SNAP households; and 2) in a fixed effects setting and since the timing of treatment does not vary across individuals, estimates for this interaction term would only be identified for those who participate in SNAP during the summer and the pre or post-summer quarter but who also switch SNAP status throughout the year. Our identification strategy therefore complicates the interpretation and generalizability of an analysis based on the full sample, and we instead focus our analysis separately on SNAP households and other subsamples. Results based on SNAP "switchers" are nonetheless available upon request.

[12] Estimates based on non-seasonally-adjusted expenditures and budget shares are presented in the supplemental appendix.

tobacco expenditures increase by almost 10% during summer months for low-income households (double that of all households with SAC), but find an insignificant negative effect among SNAP households. Finally, we find that expenditures on utilities increase across all groups, with larger increases among the lower income samples.

Table 6

Based on our fixed effects analysis of expenditure shares (Table 6), we find that the share on food at home significantly increases during summer for low-income and SNAP-participating households. Specifically, the share spent on food at home increases by 0.38 percentage points for low-income households and 0.84 percentage points for SNAP-participating households. Similar to the logged expenditure results, we find that food away from home expenditure share decreases for all households with SAC, although this is imprecisely estimated among SNAP households. In regards to education and enrichment expenditure share, the results are somewhat mixed, with a relatively large and statistically significant increase among all households with SAC (0.20 percentage points) and among SNAP households with SAC (0.26 percentage points), but with much smaller magnitudes in the other samples. Regarding entertainment, the results show a significant increase in budget share of 0.17 percentage points among all households with SAC, with a significant decrease of up to 0.52 percentage points among SNAP-participating households with SAC. We also find statistically significant increases in the share of expenditures devoted to utilities, increases in expenditure shares on health (although insignificant among SNAP-participating households), and large decreases in shares on "other" expenditures.

Collectively, our fixed effects analysis suggests that SNAP-participating households with SAC must make significantly larger adjustments to their budgets during the summer months relative to other households with SAC (even other low-income households). In particular, expenditures on food at home dramatically increase among SNAP-participating households, funded by a large reduction in entertainment and "other"

expenditures.

4.2 Fractional Multinomial Logit Analysis

Naturally, budget shares for a household are related across categories, as an increase in one share requires a decrease in some other share(s). To more formally accommodate this interdependency across shares, we estimate the effects of interest using a fractional multinomial logit (FMlogit) model (Papke & Wooldridge, 1996; Mullahy, 2011). Denoting household i's budget share on the kth category of expenditure at time t by s_{ikt}, we assume

$$\mathrm{E}\left[s_{ikt}|z_{it}\right] = \xi_{kt}\left(z_{it};\beta\right) = \frac{\exp\left(z_{it}\beta_k\right)}{\sum_{m=1}^{K}\exp\left(z_{it}\beta_m\right)}, \text{ and} \tag{2}$$

$$\sum_{k=1}^{K}\mathrm{E}\left[s_{ikt}|z_{it}\right] = 1, \forall t, \tag{3}$$

with the identifying normalization, $\beta_K = 0$. Here, z_{it} denotes a vector of household characteristics including x_{it} and b_{it} from equation 1. Importantly, the FMlogit specification accommodates the requirement that shares across all expenditure categories must sum to one, with no restrictions that individual shares be strictly non-zero or less than one. Denoting by s^*_{ikt} the observed budget shares, the resulting quasi-likelihood function is

$$Q(\beta) = \prod_{i=1}^{N}\prod_{t=1}^{T}\prod_{k=1}^{K}\xi_{kt}\left(x_{it};\beta\right)^{s^*_{ikt}}. \tag{4}$$

Results are presented in Table 7. Coefficient estimates are relative to the "shelter" expenditure category and therefore difficult to interpret, both in terms of sign and magnitude. We therefore present estimated effects from a discrete change in non-summer to summer (at mean values of other covariates) in brackets. Similar to a linear probability model, the estimates in brackets are interpreted as the predicted percentage point change (in hundredths) in the share of a given category of expenditure. For example, the

estimate of 0.007 for "Food at Home" among SNAP-participating households implies that SNAP-participating households increase the share of their budget spent on food at home by 0.7 percentage points during the summer. On a base of 23%, this represents a 3% increase, similar to our initial findings when examining logged expenditures in Table 5. This is funded in-part by a large and significant reduction in entertainment, with SNAP-participating households reducing the budget share in this area by between 0.6 and 0.7 percentage points (or nearly 17%), as well as a large but statistically insignificant reduction in "other" expenditures of between 0.4 and 0.6 percentage points (or nearly 5%).

