Expenditure Response to Increases in In–Kind Transfers: Evidence from the Supplemental Nutrition Assistance Program

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Abstract

Recent studies on food stamp participant households' marginal propensity to spend out of food stamps versus income have had contradictory results: experimental studies have found household behavior aligns with standard economic theory where households' marginal propensity to spend on food out of food stamps is equivalent to cash income; observational studies find that households have a larger marginal propensity to spend out of food stamps than cash income. In this study, we re–examine this question by estimating how an unprecedentedly large increase in food stamp benefits due to the implementation of the American Recovery and Reinvestment Act affects food–at–home expenditure. We find that the policy change caused households to increase food–at–home expenditure as well as increase households' share of total expenditure allocated toward food–at–home expenditure. We compare these results to a time period without a meaningful food stamp policy change and find our results are unique to the ARRA implementation time period.

1 Introduction

Food Stamps, now known as the Supplemental Nutrition Assistance Program (SNAP), account for between 10% and 16% of total U.S. food–at–home spending (Wilde, 2012). Moreover, SNAP

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accounts for nearly 50% of food–at–home spending for low–income households. The current size the SNAP program is a recent phenomenon. SNAP expenditures increased by 93% between 2000 and 2010. This increase was due to an increase in the number of eligible households, the recent run up in food prices, but most importantly, it was due to an unprecedented increase in per household benefits as a part of the American Recovery and Reinvestment Act (ARRA) of 2009.

In this paper, we examine how a large increase in the value of an in-kind transfer affected household expenditure. More narrowly, we ask how this unprecedented increase in per household food stamp benefits affected participants spending on food–at–home. Standard economic theory predicts that for infra–marginal households – those who spend more on food than they receive in benefits – in–kind transfers operate identically to cash; the marginal propensity to spend out of food stamps is equal to the marginal propensity to spend out of cash. Any increase in food stamp benefits should be no different than an equivalent cash transfer.

While the theory is fairly clear, empirical tests have been contradictory. Broadly speaking, observational studies have found that the marginal propensity to spend on food from food stamps is higher than the marginal propensity to spend out of cash. In contrast, experimental and quasi–experimental evidence have found results consistent with theory where the marginal propensity to spend out of in–kind transfers and cash is identical.

Much of the work on how households treat in–kind transfers comes from a series of "cash out" experiments in which households were provided with a cash transfer in place of an in–kind transfer. Moffitt (1989) examines the effects of converting food stamps into cash in Puerto Rico in the early 1980s and finds that the face value of food stamps is nearly equivalent to the cash value of food stamps. This suggests that food stamps were valued at 100% of their face value. In a similar vein, Whitmore (2002) uses data from the San Diego and Alabama cash–out experiments in the early 1990s and also finds that infra-marginal households treat cash and food stamps as equivalent. Again in keeping with theory, extra–marginal households – those who spend less on food than they receive in benefits – adjust their food spending when food stamps are given in cash. On the other hand, two studies using the same data came to opposite conclusions of Whitmore. Using data from the San Diego food stamp cash–out experiment, Levedahl (1995) finds that the marginal propensity to spend on food is greater out of food stamp benefits than equivalent cash. Using the same data, Breunig and Dasgupta (2002, 2005), also find that the marginal propensity to spend on food is higher with food stamps than with cash income but argue that this is driven by changes in intra-household bargaining associated with the benefit receipt. Note that these "cash–out" experiments were limited in scope and occurred almost 20 years ago.

