

SNAP and Food Consumption

Hilary W. Hoynes

University of California, Berkeley
NBER

Leslie McGranahan

Federal Reserve Bank of Chicago

Diane W. Schanzenbach

Northwestern University
NBER

Preferred citation

Hoynes, H., McGranahan, L. & Schanzenbach, D. SNAP and Food Consumption *University of Kentucky Center for Poverty Research Discussion Paper Series, DP2014-03*. Retrieved [Date] from <http://www.ukcpr.org/Publications/DP2014-03.pdf>.

Author correspondence

Diane W. Schanzenbach, Northwestern University, School of Education and Social Policy, 2120 Campus Drive, Evanston, IL 60208; Email: dws@northwestern.edu; Phone: 847-491-3884

SNAP and Food Consumption

January 16, 2014

Hilary W. Hoynes
University of California,
Berkeley and NBER

Leslie McGranahan
Federal Reserve Bank of
Chicago

Diane W. Schanzenbach
Northwestern University
and NBER

Abstract

In this paper we describe the relationship between SNAP and food consumption. We first present the neoclassical framework for analyzing in-kind transfers, which unambiguously predicts that SNAP will increase food consumption, and then describe the SNAP benefit formula. We then present new evidence from the Consumer Expenditure Survey on food spending patterns among households overall, SNAP recipients, and other subgroups of interest. We find that a substantial fraction of SNAP-eligible households spend an amount that is above the program's needs standard. We also show that the relationship between family size and food spending is steeper than the slope of the SNAP needs parameter, and that large families are more likely to spend less on food than the needs standard amount. By program design, actual benefit levels are smaller than the needs standards. We find that most families spend more on food than their predicted benefit allotment, and are therefore infra-marginal and are predicted to treat their benefits like cash according to the neoclassical model.

This paper was prepared for the conference "Five Decades of Food Stamps" held at the Brookings Institution on September 20, 2013. The authors would like to thank Tom DeLeire, Jonathan Scwabish, and the editors for useful comments.

I. Introduction

SNAP is the largest cash or near-cash means tested, universal safety net program in the United States. Participation neared 15 percent of the population in 2012, and almost \$75 billion in benefits were paid. Benefits are allotted according to a means-tested formula, and average benefits in 2013 were \$275 per household per month, or \$133 per person. The program has been changed relatively little over time, and the basic framework for determining benefits that was put into place almost 50 years ago is still employed today. As described below, economists have a robust theoretical framework through which to predict consumption responses to in-kind transfers such as SNAP.

In this paper, we present new evidence on food spending patterns among households that are eligible for SNAP, as well as other population groups. We compare these spending patterns to parameters used in the SNAP benefit formula, and to average benefit levels. These data allow for a rich description of the food spending patterns of low-income families and, importantly, an evaluation of the adequacy of the SNAP program. Additionally, they allow us to provide new evidence on one of the oldest questions in the analysis of the Food Stamp Program – how the provision of food benefits *in-kind* effects food spending in an absolute sense, and relative to providing these benefits in cash.

We find that a substantial fraction of SNAP-eligible households spend more on food than the target amount assumed in the program's needs standard. We also show that the relationship between family size and food spending is steeper than the slope of the SNAP needs parameter. Finally, we show that most families spend

more on food stamps than their predicted benefit allotment, which under the neoclassical model implies that SNAP benefits are treated like cash.

II. A framework for consumption responses to SNAP

a. The Neoclassical theory

We begin by presenting the neoclassical model of consumer choice and use this to discuss predictions for the effects of SNAP on family spending patterns.¹ Figure 1, Panel A presents the standard Southworth (1945) model, in which a consumer chooses to allocate a fixed budget between food and all other goods. The slope of the budget line is the relative price of food to other goods. In the absence of SNAP, the budget constraint is represented by the line AB. When SNAP is introduced, it shifts the budget constraint out by the food benefit amount B_F to the new budget line labeled ACD. The first, and most important, prediction of the neoclassical model is that the presence of, or increase in the generosity of, the SNAP transfer leads to a shift out in the budget constraint. The transfer does not alter the relative prices of different goods, so can be analyzed as a pure income effect, and we predict an increase in the consumption level of all normal goods. Thus, the central prediction is that food stamps, like an increase in disposable income or a cash transfer, will increase food spending and non-food spending.

However, SNAP benefits are provided as a voucher that only can be used toward food purchases. Canonical economic theory predicts that in-kind transfers like SNAP are treated as if they are cash as long as their value is no larger than the

¹ See also Currie and Gahvari (2008) for an excellent overview of the economics of in-kind transfer programs.

amount that a consumer would spend on the good if she had the same total income in cash. Returning to our figure, there is a portion of the budget set that is not attainable with SNAP that would be attainable with the cash-equivalent value income transfer. In other words, because the benefits B_F are provided in the form of a food voucher, this amount is not available to purchase other goods, and thus we would expect a consumer to purchase at least B_F amount of food. As shown in Figure 1, paying benefits in the form of a food voucher leads to a budget constraint with a kink point.

Panel B illustrates how consumption responds to SNAP benefits. According to standard economic theory, consumers have well-defined preferences that can be represented in a utility curve. In the absence of SNAP, a typical consumer purchases some mix of food and non-food goods, choosing the bundle that maximizes her utility and exhausts her budget constraint. This is represented in Panel B as point A_0^* , with the consumer purchasing food in the amount F_0 . After SNAP is introduced, the budget constraint shifts outwards and the consumer chooses the consumption bundle represented by point A_1^* . Note that consumption of both goods increases, and food consumption goes up by less than the full SNAP benefit amount. Such a consumer is termed “infra-marginal” and the canonical model predicts that SNAP will increase food spending the same amount as if the SNAP benefits were paid in cash. As discussed further below, the predicted impacts of proposed policy changes, such as calls to restrict purchases of certain goods with SNAP benefits, hinges on what proportion of recipients are infra-marginal. We show below that the vast majority of SNAP recipients are infra-marginal.

There are two important exceptions to the SNAP-as-cash model, though. The first is for consumers that prefer relatively little food consumption. In the absence of SNAP, such a consumer may choose the consumption bundle labeled B_0^* in Panel B. When SNAP is introduced, this consumer spends only his benefit amount on food, preferring to use all available cash resources to purchase other goods as represented at point B_1^* . If benefits were paid in cash instead of as a food voucher, the consumer would opt to purchase less food and could obtain a higher level of utility. As a result, for this type of consumer, the canonical model predicts that SNAP will increase food spending by more than an equivalent cash transfer would. Another exception to the standard model comes from behavioral economics and predicts that SNAP may not be equivalent to cash if households use a mental accounting framework that puts the benefits in a separate “category”.²

b. The benefit formula

A stylized version of the benefit formula is presented in Figure 1, Panel C for a family of a fixed size. A key parameter of the formula is the cost of food under the USDA’s Thrifty Food Plan, which we term the “needs standard” in this chapter. The maximum SNAP benefit (the horizontal line in the figure) amount is typically set equal to the needs standard, although sometimes Congress sets maximum benefits equal to some multiple of the needs standard. For example, the American Recovery

² There are other reasons that may explain why SNAP leads to different effects on food consumption compared to ordinary case income. It is possible that the family member with control over food stamp benefits may be different from the person that controls earnings and other cash income. If the person with control over food stamps has greater preferences for food, then we may find that food stamps leads to larger increases in food consumption compared to cash income. Alternatively, families may perceive that food stamp benefits are a more permanent source of income compared to earnings. Finally, Shapiro (2005) finds evidence of a “food stamp cycle” whereby daily caloric and nutritional intake declines with weeks since their food stamp payment suggests a significant preference for immediate consumption.

and Reinvestment Act of 2009 temporarily raised maximum benefits to be 113.6 percent of the needs standard.

SNAP is designed to fill the gap between the cash resources available to a family to purchase food and the needs standard. A family with no income receives the maximum benefit amount, and is expected to contribute nothing out-of-pocket to food purchases. Thus, total food spending (depicted by the upward sloping line “hypothetical food spending”) equals maximum benefits for a family with no other income source. As a family’s income increases, they are expected to be able to spend more of their own cash on food purchases, and consequently SNAP benefits are reduced accordingly. The slope of the SNAP benefits line in Panel C is known as the benefit reduction rate, and is currently set at 0.3. Therefore, the benefit formula can be described mathematically as follows:

$$(1) \quad \text{Benefits} = \text{Max_Benefit} - 0.3 * (\text{Net_Income})$$

The SNAP benefit line as a function of net family income is thus the downward sloping line on the figure. Finally, the family’s out-of-pocket spending on food is the vertical distance between the SNAP benefits line and the food spending line.

Central policy issues include whether the needs standard is set at an appropriate level, and whether the benefit reduction rate is appropriate. We explore these issues in more detail in the empirical results below. It is worth pointing out that this 0.3 benefit reduction rate is much lower than that experienced by other safety net programs such as disability and TANF.

In practice, the SNAP funding formula is somewhat more complicated than we have described, because benefit levels are a function of net income and not gross

income. Net income is calculated as total earned plus unearned income minus the following deductions: a standard deduction, a deduction of some of the earned income, an excess shelter cost deduction, a deduction for childcare costs associated with working/training, and a medical cost deduction that is available only to the elderly and disabled. Because of the mechanics of these deductions, in practice the benefit reduction rate out of gross income is somewhat lower than 0.3.

III. Prior research on consumption responses to SNAP

The first order prediction of the model is that SNAP, by shifting out the budget set, should lead to an increase in food (and nonfood) spending. This is confirmed in the empirical literature. A large literature, mostly using data from more than 20 years ago, focuses on whether SNAP leads to larger increases in food spending than a similar sized cash transfer. Many papers have found that SNAP recipients consume more food out of SNAP than they would with an equivalent cash transfer. More recent papers, however, based on research designs that are able to isolate causality have found evidence results more consistent with the canonical economics model.

Early observational studies (summarized in Fraker 1990 and Levedahl 1995) typically estimate the marginal propensity to consume food using the following linear specification (or semi-log or double-log specification):

$$(2) \quad fspend_i = \beta_0 + \beta_1 cash_i + \beta_2 fstamp_i + Z_i \gamma + \varepsilon_i$$

where $fspend_i$ is expenditure on food for household i , $cash_i$ and $fstamp_i$ are income in cash and from food stamps, respectively, Z_i is a vector of covariates such as household size and age/gender makeup, and ε_i is an error term. Here the primary

impact of food stamps is measured as the increased consumption out of food stamps compared to cash income, as measured by the differences in estimated coefficients by income type in equation (2).

This literature suffers from many of the standard shortcomings of observational studies conducted in the 1970s and 1980s. Importantly, Food Stamp participation is taken as exogenous and the estimates are identified by comparing Food Stamp recipients and "similar" non-recipients. Standard models of program participation (Currie 2006, Moffitt 1983), however, show that program participation is a choice variable and—in this case—positively correlated with tastes for food consumption. Critically, then, these naïve comparisons between participants and non-participants will *overstate* the impact of the program on food consumption.

This upward bias seems evident in the literature. Fraker (1990), in his summary of the literature, reports that the estimates of the marginal propensity to consume (MPC) food out of food stamps are two to ten times higher than the estimated MPC food out of cash income. The median study in Fraker's literature review reports a marginal propensity to consume food out of food stamp income that is 3.8 times as large as that from cash income.³ These findings are often interpreted as evidence that food stamps increase food spending by more than an equivalent cash-transfer system.

Another set of evidence comes from randomized experiments conducted by the USDA in the early 1990s. In those experiments, the treatment group received its food stamp benefits in cash while the controls received the standard food stamp

³ The MPC out of cash is estimated to be 0.03-0.17 (with most estimates between 0.05 and 0.10), and the MPC out of food stamps is estimated to be 0.17-0.47.

voucher. The results of these experiments indicate that spending on food was only about 5 percent higher among the group that received benefits paid in stamps (Ohls et al. 1992, Fraker et al. 1992). Schanzenbach (2007) finds that the mean treatment effect is a combination of no difference in food spending among infra-marginal recipients, and a substantial shift in consumption toward food for stamp recipients who are constrained. Thus the experimental literature concludes that SNAP and cash payments would provide very similar effects on food spending. These experiments provide evidence on the difference between cash and vouchers, but do not provide estimates for the broader question of how providing SNAP benefits, by increasing family disposable income, affects food spending, or consumption more broadly.

Recent work by two of us (Hoynes and Schanzenbach 2009) provides the first quasi-experimental research on the effects of SNAP on food spending. We use the initial rollout of the food stamp program, which took place across the approximately 3,000 U.S. counties between 1961 and 1975. Our estimates use this “program introduction” design by comparing differences across counties over time in a difference-in-difference approach. We find that the introduction of FSP leads to a decrease in out-of-pocket food spending and an increase in overall food expenditures. Our estimated marginal propensity to consume food out of food stamp income is close to the marginal propensity to consume out of cash income. In addition, those predicted to be constrained (at the kink in the food/nonfood budget set) experience larger increases in food spending with the introduction of food stamps.

IV. Measuring spending patterns

The theoretical discussion above suggests that to understand the effect of SNAP on consumption we need to know the relationship between desired food spending and the generosity of SNAP benefits. There is little such evidence in the literature. In our paper, we aim to fill the gap and provide that evidence. We present a careful description of the overall spending patterns of SNAP recipients, how those have evolved over time, and how they compare to the spending patterns of other low-income consumers. In particular, we analyze a time series of microdata from the Consumer Expenditure Survey, the most comprehensive source of data on spending in the United States. We document trends in spending on food among SNAP recipients and compare these both to the program's assumed needs standards and to other groups of low-income non-participants. We are not investigating the causal impact of the food stamp program as to do so would require a research design that accounts for selection into the program (Bitler 2014). Rather, we are presenting the underlying consumption patterns that would inform predictions of these causal relationships.

We are interested in how well the food stamp program's parameters match the food consumption patterns of households. We investigate both aggregates, such as whether the needs standards correspond to food consumption patterns, and the more nuanced aspects of the program, such as how family size adjustments correspond to observed changes in consumption across different family sizes.

Measures of Food Consumption

In the Consumer Expenditure Survey (CEX), expenditures are included independent of the method of payment (e.g., food stamps, cash out of pocket). Importantly for our analysis, the instructions specify that households are to include items paid for with SNAP. However, we cannot link items to their source of payment, so we cannot identify which food items are purchased with SNAP and which are purchased with a family's other resources. In addition, the CEX measures expenditure, not consumption. It does not capture food provided free of charge through other programs (school meals, emergency food) or by non-profits, and does not account for the fact that some food is thrown out.

There are two sub-surveys in the CEX – the Interview and the Diary. The Diary covers expenditures over two consecutive weekly periods. The data contain detailed information on highly disaggregated food spending for the two survey weeks. In the Diary data we can measure spending on apples separately from spending on bananas, for example. The interview covers spending in the three months leading to the survey date. The food spending data are far more aggregated than in the Diary and are based on questions concerning average weekly spending on food over the 3 months prior to the interview. These weekly averages are converted to monthly spending, and monthly spending is identical across all 3 months of the survey. Analysis of the data quality of the CEX food consumption data, as discussed in Appendix A, suggests that there is some underreporting of food expenditures in both subsurveys. For most studies of food expenditures, researchers use the two-week Diary Survey. In this paper, however, we rely almost

exclusively on the Interview Survey because we are interested in the typical consumption patterns of households, and we have reservations about the data quality in the Diary Survey.⁴

We calculate three measures of food expenditures. First is spending on food for at-home consumption. SNAP benefits can only be used to purchase food intended for preparation and consumption at home. Prepared hot foods, fast food or restaurant foods cannot be purchased with SNAP benefits. The CEX “food at home” concept is the one that is the closest (but still imperfect) match to the items that can be purchased with SNAP benefits. This measure collects information on spending on food at groceries, convenience stores, specialty stores, farmers markets and home delivery services, minus the cost of paper products, cleaning supplies, pet food and alcohol.