Table 7

4.3 Fractional Multinomial Logit Net of Fixed Effects

Note that our estimation of β in equation 4 is essentially a pooled cross-sectional analysis as it is infeasible to remove individual fixed effects via conditioning on the sum of outcomes over time as in, for example, a fixed effects logistic model. In order to better exploit the CE panel structure within the FMlogit model, we consider an additional analysis that intuitively accommodates household-specific, time-invariant factors with a two-step estimation process. In step one, we estimate the standard fixed effects model as reflected in equation 1. From this, we obtain predicted values of the individual fixed effects for each expenditure category, denoted $\hat{\nu}_{ik}$, and we re-estimate the FMlogit models including $\hat{\nu}_{ik}$ as an independent variable for each person and each expenditure category.

Results based on this additional analysis are summarized in Table 8 and largely support our initial FMlogit analysis. With regard to expenditure share on "food at home," the magnitude of the estimated reduction during the summer is largely unchanged at 0.7 percentage points among SNAP-participating households, although these estimates are less precisely estimated relative to Table 7. The magnitude of reduction in

entertainment expenditures is also similar. Notable differences between these results and our initial FMlogit estimates include the magnitude of the change in expenditures on health and the change in "other" expenditures. Specifically, we now estimate a large and significant increase in expenditures on health of 0.7 percentage points among SNAP-participating households compared to 0.4 percentage points in FMlogit results without fixed effects, along with a decrease of 1 percentage point (though statistically insignificant) in other expenditures.

Table 8

4.4 Influence of Misreported SNAP Participation

A common concern in this literature is the potential misreporting of SNAP participation. Since we focus our analysis on SNAP-participating households, rather than including SNAP participation as a treatment indicator, our analysis is not subject to misreported treatment as in Almada *et al.* (2016); however, misreported participation may still introduce some selection bias since we limit the sample only to reported SNAP participants. To examine the sensitivity of our findings to such misreporting, we consider a Monte Carlo study in which we randomly assign SNAP-eligible households as SNAP participants. Specifically, we assume that some portion of SNAP-eligible households misreport their SNAP participation status, stating that they do not participate in SNAP when in fact they do participate. We then simulate a new set of SNAP participants, consisting of all reported participants and some percentage, ρ, of additional SNAP-eligible households. We consider values of ρ ranging from 10% to 100% in 10% increments. The results offer some evidence as to the sensitivity of our estimates to potentially misreported SNAP participation.

For each value of ρ, we simulate 200 samples of SNAP-participating households, and we re-estimate our fixed effects and FMlogit models for each simulated sample. Denoting each individual sub-sample by k, we form our point estimate as the simple

average across all $M = 200$ simulations,

$$\hat{\beta}_M = \frac{1}{M} \sum_{k=1}^{M} \hat{\beta}_k.$$

We estimate standard errors following Rubin (1987) and Vassilopoulos *et al.* (2011):

$$SE_{\hat{\beta}_M} = \sqrt{\frac{1}{M} \sum_{k=1}^{M} \hat{V}_{\hat{\beta}_k} + \left(1 + \frac{1}{M}\right) \hat{B}_M},$$

where $\hat{V}_{\hat{\beta}_k}$ denotes the estimated variance of $\hat{\beta}$ within each kth sub-sample, and $\hat{B}_M$ denotes the estimated variance across all M simulations,

$$\hat{B}_M = \frac{1}{M-1} \sum_{k=1}^{M} \left(\hat{\beta}_k - \hat{\beta}_M\right).$$

Results of our fixed effects analysis for household expenditures are summarized in Table 9, with results of our FMlogit analysis for budget shares in Table 10. *Ex ante*, we expect our initial results to be larger in absolute value if households who report SNAP participation are the neediest (or most likely to benefit) households among the SNAP-eligible group. Trends in our estimated coefficients for food at home are consistent with this expectation, where the estimated increase in the expenditure shares (Table 10) slightly decreases in magnitude as we allow for increasing prevalence of misreporting. When allowing for misreporting, we therefore conclude that the true increase in expenditures on food at home is likely smaller than originally estimated, although still positive and statistically significant based on the FMlogit results.

Tables 9 and 10

5 Conclusion

This paper identifies the intensive margin effects of nutrition assistance benefits on household expenditures by exploiting two specific aspects of government nutrition assistance programs: 1) children in SNAP households are automatically eligible for school breakfast and lunch programs; and 2) such school meals are necessarily unavailable during extended school breaks. Based on data from the Consumer Expenditure Survey, we then estimate the effects of interest by comparing expenditures in summer versus non-summer months, with a focus on SNAP-participating households with SAC.

Our fixed effects and FMlogit results are consistent in that we find significant increases in expenditures on food at home during the summer among SNAP-participating households relative to other households. These increases appear to be funded through a reduction in entertainment and "other" expenditures. Households that do no participate in SNAP may still receive free or reduced-price school meals. Our results among all low-income households suggest qualitatively similar effects, albeit of lesser magnitude, relative to SNAP participants.