An alternative approach has been to compare the food spending of participant households to the spending of non–participants. In an early example, Smeeding (1982) finds a cash value of food

stamps to be 83 to 97% of face value. Senauer and Young (1986) study whether the elimination of the food stamp purchase requirement in 1979 and the resulting higher allotment affected a household's marginal propensity to spend on food out of food stamps. They find a the marginal propensity to spend out of food stamps is higher than the marginal propensity to spend out of cash income. Wilde and Ranney (2000) examine the timing of food shopping over the food stamp cycle using the Consumer Expenditure Diary Survey as well as the Continuing Survey of Food Intake by Individual (CSFII) and find that expenditure was highest during the first few days after food stamp receipt. The implication is that food expenditure out of food stamps differ from food expenditure out of cash. In more recent work, Wilde, Troy and Rogers (2009), estimate Engel curves for infra–marginal participant and non–participant households to see whether, all else equal, participants have higher levels of expenditure of food–at–home than non–participants over the period 2001–2005. They find that food–at–home expenditure for participants exceeded food–at–home expenditure for non–participants holding total income constant, suggesting a greater propensity to spend on food out of food stamps. A possible serious issue with many of these studies is that they fail to account for the potential selection bias inherent participation in a voluntary assistance programs. Currie (2003) argues that participants in social programs differ from non–participants in unobservable ways, hence selection issues persist in these studies.

Hoynes and Schazenbach (2009) leverage the phased implementation of the food stamp program during the 1960s and 1979s to address these difficult selection issues. They find that, consistent with the predictions of theory, participation in food stamps increases overall food expenditure at a similar rate to cash income. While results are convincing, the current food stamp program has evolved considerably since its inception. Notable changes include the elimination of the purchase requirement, the switch to electronic benefits (commonly referred to as EBT) and the concomitant reduction in the secondary market for food stamps. The population served by food stamps has also changed considerably since the period considered by Hoynes and Schazenbach (2009). Indeed some current participants may be third generation food stamp participants. Moreover, participation has nearly tripled since the program's inception, increasing from approximately around 4% of the US population in 1971 (USDA 2011) to nearly 15% in 2011 (FRAC 2011).

This paper also contributes to the literature on labeled transfers, that is unconditional cash transfers given a suggestive name to indicate their intended use but with no obligation to follow the label. For infra–marginal households, in–kind transfers and labeled transfers are equivalent. A major area of study has been the effect of so-called "child benefits," cash transfers given to households with children. Kooreman (2000) finds some evidence that child benefits tend to be allocated toward more expenditure on goods intended for children. In contrast, Blow, Walker and Zhu (2010) consider the effect of child benefit transfers on different categories of expenditure and

find that labeled income transfers tend to be allocated toward adult goods as opposed to other household items. In a similar spirit, Beatty et al. (2011) test the effect of the UK Winter Fuel Payment (WFP) program, a universal cash transfer nominally intended to assist elderly Britons to heat their homes. They find a statistically significant and economically important labeling effect; households spend significantly more on fuel with labeled WFP transfers than they would had the transfer been treated as cash income.

This paper makes several contributions. First, we leverage the effect of a plausibly exogenous and extremely large increase in program benefits to identify the effect of in–kind transfers on infra–marginal households. This will allow us to combine the best elements of the observational studies, with a credible identification strategy. Second, we study the current food stamp program; therefore the estimates are directly relevant to policy makers. Further, the current paper considers a slightly different question, how do *current* food stamp participants respond to *increases* in food stamp benefits, a question of interest both to economists and policy makers. Finally, because we directly examine a recently implemented federal policy intended to address the consequences of the recent economic downturn, we can provide some guidance as to the effectiveness of the program.

2 Institutional Detail

As the largest food and nutrition program in the U.S., the food stamp program was created to assist low income households in accessing sufficient food and nutrition when facing financial hardship. Historically, participation eligibility and maximum allotment of benefits are subject to federal policy changes primarily by the U.S. Farm Bill implemented every five years. Currently, to be eligible, households must have a gross income of 130% of or less than the Federal Poverty Guideline (FPG) and have a net income under the FPG. Benefit levels themselves are determined by the cost of the Thrifty Food Plan (TFP), a low cost diet plan constructed by the USDA for participants. In principle, food stamp benefits are pegged at 103% of the cost of the TFP from the previous quarter in order to make up for any inflation in the price of food.