The second measure is total food spending, including both food at home and food away from home. Food away from home includes food purchased at restaurants, fast food establishments and cafeterias. Total food spending shows the role of food spending in the household’s budget.

Food away from home is typically more expensive than food at home, because the price of food away implicitly includes costs of preparation, while households typically provide their own labor to prepare food at home. While higher income households spend a higher percentage of their food dollars away from home, low-income households also eat out. We would like to construct a measure that

⁴ In particular, we are concerned that the week-to-week variation in expenditures are likely due to interview fatigue and not reflective of actual spending differences. We performed nearly all of the analysis using the Diary data as well, and patterns are similar. (Results available upon request).

accounts for all food spending, but adjusts the price of food away from home to a food-at-home equivalent. In other words, spending on dining out can be thought of as a combination of spending on food, preparation, service, and entertainment, and we would like to extract the food portion of the overall spending. According to tabulations based on Morrison, Mancino and Variya (2011) and CEX aggregated data, on average food out costs about 60% more per calorie than food away from home. We use this to adjust downward the expenditures on food away from home to estimate the cost of food, if all of it had been consumed at home. This adjusted food-at-home measure is our third (and preferred) food spending measure.

Measures of Food Stamps

The dollar amount of SNAP benefits received in the CEX is measured with substantial error. The number of households reporting benefit receipt in the CEX is between 50 and 60 percent of the SNAP administrative records totals (see Appendix B Figure 1). Dollars received are also underreported. In recent years, the CEX Interview reports total annual benefits based on a question about the value of benefits received. In earlier years, benefits were estimated based on questions concerning recent benefit amounts and the number of months of benefit receipt. According the BLS (2009) approximately 47% of the administrative totals of for the total dollar amount of SNAP benefits are captured by the data (see Appendix B Figure 2). Because of the underreporting in these data, we focus on other SNAP parameters, but also provide some tabulations based on reported benefits.

We use three different concepts when considering SNAP benefit amounts. First is the needs standard, which is based on the Thrifty Food Plan budget for a family of four in a given year, and is then adjusted by family size (we return to this family size adjustment below). Second is the maximum benefit level (MAXBEN), which is typically set by Congress to equal 99 to 103 percent of the needs standard. As part of the ARRA stimulus, maximum benefits were temporarily increased by 13.6 percent beginning in April, 2009. Third, we impute benefits according to the benefit formula using information on a household's income, family size, age, disability status, and spending on childcare and shelter costs. The imputed benefit measure assumes universal take-up, but the best estimates of take-up suggest that only 70 percent of eligible persons participate in the program.⁵ People who are eligible for relatively small benefits are less likely to enroll in the program, and participants take-up approximately 90 percent of available benefits (Hanson and Oliveira, 2012). We call households for which there is a positive imputed benefit level "SNAP-eligible" households. Further discussion of the quality of the SNAP data in the CEX and the quality of our imputed benefit measure are discussed in Appendix B. Overall, our imputation procedure leads to an estimate of SNAP spending in the Interview that is higher than actual spending, even adjusting for take-up. We attribute this to income underreporting in the CEX.

V. Food Spending Patterns in the Consumer Expenditure Survey

Spending by Type of Food and SNAP Eligibility

⁵ Take-up rates also vary over the business cycle and in response to policy.

Table 1 presents information on the level of food spending by type of food, separately by whether a household is eligible for SNAP benefits. Overall, SNAP-eligible households spend an average of \$323 per month on food at home, compared to \$379 among higher-income households that are not SNAP eligible. To provide more information on the composition of food spending, we categorize items into three mutually exclusive groups. The “healthier foods” category includes bread (other than white), poultry, fish and shellfish, eggs, milk, cheese, other non-ice cream dairy foods, fruit (excluding juice), vegetables, dried fruit, nuts, prepared salads and baby food. The “unhealthy foods” category comprises ice cream, candy, gum, hot dogs, potato chips and other snacks, and bakery goods and prepared desserts such as cakes, cupcakes, doughnuts, pies, and tarts. The sugar-sweetened beverages group includes colas, other carbonated drinks, and non-carbonated fruit-flavored and sports drinks. Note that only about half of all spending falls into one of these three categories. The table shows that consumption patterns across these food categories are similar for households that are and are not eligible for SNAP benefits. Approximately 36 percent of food at home spending is spent on the healthier food items we identified. SNAP eligible and ineligible households spent 11 and 12 percent of their food budget, respectively, on unhealthy foods. Average spending on sugar-sweetened beverages averages about \$20 per month in both groups.

Spending in Relation to the Needs Standard

An important parameter for SNAP benefit allotments is the needs standard, which is the level of expenditures necessary to purchase a “healthful and minimal

cost meal plan.” The needs standard is based on the Thrifty Food Plan (TFP, described further below), and the maximum benefit is a function of the TFP needs standard. We begin by comparing how *actual* spending compares with the needs standard in Figure 2. We tabulate adjusted food spending – that is, food at home plus a fraction of food away from home – relative to the needs standards. Note that we use the needs standard instead of maximum benefit levels to abstract from the temporary 2009 ARRA benefit increase.

Panel A shows results for all households. Approximately 32 percent of households spend less on food than the needs standard over the time period covered by our data. Another 30 percent spend between 100 and 150 percent of the needs standard. Eighteen and 20 percent of households, respectively, spend between 150 and 200 percent, and more than 200 percent of the needs standards.⁶ Panel B limits the results to only households with incomes less than 200 percent of the poverty line. A higher share – 48 percent – report spending less than the needs standard, and 23 percent spend more than 150 percent of it. Among households that report receiving SNAP income (Panel F), approximately 63 percent spend less than the needs standard, and only 12 percent spend more than 150 percent of it. The percent of households falling into each expenditure bin (averaged across all years) is shown in Table 1.

In Figure 3, we display median (Panel A) and mean (Panel B) food spending as a percent of the needs standards for all households and various subsets of

⁶ The drop in 2007 and 2008 is the result of increases in reported spending on food away from home, which was the result of changes in the interview question rather than the result of a real increase in spending. The responses in 2007 and beyond are closer to the responses in the Diary and likely reflect an improvement in the survey instrument. (Henderson 2012).

interest. For imputed SNAP households, at the median, food spending is fairly close to maximum benefits throughout the sample period. The ratio rises above 1.0 (higher food spending) as better food away spending is captured beginning in 2007. Spending among all households with income less than 200 percent of the poverty line follows a similar pattern, with spending ratios that are just above 1.0. Mean benefit ratios are quite a bit higher reflecting the fact that the distribution is skewed – that is, there are a small group of households that spend substantially more than the maximum benefit level. Figure 4 displays the distribution of spending relative to the needs standard among the population eligible for SNAP and those reporting SNAP receipt. Overall, these results document that the needs standards are fairly close to the average and median food expenditure patterns of SNAP eligible households although a substantial fraction spend more than the needs standard. As described above, measurement error in the CEX implies that food spending is understated in the data. If we could account for this measurement error, it would imply that even fewer families spend less than the needs standard.⁷

Family Size Adjustments

SNAP benefits vary by family size based on assumptions about economies of scale in the consumption and preparation of meals at home. In particular, maximum benefits increase as family size increases, but by less than an amount that would

⁷ As stated above, the CEX measures food expenditures not consumption. In particular, we do not capture the consumption of no-cost food such as school meals, emergency food and so on. This suggests that expenditures understate consumption. But for our analysis here, and the implications for the adequacy of the SNAP benefit, it is important to point out that the unmeasured elements are absent from both the numerator (spending) and denominator (benefit level). Using aggregate statistics, we estimate that SNAP represents 76 percent of total food program benefits.

keep per capita maximum benefits fixed. For example, a household with 4 people receives 182% of the benefits of a household with two people, or about 9 percent less per person. In this section, we document how the family size adjustments used in the SNAP formula compare to the observed differences in the spending amounts of households of different sizes.

Table 2 lays out the SNAP program benefit multipliers across different family sizes (in columns 1-3). The reference family contains 4 persons, and the TFP is estimated to cost \$588 per month (i.e., \$139.50 per person per month). Because of the ARRA increase, benefits in 2010 were set at 113.6 percent of the needs standard, so maximum benefits for a 4-person family were increased to \$668 per month or \$167 per person. To account for economies of scale, the SNAP formula multiplies the per-person benefit in the reference family by different multipliers for each family size. For example, the multiplier for a 1-person family is 1.2, so the maximum per-person benefit is 1.2 times the per-person benefit in the reference family. All families with 5 or more people have the same per-person multiplier (0.95). The per-person benefit level is displayed in column (2). Multiplying column (2) by the family size yields the maximum benefits (column 3).

In Figure 5, Panel A, we graph average spending per capita for families of sizes ranging from one to eight members relative to spending per capita of a four person family for selected years of our sample. We compare this to the multiplier used by the program to adjust benefits, which we label “program parameter.” For example, the line for 2010 attains the value of 1.47 for a two-person household because the average two-person household spent \$252 per person in 2010, which is

1.47 times the \$171 average per-person spending of a four-person family in the same year. The program multiplier allows individuals in a two-person household a budget that is only 1.1 times as much per person. Note that the lines are very similar across the different years presented in the Figure. The main take-away is that the actual changes in consumption patterns by family size are far steeper than the gradient in the program generosity across household sizes. This could reflect differences in resources across family sizes, or may suggest that actual economies of scale in the production and consumption of food are larger than is assumed by the program.

In Figure 5, Panel B, we show spending per capita relative to benefits per capita in four person families for different types of families, averaging across all the years in the sample. We note that for all family types, the gradient is far steeper, with respect to family size, than the program parameters capture. Households eligible for SNAP and those reporting receipt of SNAP follow a pattern similar to households overall. For families with children, we include data for family sizes of two or more because “child only” cases are rare in the data. For small families with children, the gradient is less steep than for other family types. This may be the result of the lower food needs of children. Figure 5, Panel C repeats the exercise using spending on food at home only. While the gradient here is flattened somewhat relative to total adjusted food spending, it is substantially steeper than the benefits multipliers.

Returning to Table 2, in columns (4) through (7) we use the CEX 2010 expenditure data and present average and median per-person spending by family

size, separately for adjusted food spending and food at home spending, as a ratio of per-person spending in a 4-person family. Although the exact estimates vary somewhat across specification, in all cases they reflect spending differentials that are steeper, with respect to family size, than those used to adjust SNAP benefits. Column (8) presents rates of food insecurity in 2010 by household size, which shows that larger families are not less likely to be food insecure than smaller families. This disparity likely reflects the fact that larger households are more likely to be poor (i.e. have less non-SNAP income).

In Figure 6, we summarize actual spending relative to the needs standard, separately for each family size 1-8+; for all households (panel A) and those who are imputed to be SNAP eligible (panel B). In both graphs we see that food spending is far more likely to be above the needs standards in smaller households. For some of the larger family sizes (6 and up), the fraction that spends less than the needs standard is twice as large as the level for the one- and two-person families. Note that the average SNAP household is fairly small, averaging 2.2 overall and 3.3 among households with children (USDA 2011).

Estimated Benefits

We next compare imputed monthly SNAP benefits to both the maximum benefit level and food spending. Using data from the interview survey, we predict SNAP benefit levels based on the benefit formula. This prediction is based on the following information:

1. Program parameters from each year: maximum benefits, the standard deduction, minimum benefits for one- and two-person households, and the caps on dependent care and excess shelter cost deductions.
2. Household demographics and income: family size, family income, earnings, and indicators for whether household contains an elderly member, someone who is disabled, or receives SSI or TANF.
3. Expenditure patterns: spending on shelter, childcare, and health care to calculate deductions for net income.

We do not use the standard medical deduction (available to the elderly) as they vary by state and are implemented late in our sample time period. We also do not have consistent data on child support payments over time. However, we capture most of the other measures used to calculate benefits. See Appendix B for more detail on how these estimated benefits compare to actual benefits and benefits as reported in the survey.

Figure 7 shows the median of the ratio of predicted SNAP benefits to maximum benefits, by year. These are less than 1.0 because most families have positive net income and are therefore not eligible for the maximum benefit. Recall that these are predicted benefits (i.e. assuming universal take-up), so variation over time is driven primarily by differences in income and deductions. As Ziliak shows in his chapter, actual take-up rates are less than 100 percent and vary across the business cycle. As shown in Panel A, in the full sample of households, the median predicted benefit is 70 percent of the maximum benefit. The ratio of median predicted benefits to maximum benefits is lower for households with children and

elderly households, reflecting higher net incomes among these groups. We estimate that nearly 30 percent of households receive the maximum benefit.

We next compare estimated benefits to food spending. Figure 8, Panel A, shows that, overall, fewer than 30 percent of households spend less on food than their predicted benefit amount and approximately a third of households spend more than twice their predicted benefit amount. Note that spending relative to average benefits jumps sharply in 2009 when benefit allotments were raised as part of the stimulus. Among households with children (Panel B), about a third of households spent less than their benefit amount prior to the temporary ARRA increase. Fewer than 20 percent of elderly spend less than their food stamp allotment (Panel C). Recall that because of measurement error, our data understate food spending and income and thus these are likely to be upper bounds on the fraction of families spending less than predicted benefit amounts. Table 3 shows the average ratio of spending to benefit levels over all years pooled. These estimates indicate that most families are inframarginal, and thus the neoclassical model implies that policies to restrict purchase of certain foods (e.g. proposed bans of soda purchase) will do little to alter consumption behavior.

Figure 9 displays the relationship between food spending and benefits by family size. Benefit levels are more likely to be above food spending for the larger households, but even among the largest families fewer than half of households spend less on food than their benefits are worth.

V. Conclusions

This paper presents new descriptive information on the food consumption patterns among households overall, the SNAP-eligible population, and other subgroups of policy relevance. We begin by reviewing the predictions of the food stamp program. The first order effect of SNAP is to shift out the budget set and thus will lead to increases in food and nonfood spending. For households who desire a low level of food spending, the voucher nature of the SNAP benefit may lead to higher food consumption than an ordinary cash transfer. Our results show that a substantial fraction of SNAP-eligible households spend an amount that is above the program “target” spending level, suggesting high rates of infra-marginality. We also show that the relationship between family size and food spending is steeper than the slope of the SNAP needs parameter, and that large families are more likely to spend less on food than the needs standard amount.

By program design, actual and predicted benefit levels are smaller than the needs standards. We find that most families spend more on food stamps than their benefit allotment, and are therefore infra-marginal and are predicted to treat their benefits like cash according to the neoclassical model.