The results suggest at least three possible avenues by which SNAP-participating households absorb the reduction in benefits. First, since the timing of the reduction in nutrition assistance benefits is known, SNAP-participating households may save in advance in order to smooth food consumption during the summer break. Such savings may derive from earned income tax credits (EITC) or other rebates received after a household files their taxes; however, the literature in this area suggests that a large portion of EITC is used relatively soon after receipt, rather than saved (Barrow & McGranahan, 2000). Moreover, saving behavior or a similar argument that households overconsume food during the school year is inconsistent with the growing evidence documenting increased food insecurity among children during the summer.

Second, due in part to the temporary nature of the reduction in benefits, households may receive additional support during the summer in the form of local assistance pro-

grams or other family/neighborhood support. For example, the USDA's Summer Food Service Program was designed specifically to offset a reduction in benefits experienced during the summer; however, for the bulk of our time period covered in our analysis, this program reached just 17% of children participating in NSLP/SBP.

Third, households may not have sufficient flexibility in their budget to absorb a meaningful reduction in nutrition assistance benefits, in which case households simply do not consume the equivalent food supply during the summer as they did during the school year. While we cannot definitively rule out any of these explanations, the low average income of SNAP-participating households suggests that some combination of additional summer support and overall reduction in food consumption likely occurs.

Combining our regression coefficients with observed expenditure levels, we estimate that SNAP households with SAC increase expenditures on food at home by less than $15 per month on average. With between 2 and 3 children per household (see Table 1), this amounts to less than $2 per child per week. For some context, the USDA estimated $32 per week to feed a 6-8 year old child in a household of 4 as part of its thrifty food plan (TFP) in July 2014.[13] The USDA describes the TFP as providing "a representative healthful and minimal cost meal plan that shows how a nutritious diet can be achieved with limited resources" and is based on national dietary guidelines, food prices paid by low-income households, and data on food consumption and nutrient content.[14] Relatedly, Almada & Tchernis (2015) estimate the value of SBP/NSLP to be $25 per child per week. If households are attempting to cover the cost of meals otherwise provided by school meal programs, then the magnitude of our estimates suggests that SNAP households are spending well below the minimum requirements for a nutritious diet and well below what would be required to fully compensate for the value of school meals.

If we instead assume that 50% of the food burden previously covered by school meal

[13]Food cost reports available at www.cnpp.usda.gov/USDAFoodPlansCostofFood/reports.
[14]2006 Thrifty Food Plan description available at www.cnpp.usda.gov.

programs could be provided through other local programs and family/neighborhood support, the average household would still be responsible for around $12 per child per week. Our estimate of a $2 increase per child per week in food expenditures therefore remains well below the required increase in expenditures to compensate for the absence of school meals. With these statistics in mind, the magnitude of our estimates is at least suggesting of limited flexibility in household budgets among SNAP participants with SAC, and are consistent with the rise in food insecurity among children and low-income households during the summer (Nord & Romig, 2006; Franckle *et al.*, 2013; Baranowski *et al.*, 2014). From a policy perspective, our results call for a more comprehensive view of federal nutrition assistance and highlight the difficulty of low-income households to adjust to piecemeal policy changes.

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Table 1: **Summary of Household Demographics**[a]

		Households with SAC		SNAP Households with SAC	
	Full Sample	All	IPR $\leq$ 1.85	Always SNAP	IPR $\leq$ 1.85
HH Income ($)	53226	65141	17392	20862	16528
	(55947)	(63040)	(13615)	(20456)	(11248)
SNAP Benefits ($)	121	249	685	2712	2740
	(665)	(1018)	(1594)	(2201)	(2172)
HH Size	2.53	4.13	4.31	4.34	4.33
	(1.46)	(1.26)	(1.46)	(1.56)	(1.55)
Number of Children	0.64	2.32	2.33	2.57	2.61
	(1.05)	(1.00)	(1.13)	(1.21)	(1.22)
Female (%)	49.86	51.73	62.58	79.49	81.73
Black (%)	12.33	15.24	24.06	38.29	39.49
Hispanic (%)	7.45	11.76	17.24	18.32	17.52
$\leq$ High School (%)	42.62	40.91	61.69	66.06	68.28
Employed (%)	68.44	83.72	70.88	57.33	54.23
SNAP (%)	6.46	9.60	25.90	100	100
IPR $\leq$ 185 (%)	36.14	37.43	100	91.48	100
Observations	148,422	36,914	11,691	2,840	2,514

[a]Weighted means using Quarterly Survey Interviews from 1996-2014 Consumer Expenditure Survey (CE). Income and SNAP Benefits are annualized and are expressed in nominal dollars. Children aged 6-17 are considered to be of school-age. SNAP participation is self-reported from 1996-2003 and imputed (by BLS) for years 2004-2014.