The food stamp program has been subject to a number of important policy changes over the past 30 years. Although it was expanded after its inception in the 1970s, the program faced political pressure in the 1980s and benefits were cut while eligibility restrictions were tightened. Further important changes in 1996 saw a large federal overhaul of the food stamp program, the Personal Responsibility and Work Opportunity Act of 1996 (PRWORA), which restricted immigrants from participating in the program and cut benefit levels to 100% of the cost of the TFP. The PRWORA also required states to phase out stamps used to purchase food and introduce the Electronic Benefit Card (EBT) as a way for participants to purchase food using their allotment. Following the

PWORA implementation, participation declined at a rate much faster than had been expected and, as a result, the Farm Bill of 2002 restored eligibility for the formerly restricted population and created shortcuts to participation to ease access to the program. At the same time, introducing the EBT for participants reduced administration costs, fraud, as well as stigma associated with food stamp use, which may have increased overall participation.

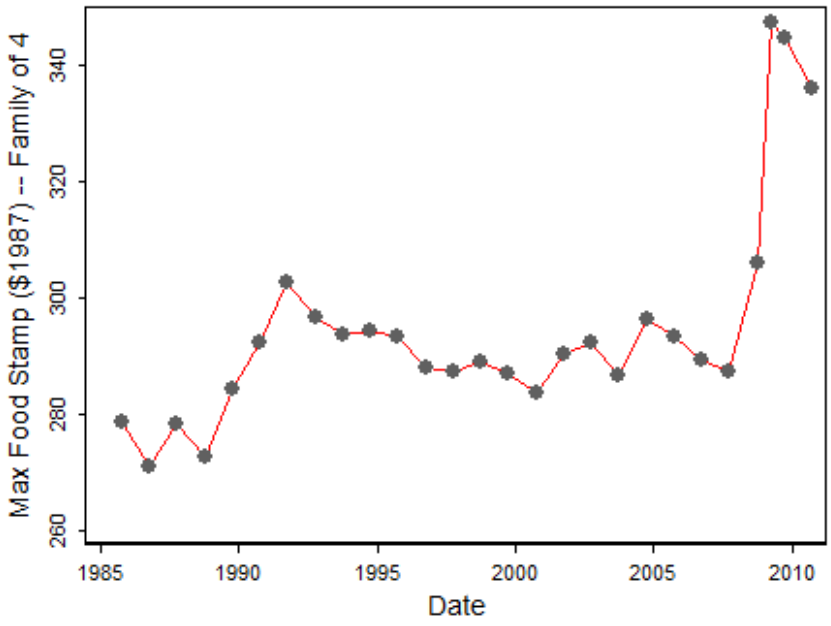
As a result of the "Great Recession" of 2007–2008 and the subsequent slow recovery, entitlement programs have seen very large increases in participation. The American Recovery and Reinvestment Act (ARRA) was implemented in February of 2009 in order to stabilize the US economy. Also called the Stimulus Package, the ARRA injected federal funds into a number of entitlement programs notably the food stamp program. The food stamp program received a direct increase in funding of $224 billion. This included $19.9 billion increase in food stamp funds which translated to an $80 increase in households benefits for a household of four. Table 1 contains the average food stamp benefit level for a family of four between 2006 and 2011. Note that benefit level changes have traditionally occurred in October of each year until the ARRA. The implementation of the ARRA resulted in an approximately 14% jump in average benefit level.