VI. References

- Bitler, Marianne, "SNAP and Nutrition," This volume, 2014.
- Carlson, Andrea, Mark Lino, Wen Yen Juan, Kenneth Hanson, and P. Peter Basiotis. 2007. *Thrifty Food Plan, 2006*. CNPP-19. USDA, Center for Nutrition Policy and Promotion.
- Currie, Janet. 2006. "The Take-up of Social Benefits," in Alan Auerbach, David Card, and John Quigley (eds.) *Poverty, the Distribution of Income, and Public Policy*. New York: Russell Sage Foundation.
- Currie, Janet and Firouz Gahvari. 2008. "Transfers in Cash and In-Kind: Theory Meets the Data," *Journal of Economic Literature*, 333-383.
- Fraker, Thomas. 1990. "Effects of Food Stamps on Food Consumption: A Review of the Literature." Washington, DC: Mathematica Policy Research, Inc.
- Fraker, Thomas M., Alberto P. Martini, James C. Ohls, Michael Ponza, and Elizabeth A. Quinn. 1992. *The Evaluation of the Alabama Food Stamp Cash-Out Demonstration*. Washington, DC: Mathematica Policy Research, Inc.
- Fraker, T. M., Martini, A. P., & Ohls, J. C. 1995. "The effect of food stamp cashout on food expenditures: An assessment of the findings from four demonstrations." *Journal of Human Resources*, 633-649.
- Garner, Thesia I., George Janini, William Passero, Laura Paszkiewicz, and Mark Vendemia. 2006. "The CE and the PCE: a comparison," *Monthly Labor Review*.
- Garner, Thesia, Robert McClelland and William Passero. 2009. "Strengths and Weaknesses of the Consumer Expenditure Survey from a BLS Perspective," Bureau of Labor Statistics.
- Hanson, Kenneth and Victor Oliveira. 2012. How Economic Conditions Affect Participation in USDA Nutrition Assistance Programs, EIB-100, USDA, Economic Research Service.
- Henderson, Steven, "Comparing Global Questions and Answers to Results from Detailed Specific Questions: Data on Food Expenditures from the Consumer Expenditure Survey" Bureau of Labor Statistics, Note, October 2, 2012.
- Hoynes, Hilary W. and Diane W. Schanzenbach. 2009. "Consumption responses to in-kind transfers: Evidence from the introduction of the food stamp program." *American Economic Journal: Applied Economics*, 109-139.
- Levedahl, J. 1995. "A Theoretical and Empirical Evaluation of the Functional Forms Used to Estimate the Food Expenditure Equation of Food Stamp Recipients" *American Journal of Agricultural Economics*, 77 (November): 960-968.

- McGranahan, Leslie and Anna Paulson, 2001, "How Do Benefit Adjustments for Government Transfer Programs Compare with Their Participants' Inflation Experiences?" Federal Reserve Bank of Chicago, Economic Perspectives, Vol. 35, 4th Quarter.
- Meyer, Bruce D., Wallace K. C. Mok, and James X. Sullivan. 2009. "The Under-Reporting of Transfers in Household Surveys: Its Nature and Consequences," NBER Working Paper #15181.
- Moffitt, Robert. 1983. "An Economic Model of Welfare Stigma." *American Economic Review* 73(5): 1023-1035.
- Morrison, Rosanna, Mancino, Lisa and Variyam Jayachandran, 2011, "Will Calorie Labeling in Restaurants Make a Difference" US ERS, Feature: Food Choices and Health, March 14.
- Ohls, James C., Thomas M. Fraker, Alberto P. Martini, and Michael Ponza. 1992. *The Effects of Cash-Out on Food Use by Food Stamp Program Participants in San Diego*. Princeton, NJ: Mathematica Policy Research, Inc.
- Schanzenbach, Diane Whitmore. 2007. "What are Food Stamps Worth?" University of Chicago, Working Paper.
- Shapiro, Jesse, "Is there a daily discount rate? Evidence from the food stamp nutrition cycle" *Journal of Public Economics*. Volume 89, Issues 2-3, February 2005, Pages 303-325.
- Southworth, H.M. 1945. "The Economics of Public Measures to Subsidize Food Consumption" *Journal of Farm Economics*, February 27: pp. 38-66.
- U.S. Department of Agriculture, Food and Nutrition Service, Office of Research and Analysis, *Characteristics of Supplemental Nutrition Assistance Program Households: Fiscal Year 2010*, by Esa Eslami, Kai Filion, and Mark Strayer. Project Officer, Jenny Genser. Alexandria, VA: 2011.

Appendix A: Food Spending Data Quality

This chapter uses food spending data from the Consumer Expenditure Survey (CEX), one of the major sources of consumption data in the United States. The other major source of U.S. consumption data is the information on Personal Consumption Expenditures (PCE) measured as part of the National Income and Product Accounts. The two data sources differ along several dimensions, including the population covered and income sources. The CEX data are created from household responses to questions about purchases which are aggregated to the national level using population weights. These weights are intended to create a sample that represents the civilian, domestic, non-institutional population. The PCE, on the other hand, intends to cover the entire U.S. economy and includes purchases of those living abroad, in the military, and institutionalized. It also includes purchases by nonprofits. In addition, the CEX does not include food transfers via the WIC program while the PCE does. The PCE is based on data from various economic Censuses. It is not correct to think of the PCE as “right” and the CEX data as “wrong” as they are intended to cover different populations and both are subject to error.

Using aggregate data released by the BEA and BLS, we compare spending in two categories. First, we compare CEX spending on “Food at Home” to PCE “Food and nonalcoholic beverages purchased for off-premises consumption.” Second, we compare CEX spending on “Food Away from Home” plus all “Alcoholic Beverages” to PCE “Purchased Meals and Beverages” plus “Alcoholic Beverages purchased for Off-Premises Consumption.” We include alcohol in these numbers because restaurant alcohol is included in the PCE purchased meals number. In Figure A1, we show the food at home comparisons. In Figure A2, we show the ratio of CEX/PCE for both sub-surveys. In Figure A3, we show the food away from home plus alcohol comparisons. In Figure A4, we show the ratio of CEX/PCE for food away from home consumption of expenditures. As expected, PCE expenditures are higher than CEX expenditures across both categories. About two-thirds of the expenditures covered in the PCE are covered in the CEX. The gap for food away from home is larger, probably due to substantial underreporting of alcoholic beverage consumption in the CEX. (See Henderson (2012) for a discussion of the differences across the sub-surveys in coverage).

According to Garner et al. (2006), in recent years, the PCE population has been about 3 percent higher than the CE population. The population differential can explain a small proportion of the gap. The inclusion of the nonprofit sector in the PCE explains a bit of the gap as well, but according to the BEA’s Input-Output tables, nonprofits are not major consumers of food. Tabulations based on the Input-Output tables suggest that the absence of nonprofits in the CEX explain 3-4% of the gap. The omission of in-kind WIC benefits explains less than one percent of the gap. The remainder of the gap is probably due to differential reporting in the two surveys. Combining food at home with adjusted food away from home, and accounting for the difference in coverage, we conclude that food spending per household is 20-25% higher in the PCE than in the Interview.

Appendix B: SNAP data Quality

The second data quality issue is underreporting of SNAP receipt in the Consumer Expenditure Survey. Meyer et al. (2009) analyzes the reporting rates in various surveys and concludes that on average over the period 1979-2007, 59.7% of administrative totals of SNAP are covered on average by the CE-Interview. However, coverage is declining over time and is under 40% in 2004-2007.

We are interested in comparing both reported and our imputed benefits to administrative totals. We begin with comparisons of the overall population of Consumer Units covered in the CEX versus the number of US households. The total number of Consumer Units is slightly (about 3%) over the number of households. This is probably largely because there can be multiple CUs in a household. In fact, the total population covered by the CEX is slightly below the US resident population because the CEX covers only the civilian non-institutional population. We conclude that differentials in SNAP coverage are not due to population coverage.

We next compare administrative data on benefits to benefits reported in the CEX survey instrument. These comparisons are based on administrative data on total programmatic spending, average monthly household benefits and average monthly participation. In Figure B1, panel A, we present the fraction households reporting in the survey relative to the administrative totals. In panel B, we show the portion of administrative spending totals that are reported in the survey. We show three values – based on Diary data, based on Interview data, and “corrected” Diary data that corrects for an error in processing.⁸ We note that between 30 and 70% of administrative totals are reported in the survey. For the Interview, we find that coverage drops in 2001 when the question switches from being asked each survey to being asked only in the first and fifth interviews. These numbers are somewhat consistent across the Interview and Diary and dramatically decline over time. When we break this into measures of participation and of average benefits, we find that there is underreporting of both benefits and participation. Participation ratios are higher in the Interview and benefit ratios are higher for the Diary⁹.

We impute benefits based on survey responses and program parameters. For years prior to the introduction of income imputation in the CEX (2004), we restrict our analysis to complete income reporters. This is crucial because if we included incomplete income reporters we would have higher benefits because we would have a greater portion of the sample being income eligible. In Figure B2, we graph total spending on SNAP for 2005-2011 based on our imputations as compared to total benefits in the administrative data. We also show an estimate of what total annual benefits would be if there was 100% take up, based on data from the USDA. Our imputation procedure implicitly assumes 100% take up.

For the interview data, total imputed spending is substantially above total spending in the administrative data, even adjusted for take-up. Compared to the

⁸ In most cases the Diary reports annual food stamp benefits as last month’s benefit times 12. In some cases, the annual benefit is last month’s benefit times the number of months that benefits were received. Our corrected benefit multiplies last month’s benefits by 12 for every recipient.

⁹ The path of the questions is very different across the two surveys which can explain this difference. In the Diary households only report benefit amounts if they received benefits last month, independent of whether they received them last year.

official data, this is the result of lower average benefits and much higher participation. Relative to the take-up adjusted data, this is the result of higher average benefits and higher participation. The pattern relative to the take-up adjusted data, may be the result of underreporting of income in the CEX. Lower income would imply more beneficiaries receiving higher benefits as we find.

For the Diary data, as compared to the Interview Data, we see lower benefits and lower participation which combine to yield lower total spending. This is probably primarily due to our inability to account for the excess shelter and other deductions due to the absence of consumption data for these items in the Diary.

Table 1: Food Spending by Type of Food and SNAP Eligibility

	Households eligible for SNAP		Households ineligible for SNAP	
	Mean (1)	Standard deviation (2)	Mean (3)	Standard deviation (4)
<i>Panel A: Spending Level</i>				
Food at home	323.3	321.7	379.1	334.4
Healthier foods	116.2	128.5	135.0	134.0
Unhealthy foods	32.9	49.9	42.9	57.1
Sugar-sweetened beverages	19.8	31.0	19.7	32.9
<i>Panel B: Spending as a Percent of Food at Home Spending</i>				
Healthier foods	36.4%		35.8%	
Unhealthy foods	11.1%		11.9%	
Sugar-sweetened beverages	7.7%		6.2%	
N	1749		9866	

Table 2: Adjusted Food Spending as a Percent of the Needs Standard

	All Households	Households < 200% FPL	Households eligible for SNAP			SNAP recipients
			Overall	HH with children	Elderly Member	
	(1)	(2)	(3)	(4)	(5)	(6)
No reported spending	0.3%	0.8%	0.9%	0.5%	1.0%	1.2%
0-50	5.5%	10.5%	12.8%	16.2%	8.3%	14.7%
50-100	26.4%	36.8%	38.1%	50.8%	32.1%	46.7%
100-150	30.1%	28.7%	27.0%	23.4%	30.4%	25.3%
150-200	17.9%	12.5%	11.2%	5.9%	14.5%	7.2%
200+	19.8%	10.6%	10.1%	3.2%	13.7%	4.9%
Sample Size	1,523,123	543,113	310,811	123,228	94,907	98,385

Table 3: Benefit Formula Multipliers, Spending Patterns, and Food Insecurity by Household Size, 2010 Data

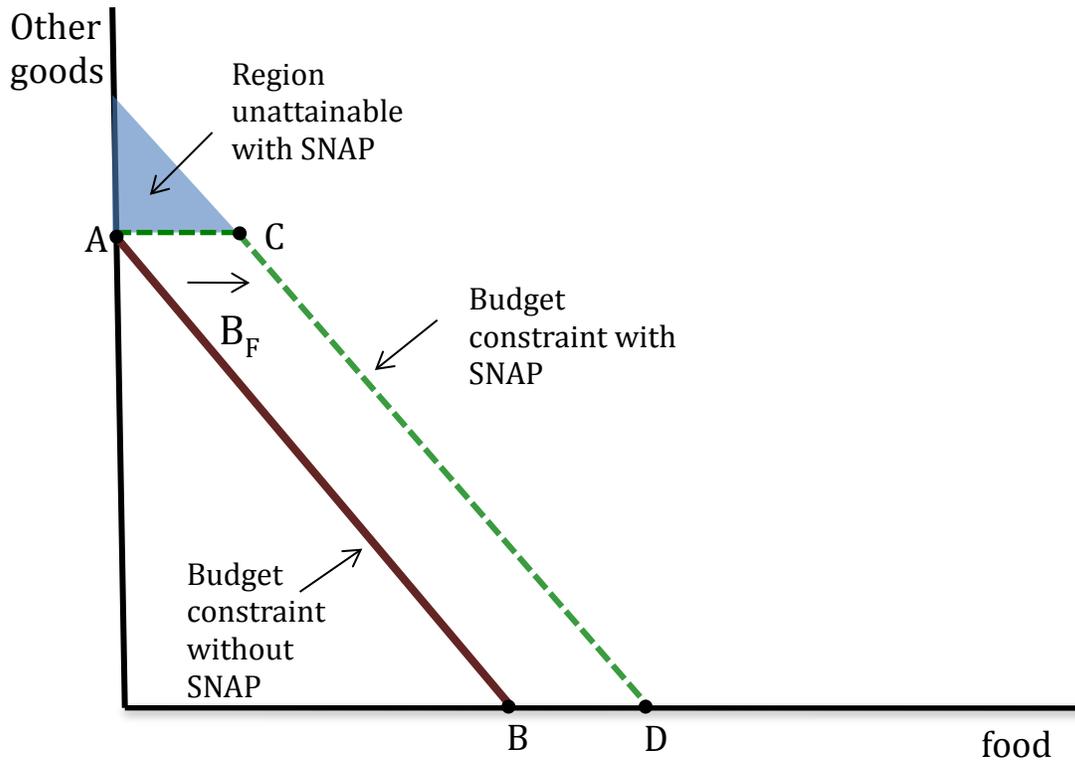
Household size	SNAP formula multiplier	SNAP formula		Per-person spending relative to family of 4				Food insecurity rate	Sample Size (Cols 4-7)
		Maximum per-person	Maximum monthly benefits	Average adjusted food spending	Median adjusted food spending	Average food at home spending	Median food at home spending		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	1.20	200	200	1.81	1.70	1.68	1.57	0.14	25,528
2	1.10	184	367	1.48	1.44	1.41	1.34	0.11	26,007
3	1.05	175	526	1.15	1.13	1.13	1.11	0.14	12,638
4 (reference)	---	167	668	1.00	1.00	1.00	1.00	0.16	11,390
5	0.95	159	793	0.83	0.83	0.85	0.82	0.21	5,387
6	0.95	159	952	0.74	0.74	0.79	0.72	0.22	2,210

Notes: Average (median) adjusted food spending for a family of 4 is \$171 (\$155) per person. Average (median) food at home spending for a family of 4 is \$136 (\$130) per person. Columns (4) through (7) are authors' calculations from CEX data. Column (8) is authors' calculations from the December 2010 Current Population Survey.