Table 2: **Description of Expenditure Categories**

	Category	Description
1	Food At Home	Food (not including alcohol) purchased at grocery stores and convenience stores for home consumption.
2	Food Away From Home	Food purchased at school (school meals) or employment; food at catered events; food during out of town trips; dining out at restaurants (not including alcohol).
3	Education and Enrichment	Recreational lessons, tutoring, and other instruction. Babysitting, nursery school and daycare centers. School tuition. School-related books, supplies and equipment. Books and magazines (not related to school). Private school transportation.
4	Entertainment	Admission fees for entertainment activities, (movie, theater, concert, sporting events); Sports-related items and general sports equipment; Personal electronic equipment. Membership fees for country clubs, health clubs, or other recreational organizations.
5	Housing	Shelter expenditures in home city, including mortgage principle and interest for owned home and/or vacation home, rents, insurance, taxes, and maintenance.
6	Utilities	Natural gas, electricity, telephone services, water and other public service, and fuel oil and other fuels.
7	Transportation	Vehicle maintenance and repair, vehicle insurance, vehicle fee, public transportation, gasoline and other motor fuel.
8	Health Care	Health insurance, medical services (Physician, dental, eye-care etc.), and medical care (Lab tests, x-rays, hospital stay, etc.)
9	Alcohol and Tobacco	Alcoholic beverages and all tobacco and smoking supplies and products from grocery/convenience store and/or restaurants and bars.
10	All Other	All other expenditures (Household operations, household furnishing and appliances, clothing, footwear, jewelry, personal care items, etc.)

Table 3: **Summary of Household Expenditures**[a]

	Households (HH) with School Age Children (SAC)				SNAP Households with SAC			
	All HH with SAC		IPR $\leq$ 1.85		Always SNAP		Always SNAP & IPR $\leq$ 1.85	
	Summer Qtr	Non-summer	Summer Qtr	Non-summer	Summer Qtr	Non-summer	Summer Qtr	Non-summer
Food at Home	1457	1465	1231*	1257	1211	1203	1189	1180
	(800)	(816)	(712)	(735)	(762)	(723)	(766)	(723)
Food Away	534***	557	272	287	180	195	161	172
	(760)	(722)	(653)	(438)	(301)	(319)	(249)	(280)
Ed & Enrichment	553***	479	175	186	107	101	79	90
	(2250)	(1494)	(812)	(862)	(458)	(518)	(303)	(502)
Entertainment	743***	690	309**	340	215***	260	184***	235
	(1691)	(1378)	(747)	(741)	(299)	(442)	(214)	(403)
Shelter	2669	2666	1639***	1751	1427	1481	1330	1379
	(2687)	(2553)	(1588)	(1795)	(1339)	(1275)	(1308)	(1209)
Utilities	1020***	980	801***	768	762	731	729	701
	(589)	(535)	(483)	(444)	(506)	(455)	(489)	(442)
Transportation	2518	2490	1433	1498	989	1027	901	926
	(4851)	(4950)	(3395)	(3496)	(2184)	(2284)	(2069)	(2209)
Health	651**	628	297	305	144	142	126	117
	(999)	(974)	(610)	(698)	(339)	(390)	(301)	(278)
Alc. & Tobacco	153	157	123	124	130	141	125	133
	(269)	(283)	(245)	(241)	(237)	(285)	(225)	(264)
Other	2961*	3035	1060***	1139	846	900	717	742
	(3618)	(3703)	(1326)	(1367)	(931)	(1000)	(796)	(803)
Observations	10,161	26,753	3,156	8,535	774	2,066	684	1,830

[a]Weighted means and standard deviations in parentheses using Quarterly Survey Interviews from 1996-2014 Consumer Expenditure Survey (CE). Quarterly expenditures are expressed in nominal dollars and are seasonally adjusted. Summer consists of expenditures that fall during the months of May, June, and July (Interviews conducted in the month of August). Non-Summer months are all other months. Children aged 6-17 are considered to be of school-age (SAC). SNAP participation is self-reported from 1996-2003 and imputed (by BLS) for years 2004-2014. ***, **, * indicate summer vs. non-summer means for each sub-sample are statistically different at $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

Table 4: **Summary of Household Budget Shares**[a]