Table 1: Average Benefit Levels – Family of Four

Year	Average Food Stamp Benefit Family of 4	Percent Change in Benefit Level
Oct 2005 – Sept 2006	$506	1.4%
Oct 2006 – Sept 2007	$518	2.4%
Oct 2007 – Sept 2008	$542	4.6%
Oct 2008 – March 2009	$588	8.5%
April 2009 – Sept 2009	$668	13.6%
Oct 2009 – Sept 2012	$668	0%

Although the ARRA brought about the greatest changes to benefits, maximum benefit levels for participating households have been readjusted over the past 30 years as a result of the numerous policy changes. Figure 1 illustrates the changes in maximum benefit levels since 1985 for a family of four in 1987 dollars. The figure shows that throughout the 1980s and 1990s, benefit levels remained fairly stable. In the early 1990s, benefits increased by $3 billion when the maximum allotment was increased from 100% to 103% of the TFP, but subsequently declined in real terms as a direct result of PRWORA and the change in maximum allotment calculation. Finally, we see that the increase in benefits due to the implementation of the ARRA was unusually large in 2009. This jump in

Figure 1: Maximum Allotment for Family of 4: 1985–2011



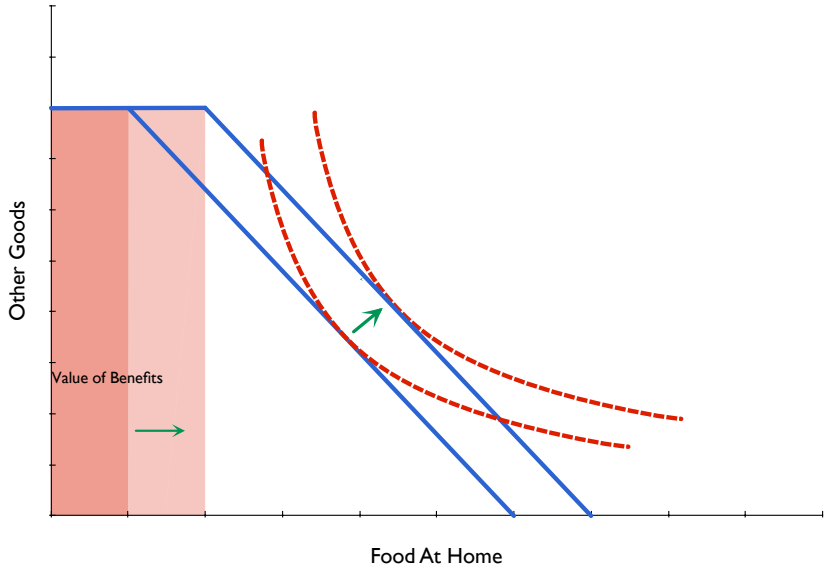
benefit levels provides us an opportunity to estimate the effect of a plausibly exogenous change in benefit levels on spending habits of participating households.

3 Conceptual Framework

Figures 1 and 2 provide intuition for our empirical approach. Figure 2 shows the effect of an in–kind transfer on an inframarginal household. We see that an increase in the value the in–kind transfer relaxes the budget constraint. As the value of in–kind transfer – food stamps – increases, the household's budget constraint shifts out, allowing for an increase in food and non–food spending. However as long as the household remains inframarginal, this increase will not induce substitution between goods.

Further, we can model the effect of an increase in benefits using an Engel curve approach, i.e. by observing how the relationship between food share and total expenditure changes in response to benefit level changes. Figure 3 illustrates this concept. When households experience an increase in resources, total expenditure increases and the household moves along the Engel curve from A to B. Following Engel's law, as expenditure increases, the expenditure share of food falls. However, if a household has a higher propensity to spend on food out of food stamp benefits than out of cash,