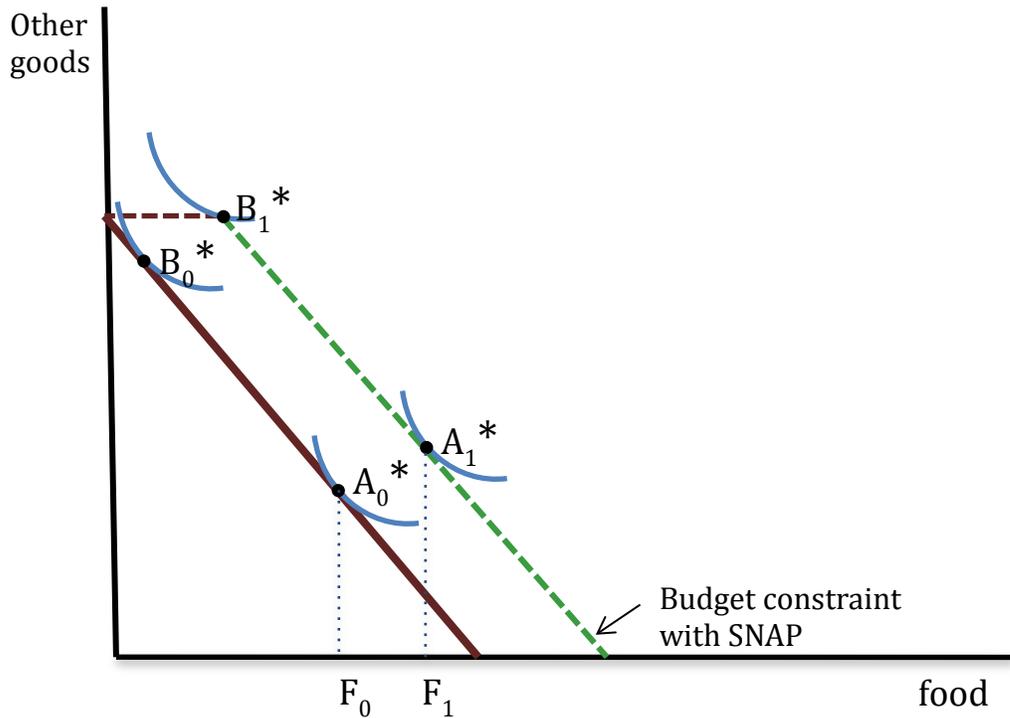
Table 4: Adjusted Food Spending as a Percent of Predicted SNAP Benefits

	All households (1)	Households with children (2)	Households <200% of FPL (3)	Households reporting SNAP benefits (4)
No Spending	0.9%	0.5%	0.9%	1.3%
0-50	6.8%	7.4%	6.9%	8.1%
50-100	20.3%	26.3%	20.4%	29.2%
100-150	32.6%	35.2%	32.7%	34.9%
150-200	13.9%	12.8%	13.8%	10.1%
200+	25.5%	17.8%	25.3%	16.4%
Sample Size	310,811	123,228	305,990	75,247

Figure 1: Economic Frameworks for Analyzing SNAP
 Panel A: Impact of SNAP on Budget Constraint



Panel B: Consumption Decisions in Response to SNAP



Panel C: Stylized Relationship between Income, Benefits and Food Spending

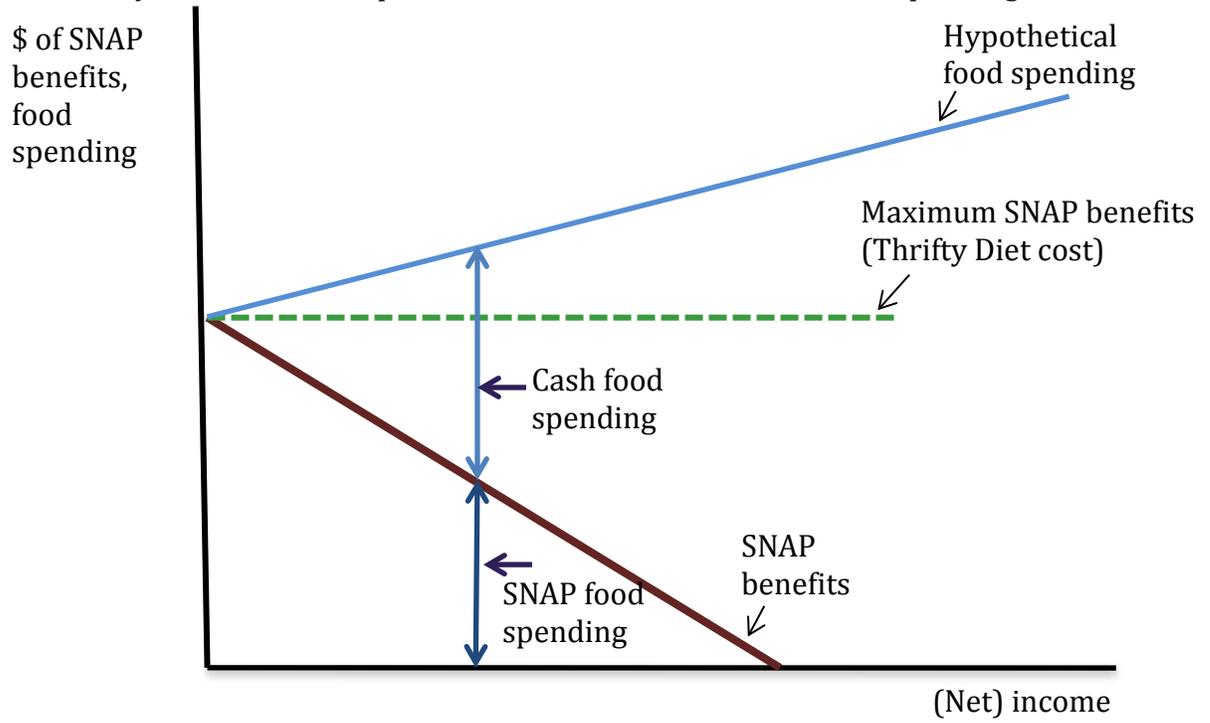
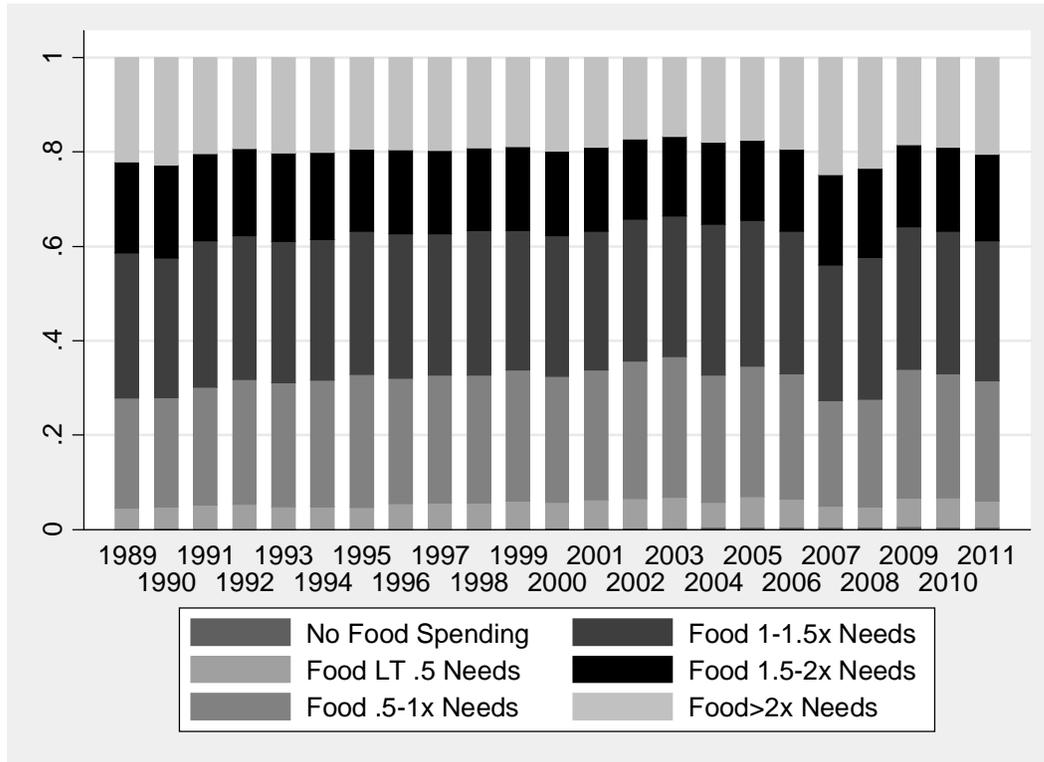
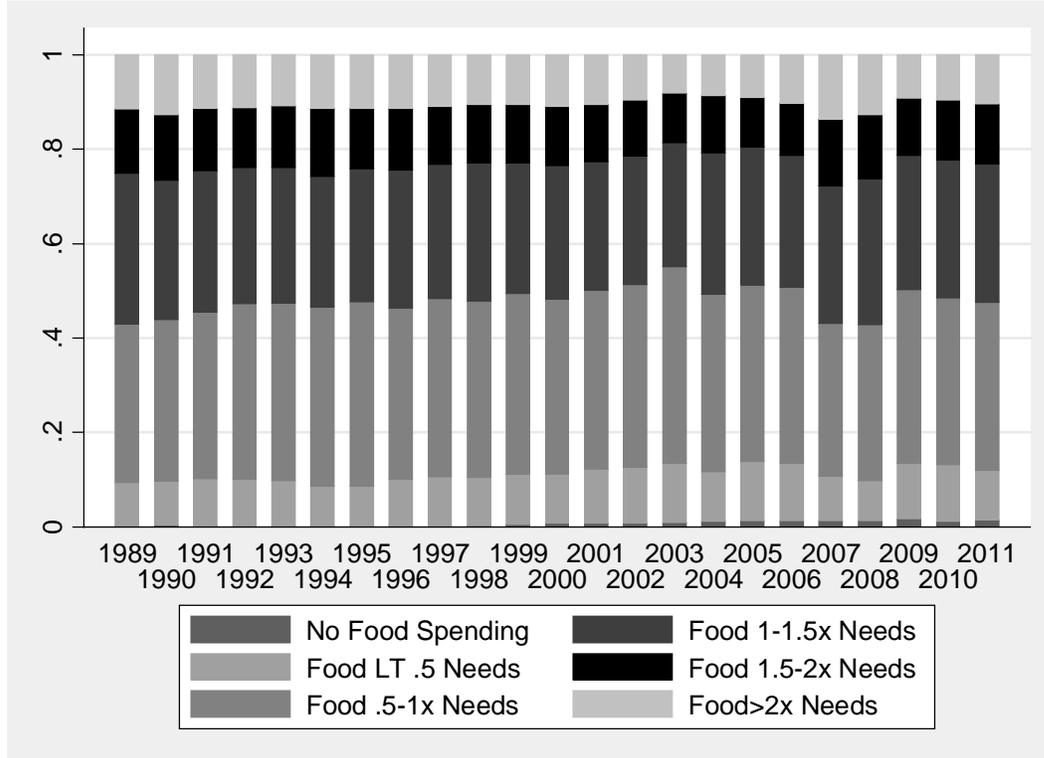


Figure 2: Adjusted Total Food Spending Relative to Needs Standards
 Panel A: All Households

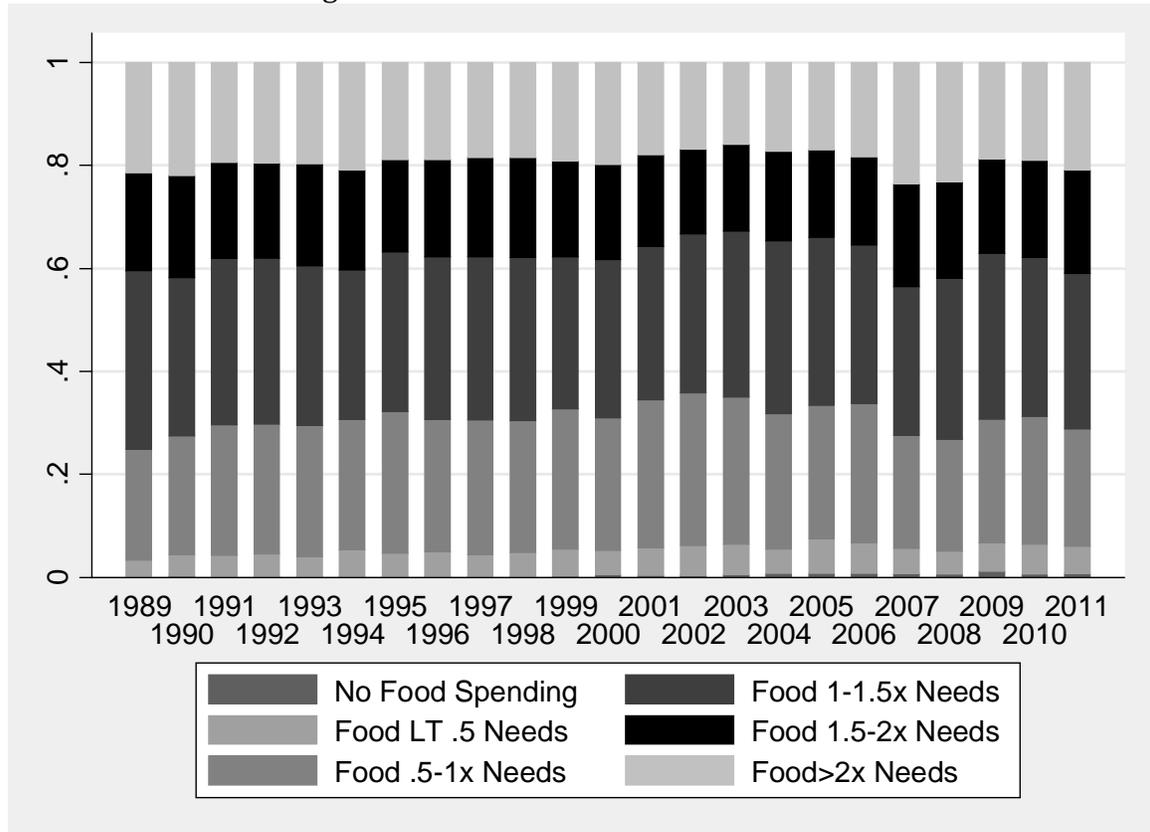


Note: Total food spending includes spending on food at home plus 0.63 times food away from home.