	Households (HH) with School Age Children (SAC)				SNAP Households with SAC			
	All HH with SAC		IPR $\leq$ 1.85		Always SNAP		Always SNAP & IPR $\leq$ 1.85	
	Summer Qtr	Non-summer	Summer Qtr	Non-summer	Summer Qtr	Non-summer	Summer Qtr	Non-summer
Food at Home	14.58	14.43	20.38**	19.84	23.77	22.94	24.73	23.94
Food Away	3.91***	4.16	3.44**	3.62	2.84	2.97	2.77	2.90
Ed & Enrichment	2.84*	2.71	1.79	1.79	1.48	1.24	1.31	1.21
Entertainment	4.92*	4.82	3.89**	4.14	3.62***	4.14	3.52***	4.14
Shelter	21.48	21.55	23.53	23.91	24.13	24.83	24.25	24.96
Utilities	9.91***	9.44	13.01***	12.06	14.45**	13.55	14.80**	13.92
Transportation	15.43	15.41	14.27	14.62	12.06	12.39	11.78	11.99
Health	4.79**	4.64	3.75	3.59	2.21	2.03	2.16	1.94
Alc. & Tobacco	1.47	1.48	1.94	1.90	2.40	2.46	2.46	2.52
Other	20.64***	21.35	13.99***	14.52	13.02	13.46	12.21	12.49
Observations	10,161	26,753	3,156	8,535	774	2,066	684	1,830

[a]Weighted means using Quarterly Survey Interviews from 1996-2014 Consumer Expenditure Survey (CE). Quarterly expenditures shares are expressed as a percent of total household expenditure and are seasonally adjusted. Summer consists of expenditures that fall during the months of May, June, and July (Interviews conducted in the month of August). Non-Summer months are all other months. Children aged 6-17 are considered to be of school-age. SNAP participation is self-reported from 1996-2003 and imputed (by BLS) for years 2004-2014. ***, **, * indicate summer vs. non-summer means for each sub-sample are statistically different at $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

Table 5: **Fixed Effects Results for Household Expenditures**[a]

	Households with SAC		SNAP HH with SAC	
	All HH	IPR $\leq$ 1.85	Always SNAP	IPR $\leq$ 1.85
Food at Home	0.002	0.011	0.029	0.039
	(0.006)	(0.015)	(0.046)	(0.050)
Food Away	-0.097***	-0.056	-0.080	-0.085
	(0.019)	(0.040)	(0.086)	(0.092)
Ed & Enrichment	-0.186***	-0.159***	-0.189***	-0.211***
	(0.024)	(0.039)	(0.075)	(0.080)
Entertainment	0.020	-0.059**	-0.146**	-0.150**
	(0.013)	(0.029)	(0.065)	(0.071)
Shelter	-0.005	-0.056***	-0.063	-0.058
	(0.009)	(0.020)	(0.054)	(0.058)
Utilities	0.041***	0.068***	0.068**	0.064**
	(0.005)	(0.012)	(0.028)	(0.031)
Transportation	-0.007	-0.041*	-0.070	-0.050
	(0.012)	(0.025)	(0.06)	(0.063)
Health	0.013	0.002	-0.030	-0.006
	(0.018)	(0.037)	(0.073)	(0.078)
Alc. & Tobacco	0.057***	0.096***	-0.029	0.003
	(0.019)	(0.034)	(0.060)	(0.065)
Other	-0.034***	-0.065***	-0.097**	-0.095**
	(0.007)	(0.019)	(0.042)	(0.047)
Observations	36,914	11,691	2,840	2,514

[a]Analysis limited to households with school-aged children. Each coefficient reflects a separate individual fixed effects regression on seasonally adjusted, logged expenditure that includes controls for age, household size, number of children (0-17 years of age), employment status, logged income and logged income squared, and year indicators. Robust standard errors clustered at the household level in parenthesis *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 6: **Fixed Effects Results for Household Budget Share**[a]

	Households with SAC		SNAP HH with SAC	
	All HH	IPR $\leq$ 1.85	Always SNAP	IPR $\leq$ 1.85
Food at Home	0.075	0.384**	0.837*	0.830*
	(0.07)	(0.175)	(0.451)	(0.496)
Food Away	-0.227***	-0.118*	-0.185	-0.204
	(0.037)	(0.069)	(0.147)	(0.137)
Ed & Enrichment	0.198***	0.036	0.261**	0.179
	(0.063)	(0.087)	(0.132)	(0.130)
Entertainment	0.167***	-0.130	-0.425***	-0.522***
	(0.053)	(0.080)	(0.143)	(0.150)
Shelter	-0.216**	-0.577***	-0.566	-0.507
	(0.094)	(0.197)	(0.453)	(0.490)
Utilities	0.410***	0.778***	0.776***	0.709**
	(0.044)	(0.107)	(0.264)	(0.293)
Transportation	0.058	-0.152	-0.055	0.109
	(0.154)	(0.268)	(0.508)	(0.507)
Health	0.208***	0.207**	0.203	0.177
	(0.049)	(0.091)	(0.125)	(0.135)
Alc. & Tobacco	-0.036*	0.021	-0.093	-0.064
	(0.02)	(0.048)	(0.117)	(0.128)
Other	-0.637***	-0.450***	-0.753**	-0.707*
	(0.093)	(0.165)	(0.343)	(0.364)
Observations	36,914	11,691	2,840	2,514