Figure 2: Expenditure Changes due to an Increase in Food Stamp Benefits



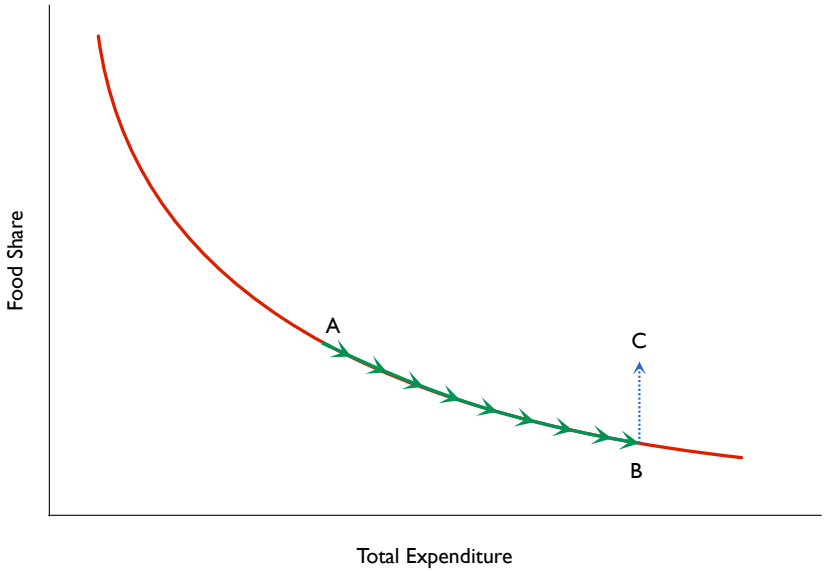
the food share will shift up from B to C.

Thaler's (1980, 1985) theory of mental accounting may provide an explanation for the cash-out puzzle. Thaler posits that households categorize income based on its source – salary, asset or future income. Accordingly, household expenditure is assigned to specific income accounts where funds are labeled. Because of this, the marginal propensity to spend is unique from each income account, where money from one category of income is not equivalent to the other (Rockenbach 2003) and likewise money from each income category is allocated to specific and distinct expenditure. In this context, participants classify food stamps into a specific income account intended only for food purchases. Therefore, the marginal propensity to spend from food stamps and income will not be equivalent. In sum, food stamp households may distinguish income by its stated expenditure purpose.

4 Data

Our sample is drawn from the Consumer Expenditure Quarterly Interview Survey (CEX) for 2007 until 2010, or before and after the implementation of the ARRA. The CEX is administered quarterly by the Bureau of Labor Statistics and represents the U.S. civilian non–institutionalized population. Participating households are interviewed once per quarter for five consecutive quarters. Each quarter contains approximately 7,000 participating households. Participating households, or

Figure 3: Engel Curves: Labeling Effect



"consumer units", are either single families in a household, a person financially independent living in a household alone or with others, or two or more people who make financial decisions jointly. For our purposes, consumer unit and household will be used interchangeably to describe our unit of analysis.

The CEX collects data on large purchases such as property and vehicles as well as regular purchases such as food expenditure and rent. The CEX also contains detailed demographic information such as age, race, gender, marital status, family number, annual salary as well as any welfare program participation and annual benefit level. In order to observe households under different benefit levels, we follow households across survey quarters. A potential limitation is that the CEX follows addresses and not specific households, therefore we dropped any households whose demographic variables were inconsistent over their survey period. For example, if age changes by more than one year or family size changes implausibly, the households are dropped from the sample. Further, we exclude households with 6 or more children

Finally, throughout the period of analysis with the exception of 2009 and 2010, benefit level changes occur in October of each year. Because a household appears multiple times in the survey, we are able to exploit the longitudinal quality of the data set and observe the majority of households before and after a benefit level increase. To capture the yearly policy change that occurs in October, we create a dummy variable that indicates whether the household is responding to the survey before or after a policy change. This variable, $After$, will take on the value of zero before a policy change

and one after the change. Each dummy is specific to a given household's timeline in the survey.

5 Empirical Approach

To estimate the effects of the benefit level changes brought about by the ARRA of 2009 on food–at–home expenditure, we limit our analysis to years before and after the implementation of the policy. While the ARRA was plausibly exogenous to individual households, it is important to note that this time period was undoubtedly tumultuous. To separate the effects of program participation from time variant effects, such as seasonality and shifts in the macroeconomy, we use a difference–in–difference approach. This requires the construction of a quasi-control group. To this end, we use the Coarsened Exact Matching approach (CEM).