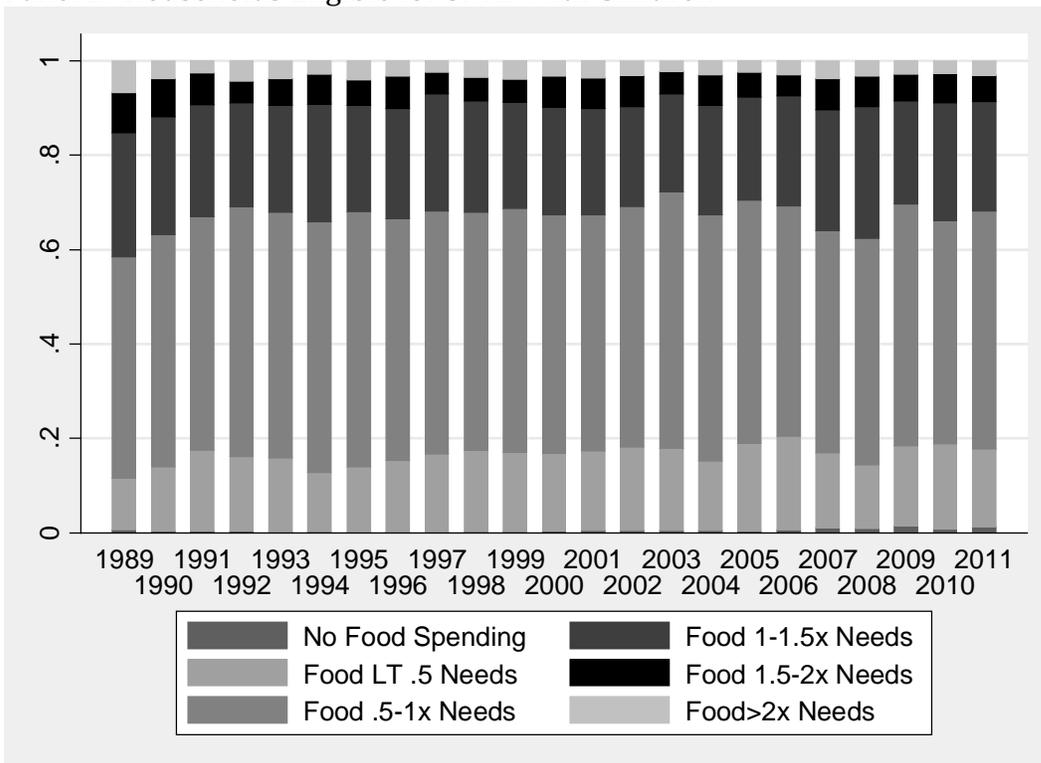
Panel B: Households with Income Less than 200 Percent of the Federal Poverty Line



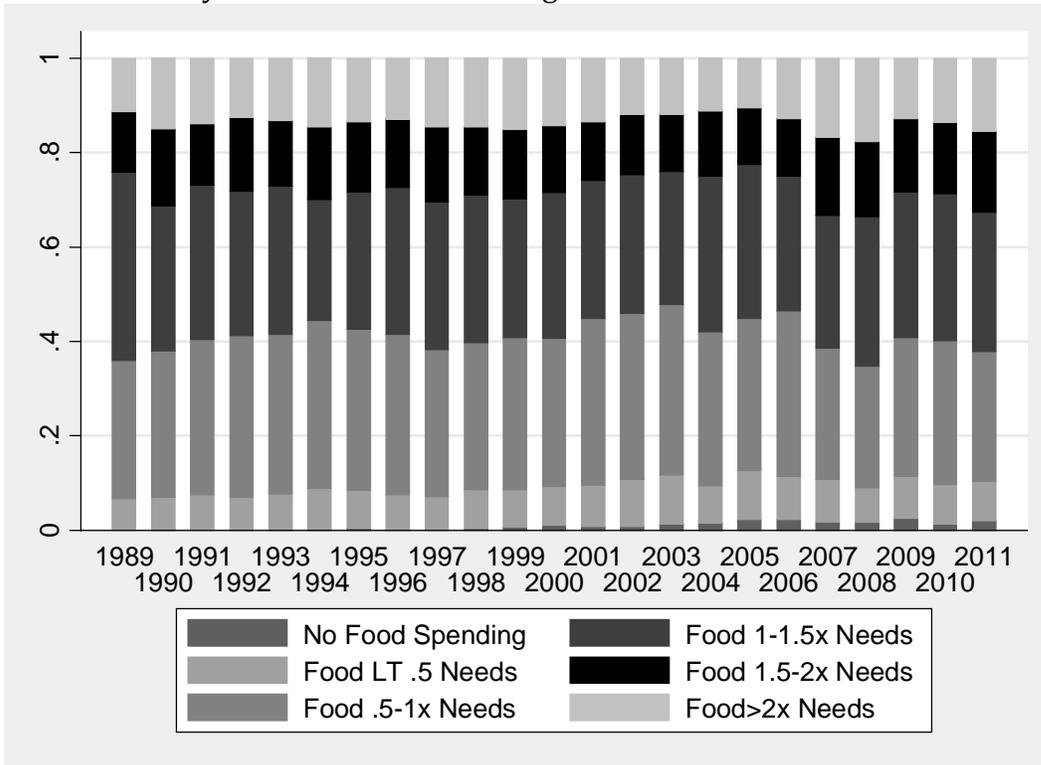
Panel C: Households Eligible for SNAP



Panel D: Households Eligible for SNAP with Children



Panel E: Elderly-Headed Households Eligible for SNAP



Panel F: Households with Reported SNAP Receipt

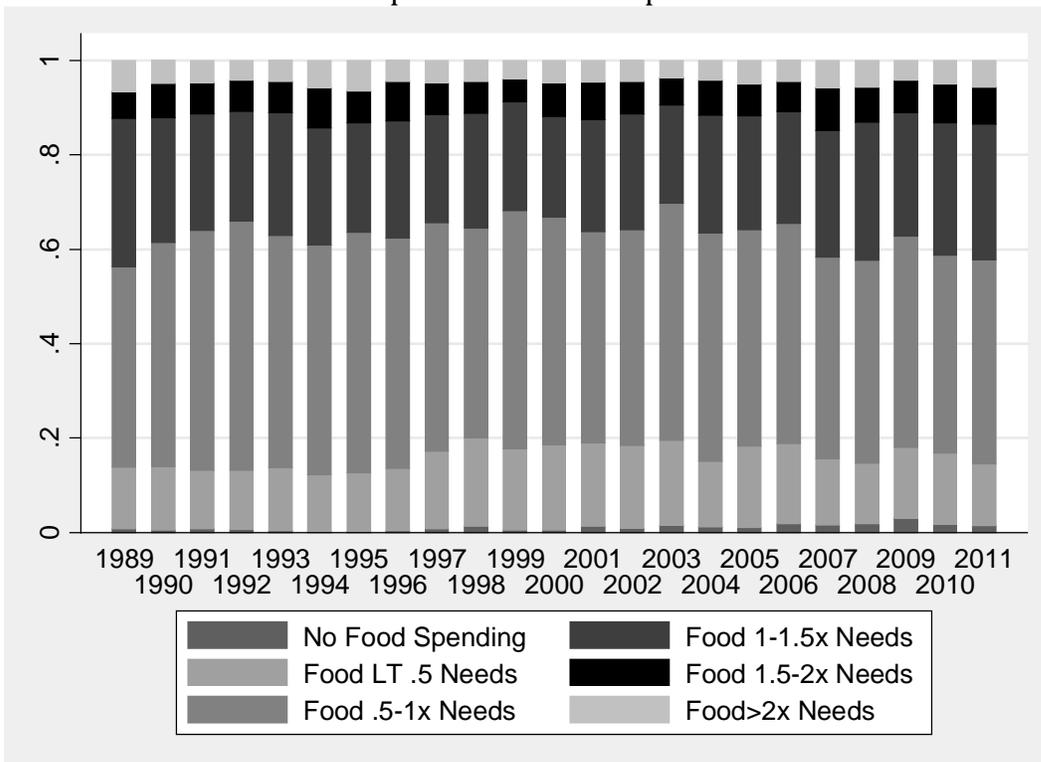
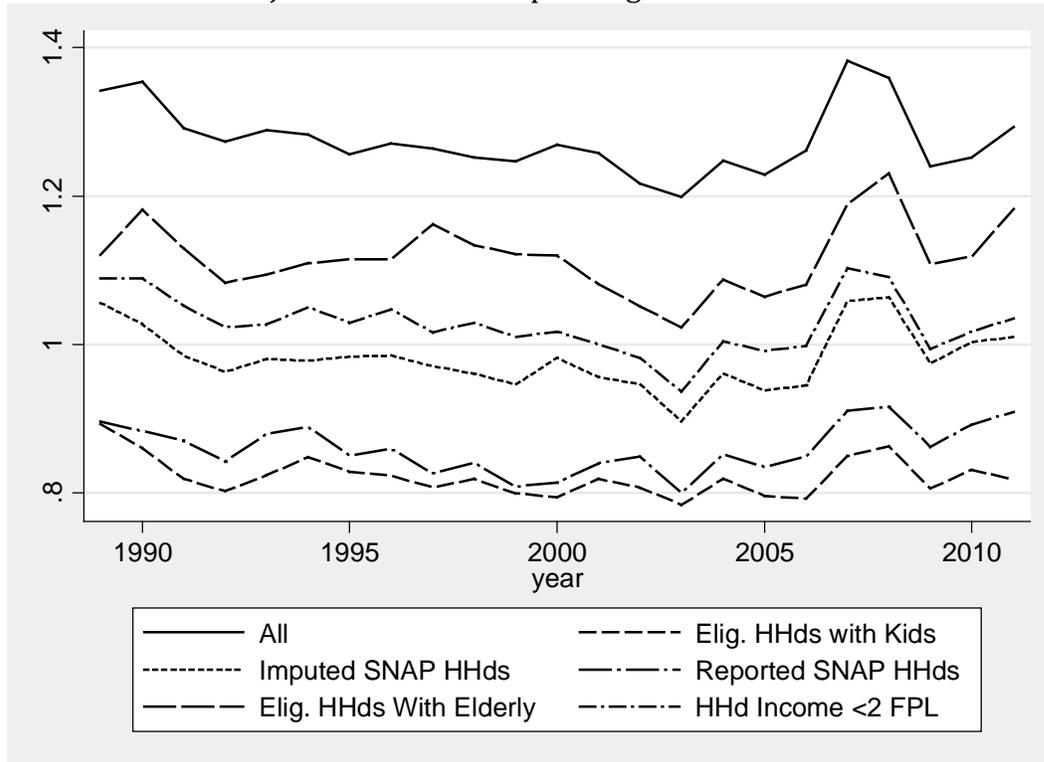


Figure 3: Ratio of Spending to Needs Standard, by Household Type
 Panel A: Median Adjusted Total Food Spending to Needs Standard



Panel B: Mean Adjusted Total Food Spending to Needs Standard

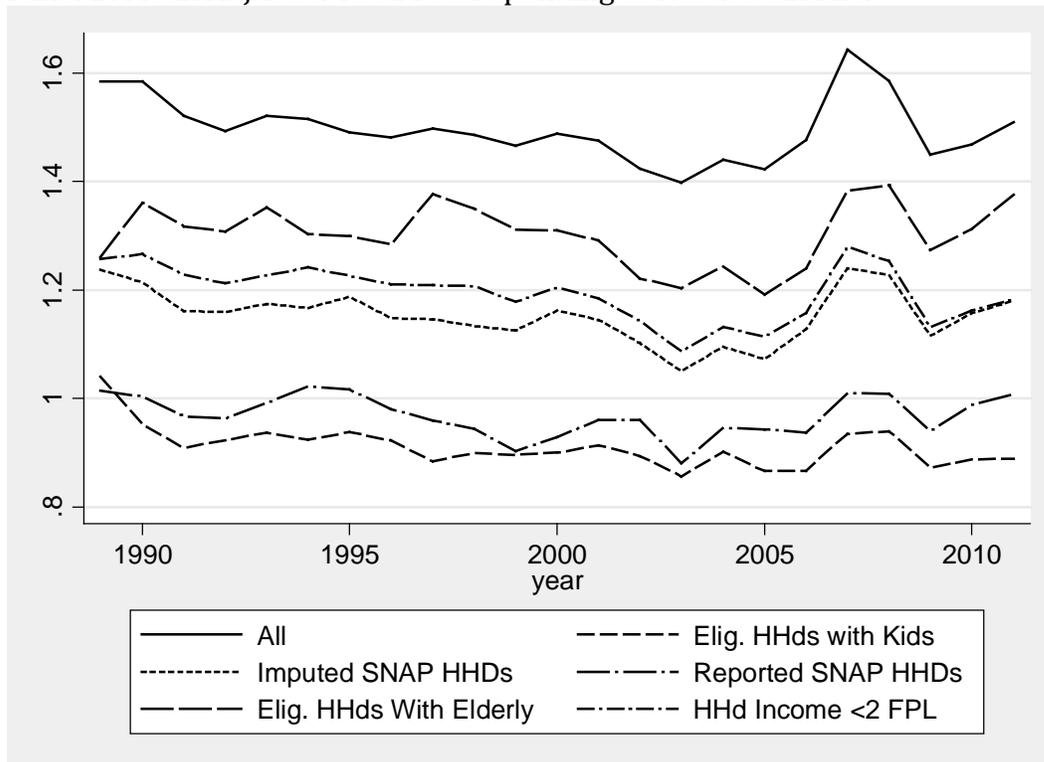
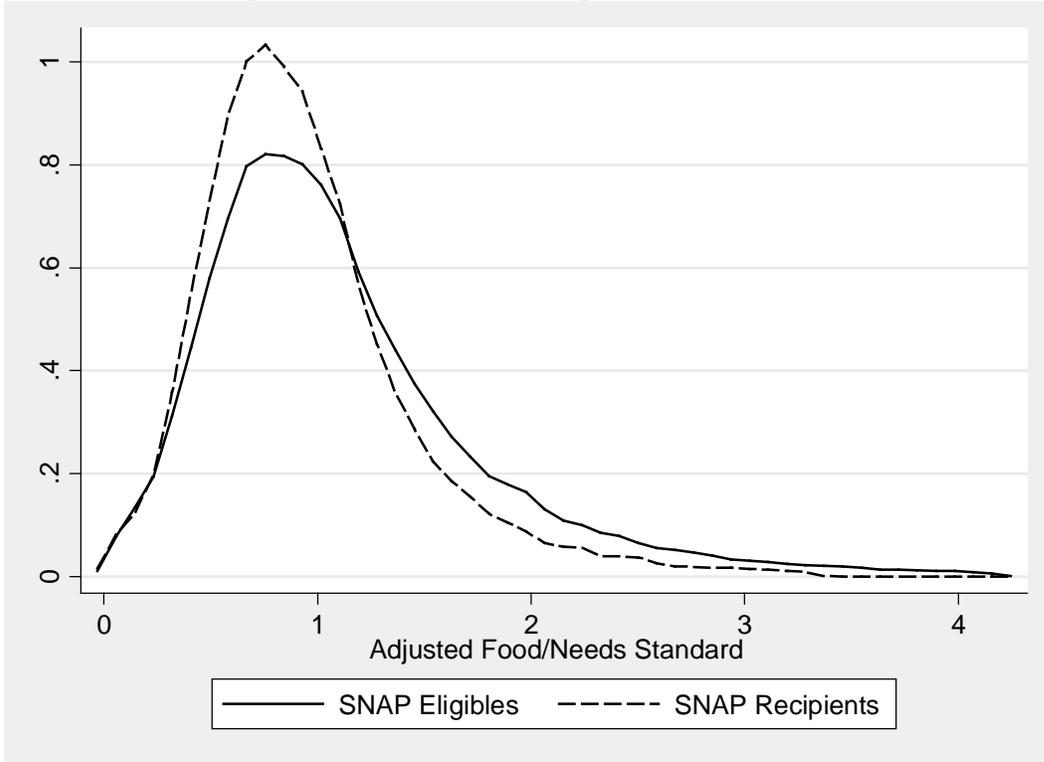