[a]Analysis limited to households with school-aged children. Each coefficient reflects a separate individual fixed effects regression on seasonally adjusted expenditure share that includes controls for age, household size, number of children (0-17 years of age), employment status, logged income and logged income squared, and year indicators. Expenditure share is multiplied by 100 to ease interpretation. Robust standard errors clustered at the household level in parenthesis *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 7: **FMlogit Results for Household Budget Share**[a]

	Households with SAC		SNAP HH with SAC	
	All HH	IPR $\leq$ 1.85	Always SNAP	IPR $\leq$ 1.85
Food at Home	0.015**	0.046***	0.064**	0.058*
	(0.007)	(0.013)	(0.031)	(0.033)
	[0.001]	[0.004]	[0.007]	[0.006]
Food Away	-0.055***	-0.018	-0.025	-0.031
	(0.010)	(0.023)	(0.054)	(0.055)
	[-0.003]	[-0.002]	[-1.30E-03]	[-1.20E-03]
Ed & Enrichment	0.072***	0.072	0.248**	0.157
	(0.023)	(0.049)	(0.099)	(0.109)
	[0.001]	[1.00E-03]	[0.002]	[1.30E-03]
Entertainment	0.024*	-0.040*	-0.112**	-0.140***
	(0.012)	(0.022)	(0.045)	(0.048)
	[7.70E-04]	[-0.003]	[-0.006]	[-0.007]
Shelter	Base Category for Coefficients			
	[-1.80E-03]	[-0.004]	[-0.007]	[-5.90E-03]
Utilities	0.051***	0.089***	0.094***	0.084***
	(0.006)	(0.013)	(0.029)	(0.031)
	[0.004]	[0.008]	[0.008]	[0.007]
Transportation	0.016	0.014	0.017	0.018
	(0.012)	(0.023)	(0.051)	(0.054)
	[0.001]	[-0.001]	[-0.001]	[-7.20E-04]
Health	0.045***	0.067**	0.142**	0.158**
	(0.012)	(0.028)	(0.069)	(0.075)
	[0.002]	[0.003]	[0.004]	[0.004]
Alc. & Tobacco	-0.007	0.044	0.010	0.016
	(0.016)	(0.030)	(0.060)	(0.065)
	[-2.50E-04]	[4.50E-04]	[-5.10E-04]	[-2.10E-04]
Other	-0.024***	-0.016	-0.009	-0.005
	(0.007)	(0.016)	(0.035)	(0.040)
	[-0.006]	[-0.006]	[-0.006]	[-0.004]
Observations	36,914	11,691	2,840	2,514

[a]Analysis limited to households with school-aged children. Each column reflects a separate FM-logit regression that includes controls for age, household size, number of children (0-17 years of age), employment status, logged income and logged income squared, and year indicators. Coefficients are relative to "shelter" expenditures. Robust standard errors clustered at the household level in parenthesis. Estimated discrete changes in brackets. SAC denotes school-age children, IPR denotes income to poverty line ratio, and SNAP denotes households with self-reported SNAP participation across all interview waves. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 8: **FMlogit Results for Household Budget Share Net of FE**[a]

	Households with SAC		SNAP HH with SAC	
	All HH	IPR $\leq$ 1.85	Always SNAP	IPR $\leq$ 1.85
Food at Home	0.016**	0.042***	0.057*	0.054
	(0.007)	(0.013)	(0.031)	(0.033)
	[0.001]	[0.004]	[0.007]	[0.007]
Food Away	-0.054***	-0.019	-0.053	-0.039
	(0.010)	(0.022)	(0.053)	(0.053)
	[-0.003]	[-0.001]	[-2.20E-03]	[-1.70E-03]
Ed & Enrichment	0.082***	0.057	0.115	0.141
	(0.025)	(0.051)	(0.102)	(0.106)
	[0.001]	[6.00E-04]	[0.001]	[5.70E-04]
Entertainment	0.029**	-0.035	-0.109**	-0.139***
	(0.012)	(0.022)	(0.043)	(0.045)
	[9.60E-04]	[-0.002]	[-0.005]	[-0.007]
Shelter	Base Category for Coefficients			
	[-2.00E-03]	[-0.004]	[-0.003]	[-2.60E-03]
Utilities	0.053***	0.086***	0.077***	0.069**
	(0.006)	(0.012)	(0.028)	(0.030)
	[0.005]	[0.007]	[0.007]	[0.006]
Transportation	0.017	0.009	0.012	0.018
	(0.013)	(0.024)	(0.053)	(0.056)
	[0.001]	[-0.001]	[-2.70E-04]	[-7.80E-04]
Health	0.048***	0.066**	0.141**	0.128
	(0.012)	(0.028)	(0.072)	(0.081)
	[0.002]	[0.003]	[0.007]	[0.007]
Alc. & Tobacco	-0.002	0.046	0.002	0.010
	(0.016)	(0.029)	(0.057)	(0.061)
	[-1.40E-04]	[4.30E-04]	[-2.10E-04]	[-5.40E-04]
Other	-0.022***	-0.015	-0.038	-0.033
	(0.007)	(0.016)	(0.034)	(0.038)
	[-0.007]	[-0.007]	[-0.011]	[-0.010]
Observations	36,914	11,691	2,840	2,514