The purpose of the CEM, proposed by Iacus, King and Porro (2008) is to create a quasi-control group with a distribution of explanatory variables similar to the treatment group. In other words, this process improves the balance between the treatment and control group. By balancing the data, we are able to estimate the effect of the treatment, in this case food stamp participation, by comparing two groups who differ only by whether they are in a treatment or control group thereby avoiding unobservable characteristics that affect selection into treatment as well as the outcome of the treatment. The strength of CEM is that the level of imbalance is determined prior to the estimation process. As a result, bias that can result from other matching strategies can be avoided.

To balance the data, we coarsen specific demographic variables by recoding continuous variables into well–defined categories and match households who fall within the same categories. For example, instead of matching the treatment and control groups by exact family size reported in the data, we coarsen the *Family Size* variable by creating three categories for family size: family size that is less than or equal to two, family size that is between two and five, and family size greater than five. Likewise, we coarsen the *Age* variable to match treatment and control groups by age categories. Categories include ages below 20, between 20 and 35, between 35 and 50, between 50 and 65 and above 65. If a household falls within the category it is matched with another household that falls in the same category. We also match using race dummies, marital status, income brackets and employment. Following Ho et al. (2011), we use CEM exclusively to construct a quasi-control group that resembles our treatment group and discard any unmatched data. As a result, our sample only contains matched households. We choose CEM based on evidence that CEM produces superior outcomes compared to more popular matching methods (Iacus, King and Porro, 2008). Finally we exclude non–participant households with total expenditure 150% greater than average total expenditure of participating households.[1]. Summary statistics for treatment and quasi-control

[1]Results are robust to a wide range of alternative cut-offs.

groups are included in Table 2

Table 2: Summary Statistics 2007–2011

	Food Stamp Part.		Non–Participants	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Food at Home Exp	986.30	683.09	808.81	467.11
Share FAH of Total	21.10	25.38	16.20	9.02
Food Away Exp	182.97	317.50	260.36	318.15
Share FAFH of Total	2.99	4.3	4.65	5.59
Total Exp	5,656.76	4,337.57	5,459.43	1,889.11
FS Amount	1,726.72	1,899.81		
Black	0.268	0.443	0.13	0.336
White	0.690	0.463	0.851	0.356
Asian	0.022	0.146	0.013	0.114
Female	0.719	0.45	0.576	0.494
Married	0.294	0.456	0.351	0.477
Employed	0.472	0.499	0.581	0.493
Family Size	2.954	1.783	1.923	1.214
Observations		4,513		24,080

Food expenditure and total expenditure levels differ between groups. Food–at–home expenditure is higher in participant households as is share of total expenditure allocated toward food–at–home. Predictably, food–away–from–home is much lower in participant households. This is likely due to the restrictions placed on types of food participant households can purchase using food stamps. Because of this the share of total expenditure allocated toward food–away–from–home is much lower in non–participating households. Finally, total expenditure is quite similar in our sample due to our editing of the sample. Both sets of households spend around $5,500 on total expenditures within the quarter of the survey.

The differences in the demographic characteristics of each group are suggestive of the issues faced by much of the observational work cited above. Even after matching our quasi–control group is more racially homogenous, more likely to be headed by a male, more likely to be married, more likely to be employed and have a smaller family size. However because the ARRA was plausibly exogenous to individual households, the differences between the treatment and quasi–control group are less problematic. In sum, our research design uses the control group to control for changes in expenditure which mirror the changes the food stamp recipient group would have experienced absent the ARRA.

Two time–dependent events may affect our analysis. As we previously stated, the time period of our analysis was tumultuous due to the economic crisis of 2008. We can assume non–participating and participating households alike were affected by the crisis. In general, it is plausible that all households altered their expenditure during their time period regardless of program participation.