Figure 4: Distribution of Food (Home Plus Adjusted Away) Spending as a Fraction of Needs Standard, SNAP eligible households, 1988-2012
Panel A: SNAP-Eligible and SNAP-Receiving Households



Panel B: SNAP-Eligible Households with Children or with Elderly Head

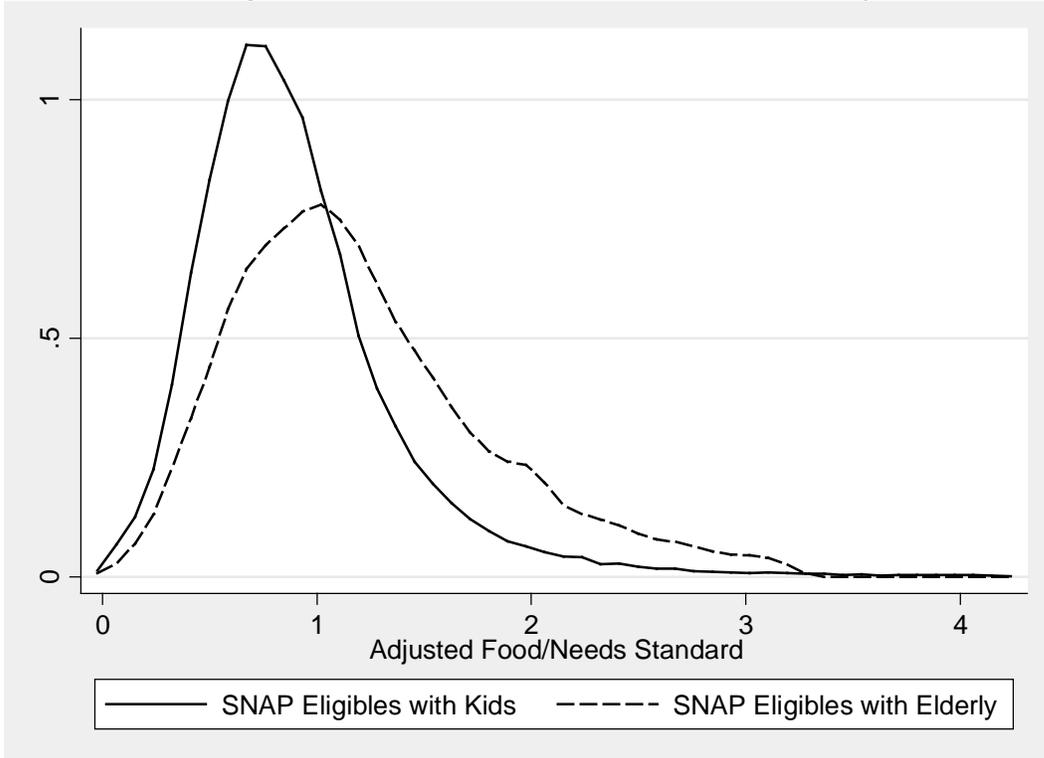
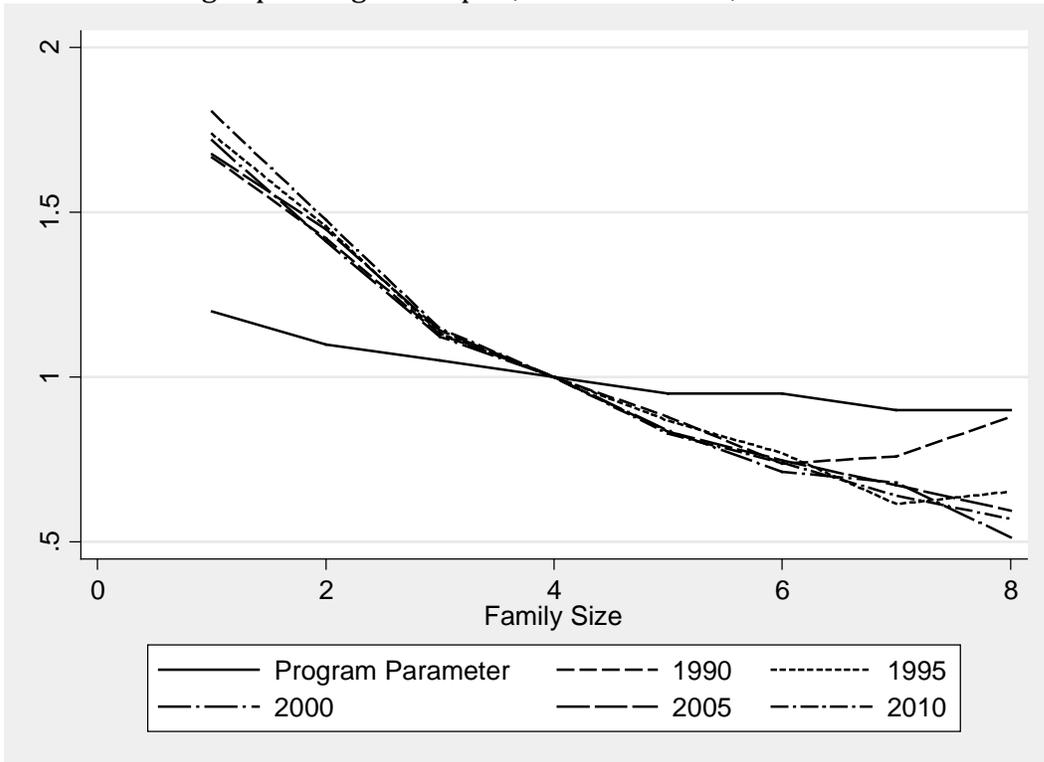
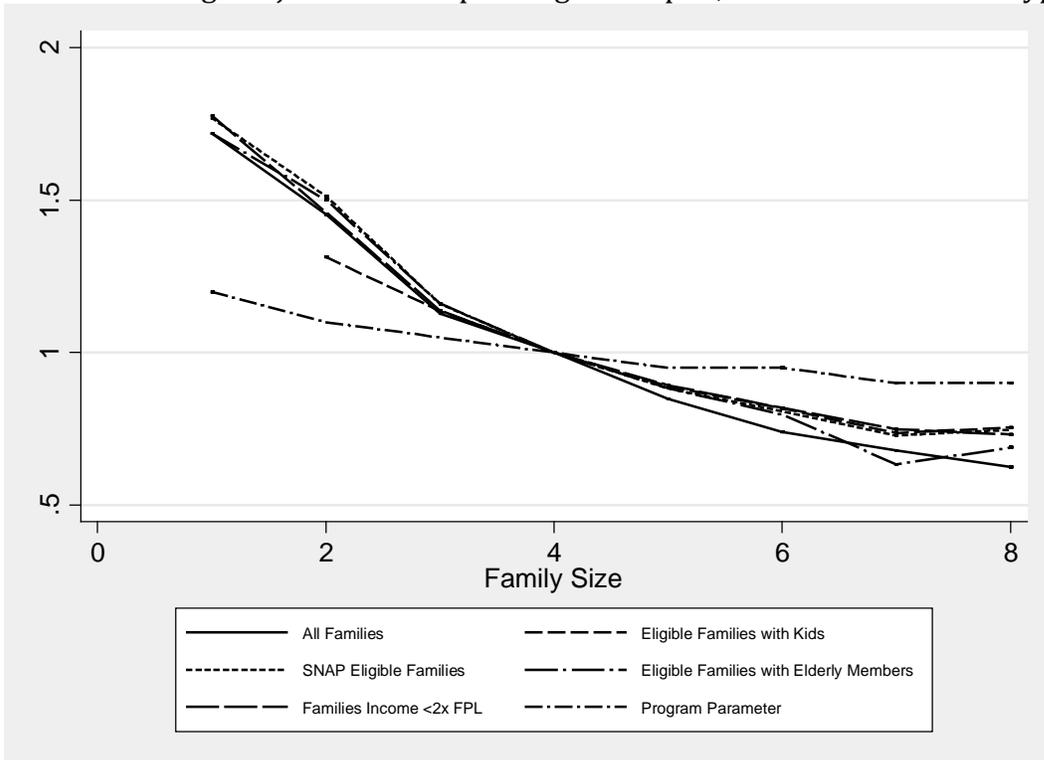


Figure 5: Spending Per Capita by Family Size, Relative to 4-Person Households
 Panel A: Average Spending Per Capita, All Households, Selected Years



Panel B: Average Adjusted Food Spending Per Capita, Selected Household Types



Panel C: Average Spending on Food at Home Per Capita, Selected Household Types

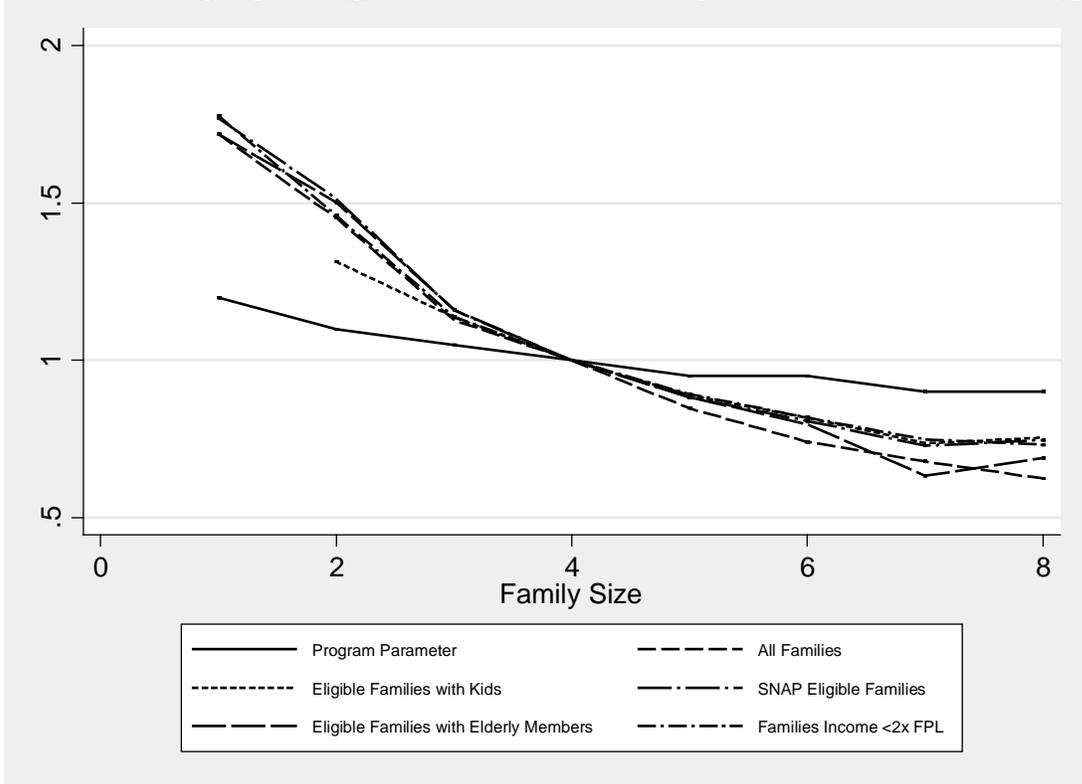
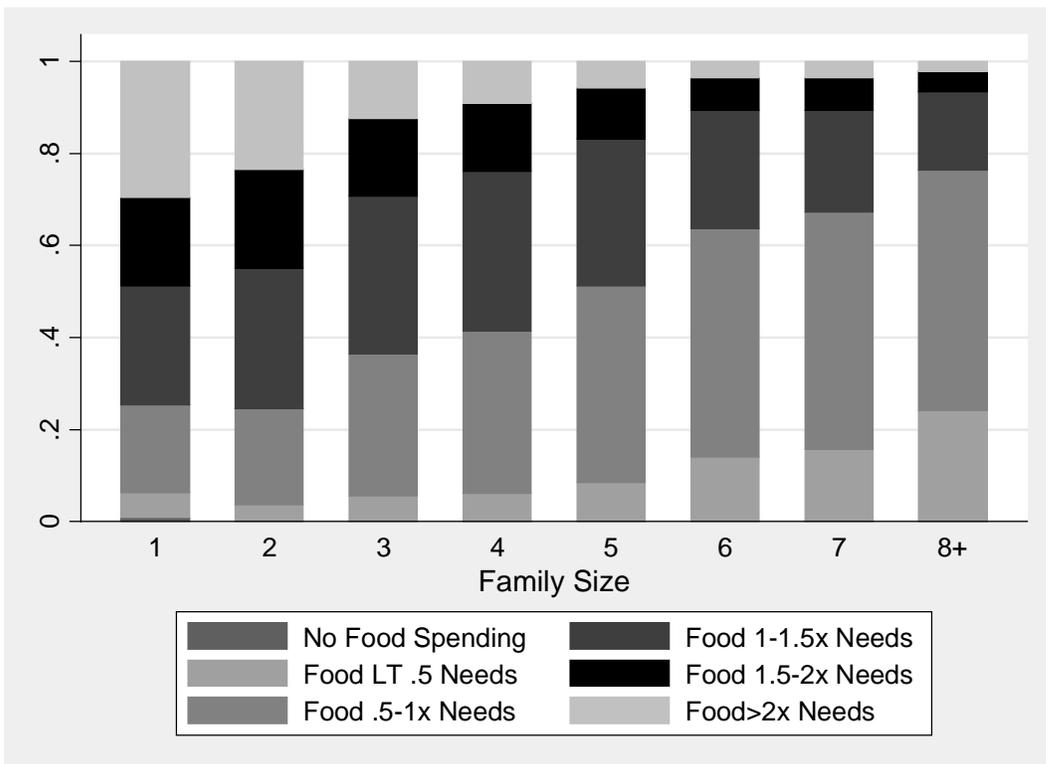


Figure 6: Adjusted Spending on Food Relative to Needs Standards, by Family Size
Panel A: All Households