[a]Analysis limited to households with school-aged children. Each column reflects a separate FMlogit regression that controls for predicted individual fixed effects for each expenditure category in addition to controls for age, household size, number of children (0-17 years of age), employment status, logged income and logged income squared, and year indicators. Coefficients are relative to "shelter" expenditures. Robust standard errors clustered at the household level in parenthesis. Estimated discrete changes in brackets. SAC denotes school-age children, IPR denotes income to poverty line ratio, and SNAP denotes households with self-reported SNAP participation across all interview waves. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 9: **SNAP Participation Misreporting Simulations for Household Expenditures**[a]

	Percent of Additional SNAP Eligible Households Simulated to Receive Benefits									
	10	20	30	40	50	60	70	80	90	100
Food at Home	0.0133	0.0125	0.0118	0.0113	0.0110	0.0104	0.0102	0.0099	0.0096	0.0096
	(0.0287)	(0.0248)	(0.0225)	(0.0211)	(0.0202)	(0.0197)	(0.0195)	(0.0193)	(0.0192)	(0.0192)
Food Away	-0.0105	-0.0180	-0.0249	-0.0256	-0.0262	-0.0254	-0.0251	-0.0246	-0.0247	-0.0245
	(0.0657)	(0.0598)	(0.0550)	(0.0520)	(0.0502)	(0.0489)	(0.0482)	(0.0478)	(0.0477)	(0.0476)
Ed & Enrichment	-0.1659***	-0.1643***	-0.1586***	-0.1607***	-0.1588***	-0.1578***	-0.1577***	-0.1586***	-0.1581***	-0.1581***
	(0.0603)	(0.0557)	(0.0516)	(0.0490)	(0.0470)	(0.0458)	(0.0452)	(0.0448)	(0.0446)	(0.0446)
Entertainment	-0.1094**	-0.0952**	-0.0862**	-0.0822**	-0.0792**	-0.0778**	-0.0773**	-0.0767**	-0.0766**	-0.0766**
	(0.0496)	(0.0448)	(0.0413)	(0.0388)	(0.0375)	(0.0365)	(0.0359)	(0.0356)	(0.0355)	(0.0355)
Shelter	-0.0558	-0.0488	-0.0438	-0.0417	-0.0397	-0.0390	-0.0386	-0.0386	-0.0385	-0.0386
	(0.0367)	(0.0322)	(0.0296)	(0.0275)	(0.0265)	(0.0258)	(0.0254)	(0.0252)	(0.0251)	(0.0251)
Utilities	0.0822***	0.0802***	0.0799***	0.0786***	0.0787***	0.0787***	0.0786***	0.0787***	0.0788***	0.0788***
	(0.0212)	(0.0187)	(0.0171)	(0.0162)	(0.0154)	(0.0151)	(0.0148)	(0.0147)	(0.0147)	(0.0147)
Transportation	-0.0528	-0.0576	-0.0621*	-0.0625*	-0.0627**	-0.0627**	-0.0626**	-0.0628**	-0.0629**	-0.0628**
	(0.0425)	(0.0382)	(0.0353)	(0.0335)	(0.0320)	(0.0312)	(0.0307)	(0.0305)	(0.0304)	(0.0303)
Health	-0.0348	-0.0142	-0.0025	0.0009	0.0080	0.0095	0.0118	0.0122	0.0132	0.0130
	(0.0598)	(0.0542)	(0.0500)	(0.0474)	(0.0454)	(0.0443)	(0.0436)	(0.0433)	(0.0431)	(0.0431)
Alc. & Tobacco	0.0566	0.0755	0.0841*	0.0904**	0.0928**	0.0941**	0.0938**	0.0940**	0.0941**	0.0939**
	(0.0530)	(0.0478)	(0.0454)	(0.0427)	(0.0411)	(0.0401)	(0.0396)	(0.0393)	(0.0391)	(0.0391)
Other	-0.1026***	-0.0979***	-0.0925***	-0.0907**	-0.0882***	-0.0868***	-0.0858***	-0.0850***	-0.0848***	-0.0847***
	(0.0331)	(0.0301)	(0.0279)	(0.0262)	(0.0251)	(0.0245)	(0.0242)	(0.0240)	(0.0239)	(0.0239)