Panel B: SNAP-eligible Households

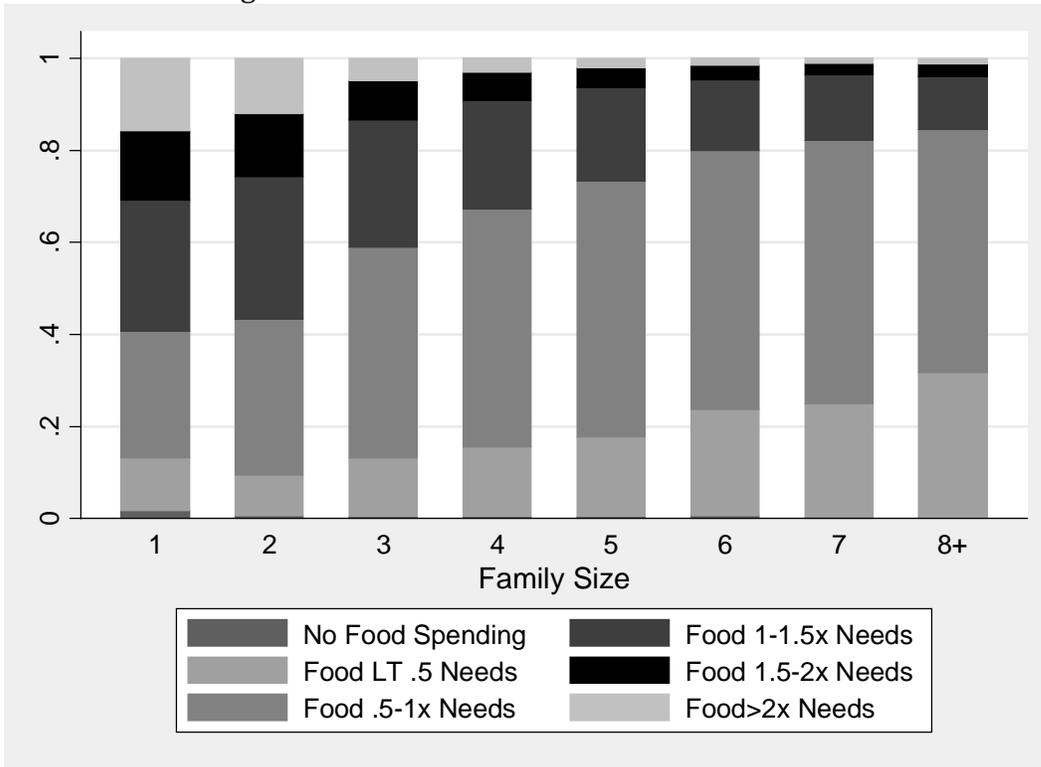


Figure 7: Median of Estimated Benefits as a Fraction of Maximum Benefits

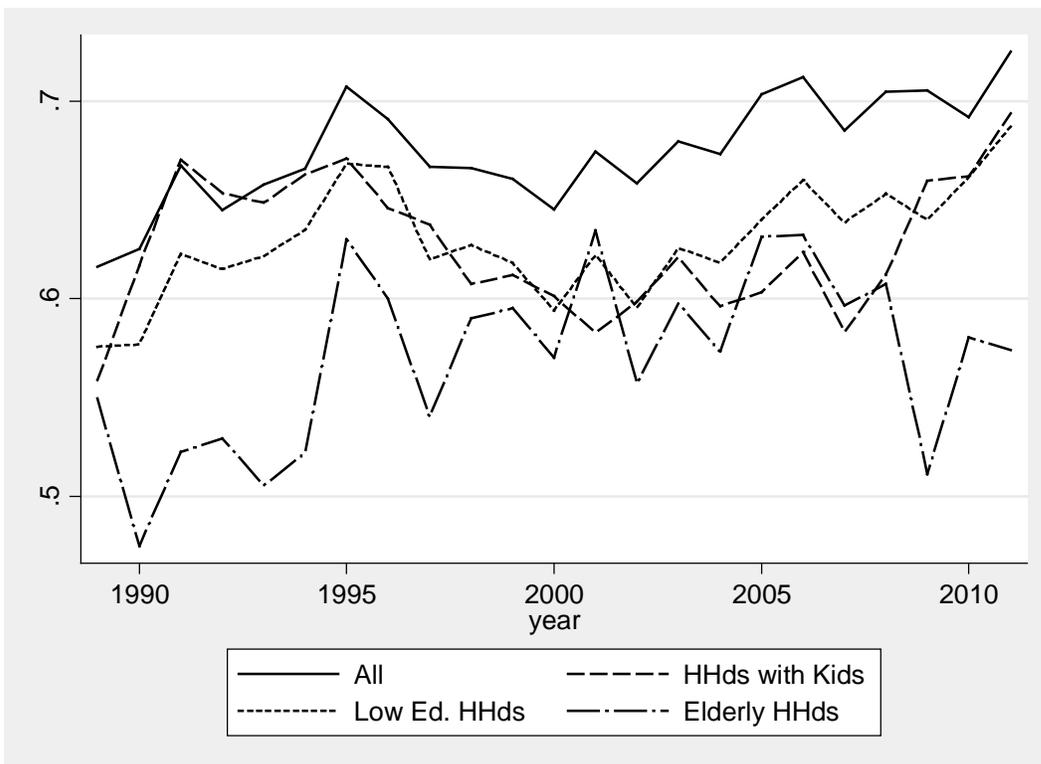
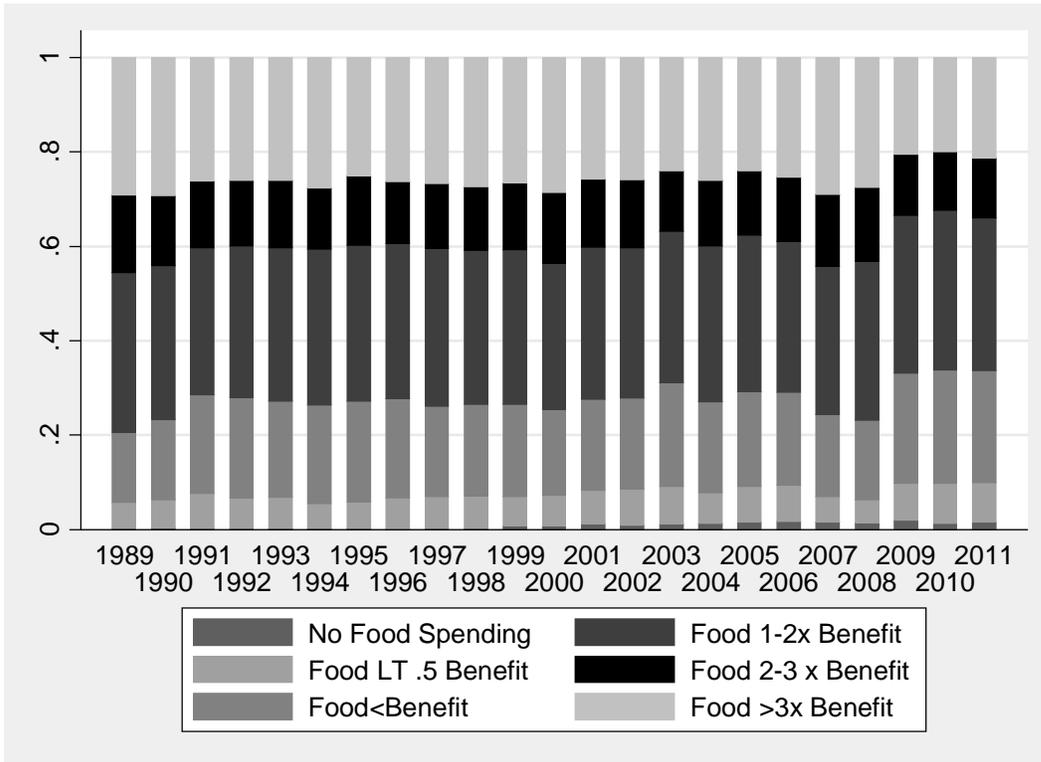
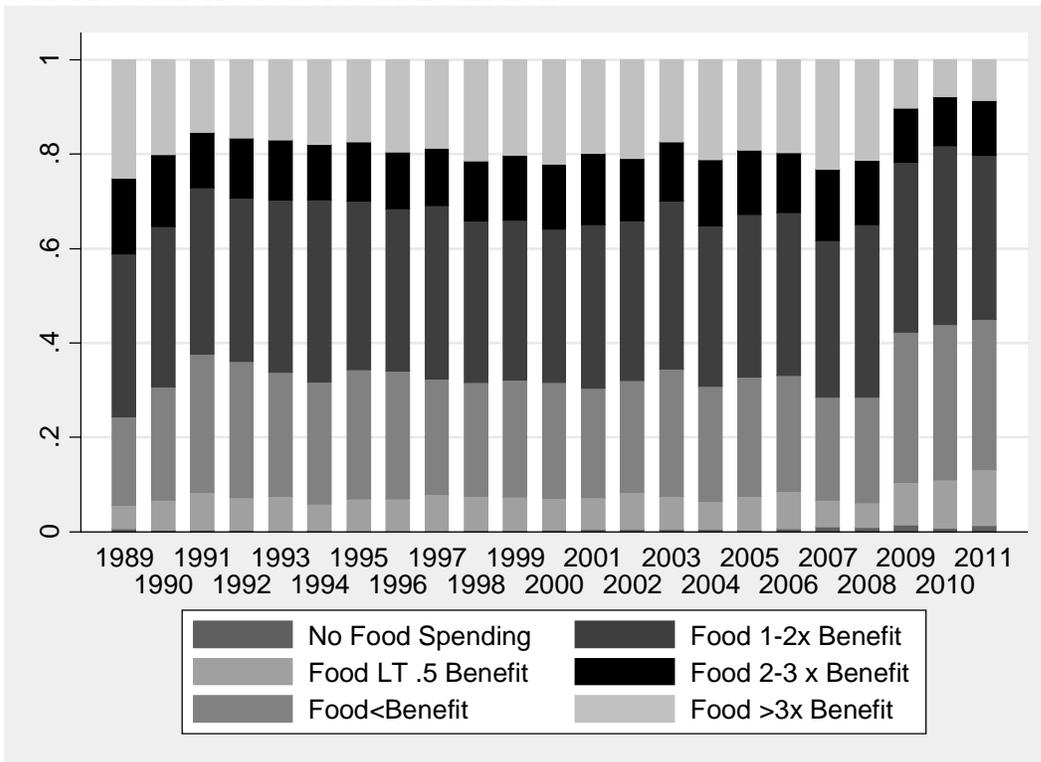


Figure 8: Adjusted Food Spending Relative to Predicted Benefits
 Panel A: All SNAP Households



Panel B: SNAP Households with Children



Panel C: SNAP Households with an Elderly Member

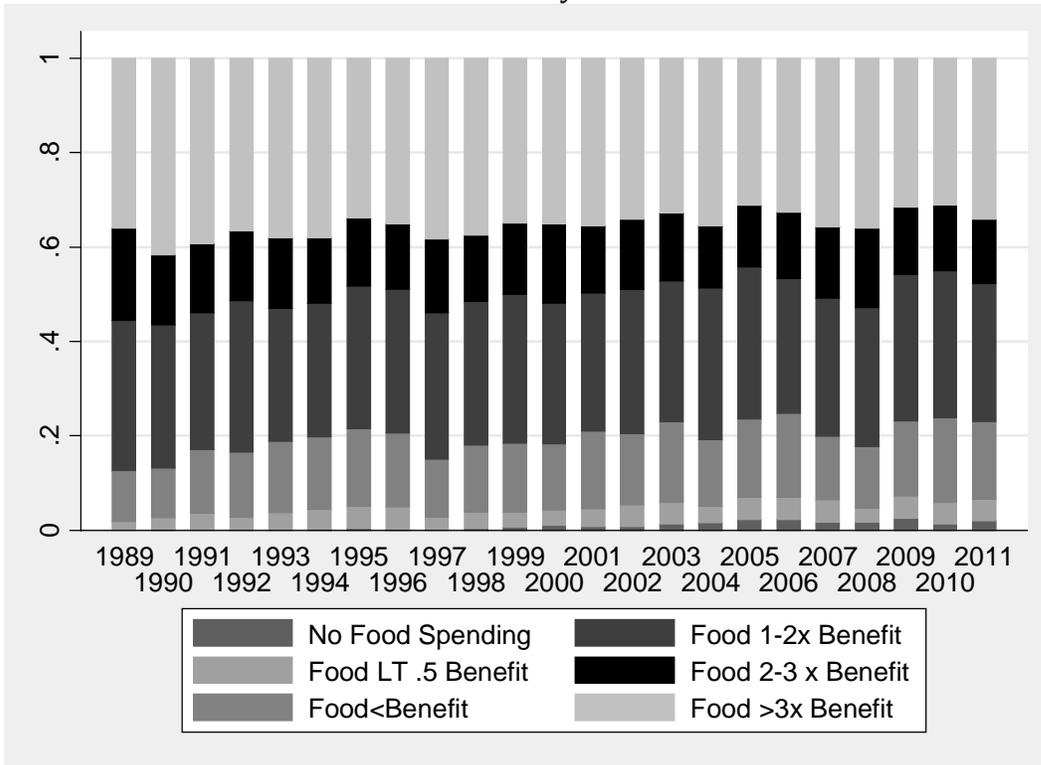
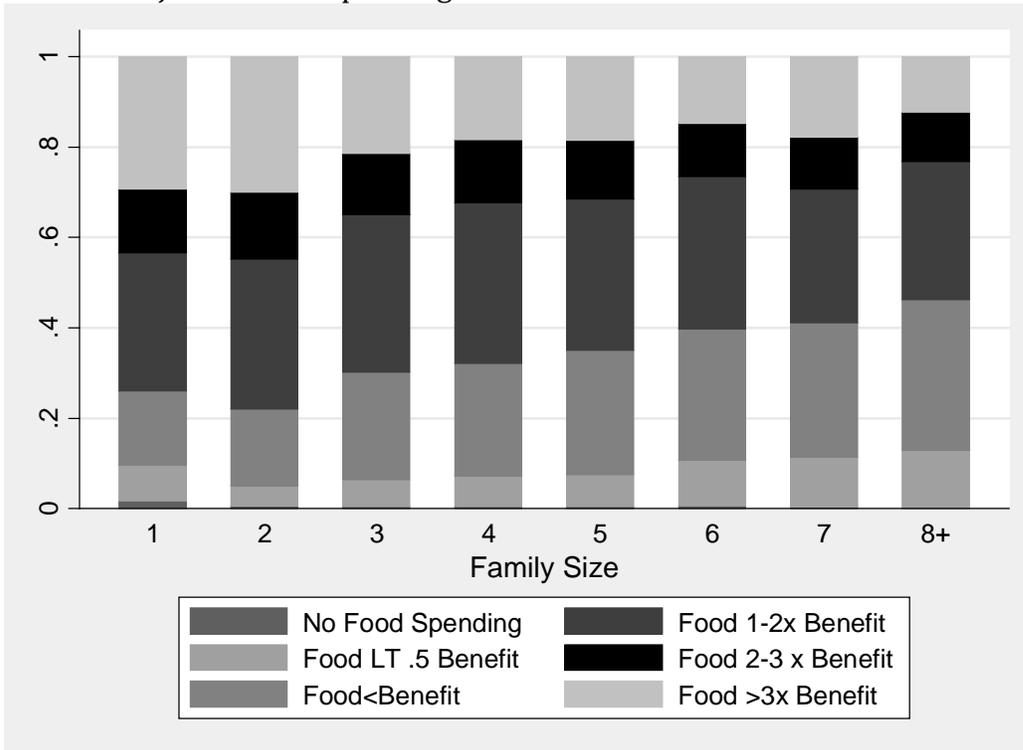
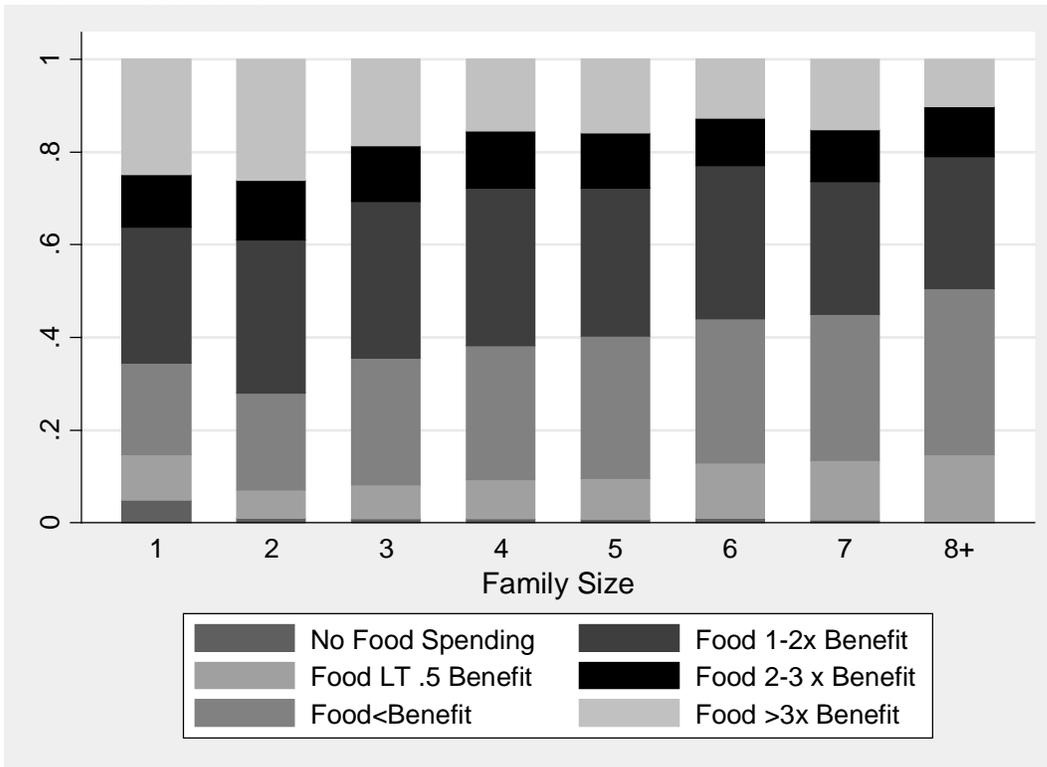


Figure 9: Food Spending Relative to Estimated Benefits, by Family Size
 Panel A: Adjusted Food Spending



Panel B: Food at Home



Appendix A Figure 1:
 Figure A1: Spending on Food at Home PCE versus CEX

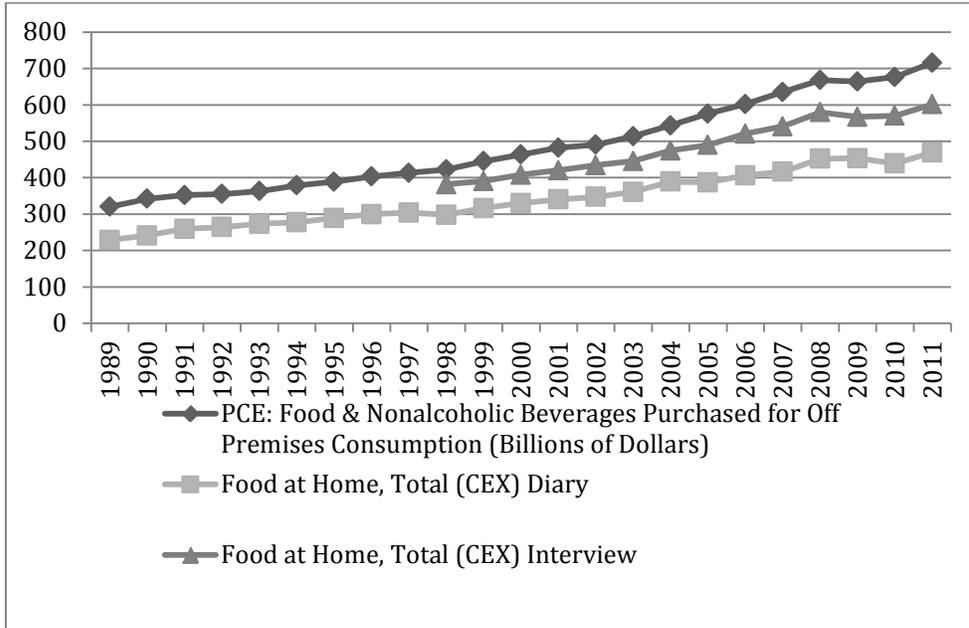


Figure A2: Ratio of PCE to CEX Spending: Food at Home

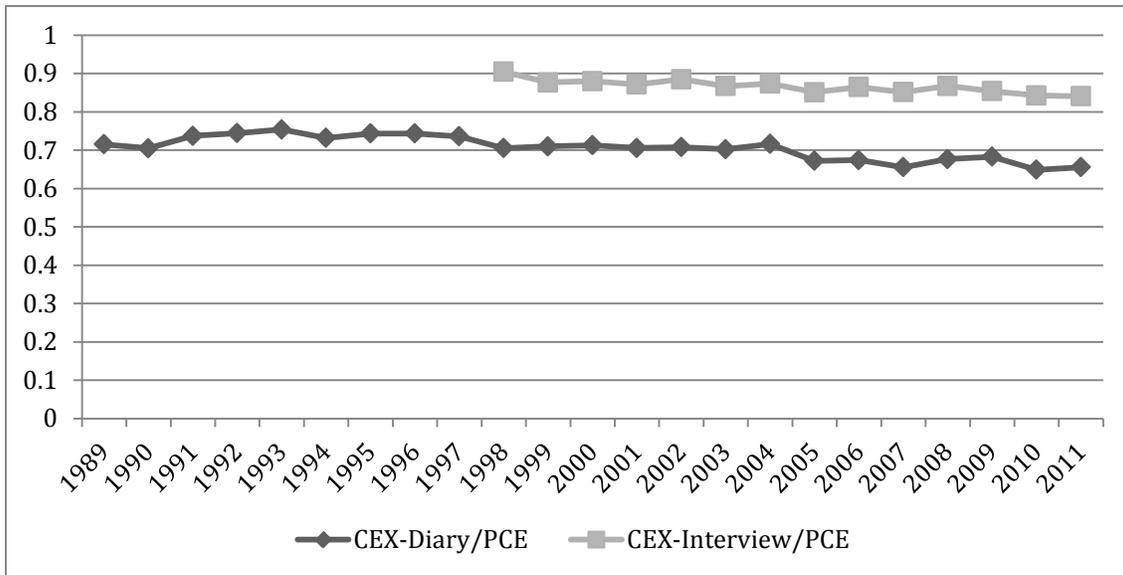


Figure A3: Spending on Food Away From Home PCE versus CEX

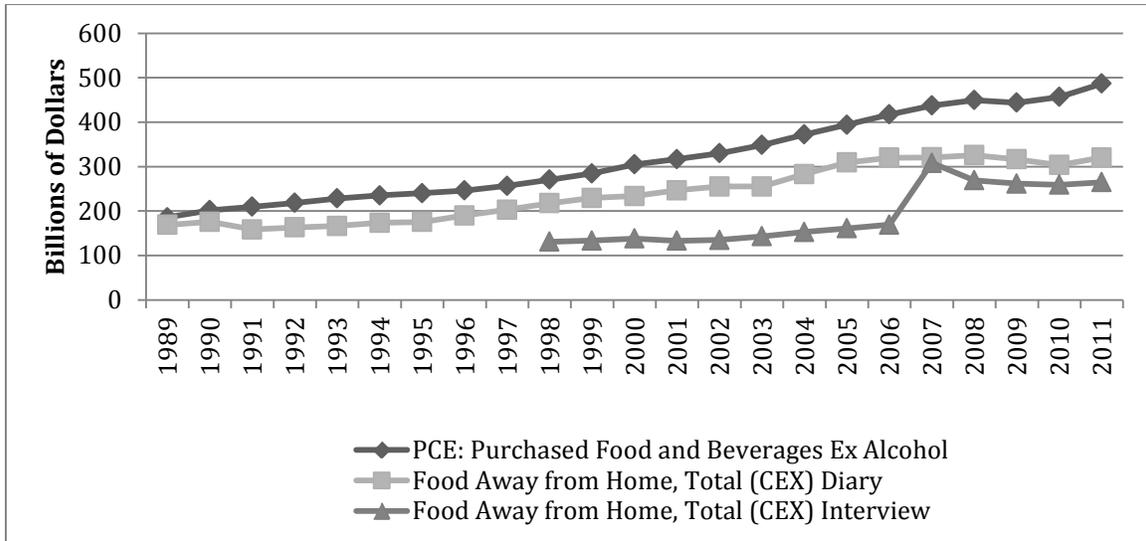
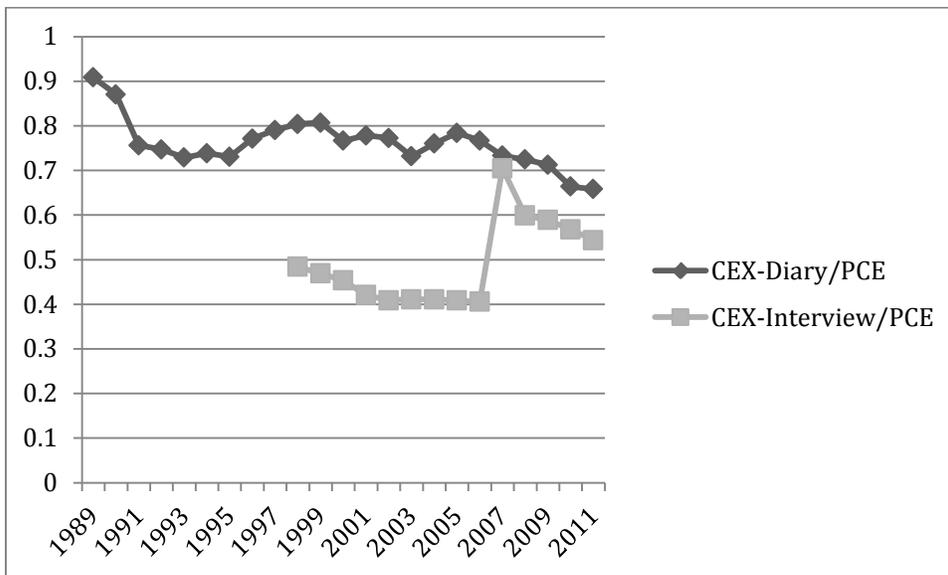
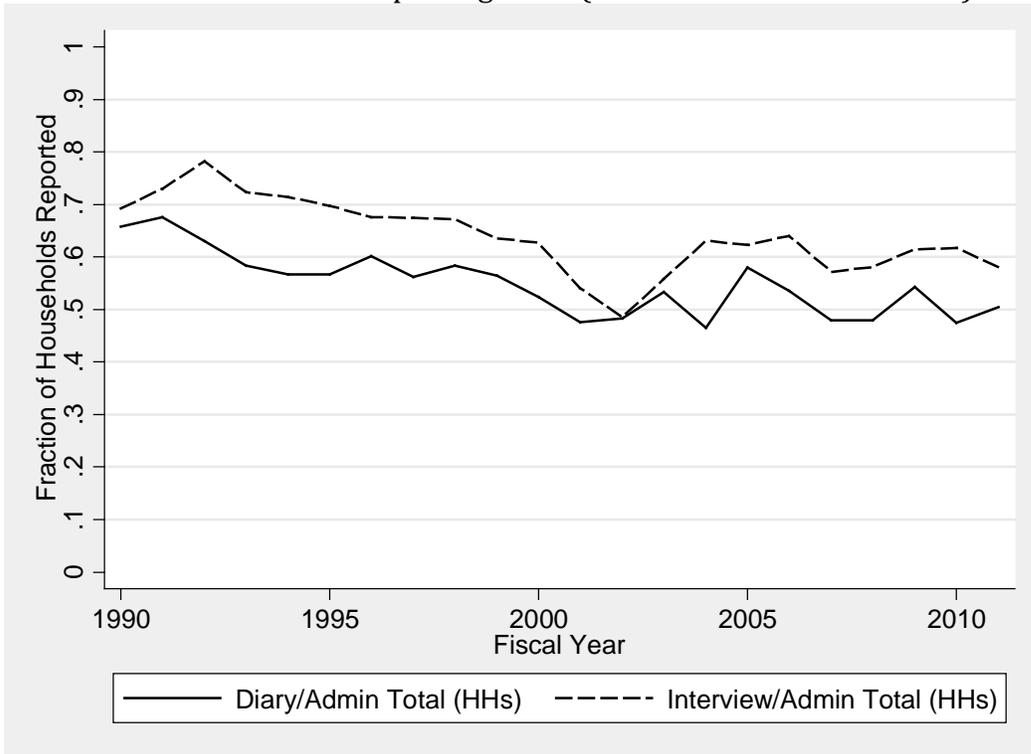


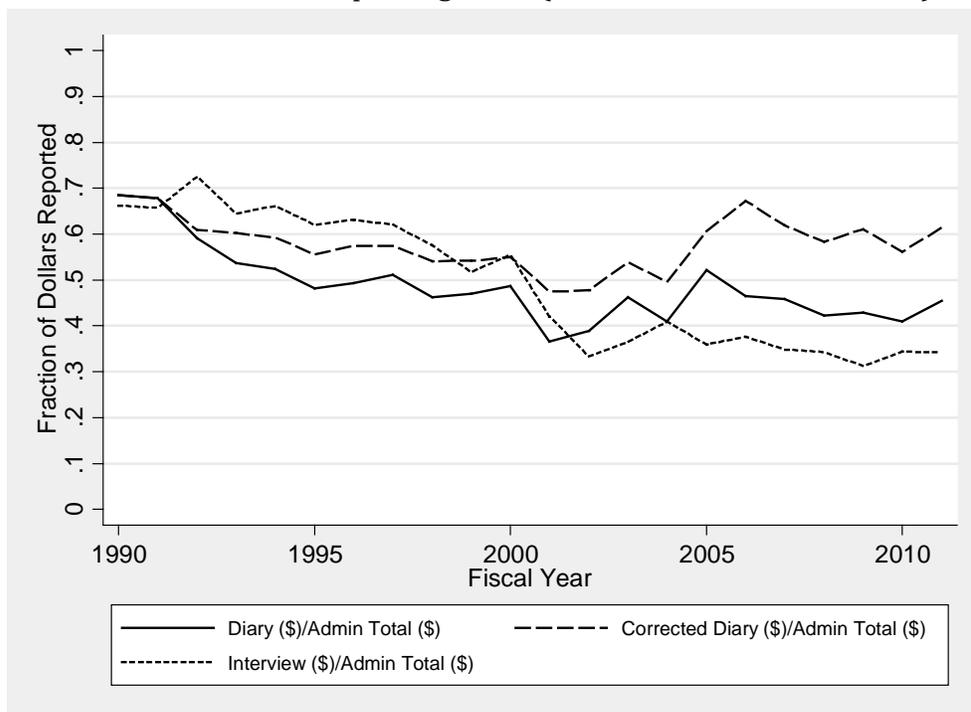
Figure A4: Ratio CEX/PCE: Food Away from Home



Appendix B Figure 1: SNAP Coverage Ratios in the CEX
 Panel A: SNAP Household Reporting Ratio (CEX to Administrative Data)



Panel B: SNAP Benefits Reporting Ratio (CEX to Administrative Data)



Panel C: SNAP Imputed Benefits vs Administrative Data