[a]Analysis limited to SNAP reporting and eligible households (at or below 130% FPL) with school-aged children (N=8,856). Each coefficient is based on 200 replications from separate individual fixed effects regressions on seasonally adjusted log expenditures that include controls for age, household size, number of children (0-17 years of age), employment status, logged income and logged income squared, and year indicators. Standard errors in parenthesis are adjusted for finite sampling following Rubin (1987) and Vassilopoulos *et al.* (2011). *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 10: **SNAP Participation Misreporting Simulations for Household Budget Share**[a]

	Percent of Additional SNAP Eligible Households Simulated to Receive Benefits									
	10	20	30	40	50	60	70	80	90	100
Food at Home	0.0485**	0.0464**	0.0427**	0.0426**	0.0418**	0.0413**	0.0407**	0.0403**	0.0403**	0.0403**
	(0.0225)	(0.0201)	(0.0185)	(0.0174)	(0.0168)	(0.0163)	(0.0160)	(0.0159)	(0.0158)	(0.0157)
Food Away	-0.0033	0.0030	0.0015	0.0052	0.0064	0.0075	0.0090	0.0089	0.0091	0.0093
	(0.0391)	(0.0347)	(0.0323)	(0.0305)	(0.0291)	(0.0281)	(0.0276)	(0.0272)	(0.0271)	(0.0269)
Ed & Enrichment	0.0564	0.0560	0.0521	0.0520	0.0532	0.0526	0.0526	0.0537	0.0550	0.0568
	(0.0907)	(0.0810)	(0.0743)	(0.0698)	(0.0671)	(0.0646)	(0.0634)	(0.0626)	(0.0621)	(0.0618)
Entertainment	-0.0521	-0.0422	-0.0411	-0.0356	-0.0345	-0.0331	-0.0326	-0.0325	-0.0321	-0.0318
	(0.0365)	(0.0332)	(0.0316)	(0.0300)	(0.0290)	(0.0280)	(0.0275)	(0.0273)	(0.0271)	(0.0270)
Shelter	Base Category for Coefficients									
Utilities	0.0921***	0.0913***	0.0869***	0.0904***	0.0901***	0.0901***	0.0899***	0.0901***	0.0904***	0.0908***
	(0.0206)	(0.0182)	(0.0169)	(0.0161)	(0.0154)	(0.0150)	(0.0147)	(0.0146)	(0.0145)	(0.0144)
Transportation	0.0096	0.0039	0.0017	0.0028	0.0018	0.0017	0.0022	0.0026	0.0035	0.0041
	(0.0408)	(0.0357)	(0.0334)	(0.0315)	(0.0302)	(0.0291)	(0.0286)	(0.0283)	(0.0281)	(0.0279)
Health	0.0597	0.0652	0.0700	0.0669	0.0658*	0.0650*	0.0628*	0.0609*	0.0585	0.0567
	(0.0571)	(0.0491)	(0.0440)	(0.0407)	(0.0387)	(0.0373)	(0.0365)	(0.0360)	(0.0358)	(0.0357)
Alc. & Tobacco	0.0150	0.0214	0.0225	0.0254	0.0266	0.0271	0.0270	0.0274	0.0274	0.0277
	(0.0445)	(0.0414)	(0.0389)	(0.0376)	(0.0362)	(0.0353)	(0.0348)	(0.0345)	(0.0343)	(0.0342)
Other	-0.0328	-0.0293	-0.0281	-0.0269	-0.0273	-0.0268	-0.0266	-0.0271	-0.0270	-0.0275
	(0.0267)	(0.0244)	(0.0225)	(0.0212)	(0.0206)	(0.0200)	(0.0196)	(0.0194)	(0.0193)	(0.0192)

[a]Analysis limited to SNAP reporting and eligible households (at or below 130% FPL) with school-aged children (N=8,856). Each column is based on 200 replications from FMlogit regression that includes a predicted individual fixed effects as well as controls for age, household size, number of children (0-17 years of age), employment status, logged income and logged income squared, and year indicators. Coefficients are relative to "shelter" expenditures. Standard errors in parenthesis are adjusted for finite sampling following Rubin (1987) and Vassilopoulos *et al.* (2011). *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$