The timing of the policy changes may also affect our analysis. Throughout our data, policy changes consistently occur in the month of October. Two large benefit increases occurred during our analysis, one of which occurred in October 2008. In the majority of cases, households who responded to surveys before the policy change responded in summer months while the majority of households who responded to surveys after the policy change responded in late fall and winter months, months containing holidays such as Thanksgiving, Christmas and New Year's which affect total expenditure as well as food expenditure. Because of these strong temporal trends in our data, we must difference out the effects to avoid further endogeneity.

To do this, we use a difference–in–difference estimation following the discussion from Angrist and Pischke (2008). The difference–in–difference model assumes that participants and non–participants experience similar trends in food–at–home expenditure absent the policy change. Because we are specifically interested in the effect of an increase in benefit level on participant households, we use this approach to control for differences between time periods that affect changes in expenditure behavior in both participant and non–participant households such as macroeconomic chaos after 2008 and expenditure affected by summer or winter holidays rather than controlling for selection into treatment, the standard motivation for using difference–in–difference methods.

We define each household as a participant, $i = 1$, or a non–participant, $i = 0$. Each household, h, reports a measure of food–at–home expenditure before and after a policy change where F_{1ht} represents a measure of food–at–home expenditure of a participant and F_{0ht} represents a measure of food–at–home expenditure for a non–participant[2]. The policy change occurs in two separate time periods represented by t; t takes on a value of zero before a policy change and one after a policy change.

For non–participating households, expected food–at–home expenditure is determined by specific household characteristics, η_h, and time effects experienced by all households, γ_t. Therefore, the food–at–home expenditure equation for each non–participant household is

$$E(F_{0ht}|h,t) = \eta_h + \gamma_t. \tag{1}$$

Including participants in the analysis, we add a food stamp participation dummy, D_i, to the

[2]Due to restrictions on what households can purchase with food stamps, we use measures of food–at–home expenditure rather than total food expenditure as the outcome variable for participants. In most cases, participant households are prohibited from using food stamps to purchase food away from home items such as restaurant food and fast food.

food–at–home expenditure equation.

$$F_{iht} = \eta_h + \gamma_t + \beta D_i + \epsilon_{iht} \tag{2}$$

where β is the effect of food stamp participation on food–at–home expenditure.

This is followed by the difference of food–at–home expenditure by non–participants before and after the policy change

$$E[F_{iht}|i = 0, t = 0] - E[F_{iht}|i = 0, t = 1] = \gamma_0 - \gamma_1 \tag{3}$$

and the difference of food–at–home expenditure by participants before and after the policy change

$$E[F_{iht}|i = 1, t = 0] - E[F_{iht}|i = 1, t = 1] = \gamma_0 - \gamma_1 + \beta. \tag{4}$$

From here, we can estimate adjustments in food–at–home expenditure by food stamp participants after the policy change by estimating the average treatment effect of the treated

$$E(F_{iht}|i = 0, t = 0) - E(F_{iht}|i = 0, t = 1) - E(F_{iht}|i = 1, t = 0) - E(F_{iht}|i = 1, t = 1) = \beta \tag{5}$$

where β is the causal effect of food stamp benefit level change on the food–at–home spending of food stamp participants. This permits us to difference out the time trend, $\gamma_0 - \gamma_1$, that may affect our results.

For our estimation process, we consider two outcome variables: (1) $\ln(F_{iht})$, log food–at–home expenditure, and (2) w_{iht}, food–at–home share, our Engel curve specification. Model (1) allows us to observe any overall changes in food–at–home expenditure as a result of a benefit level increase. Model (2) allows us see whether households increase food–at–home share due to a jump in resources.

Our first model estimates the effect of the policy change on log food–at–home expenditure for food stamp participants

$$\ln(F_{iht}) = \alpha_1 + X_h\eta_h + \alpha_2 FS_{ht} + \alpha_3 \text{After}_t + \beta(FS_{ht} * \text{After}_t) + \delta_m + \gamma_t + +\epsilon_{iht}, \tag{6}$$

where $After_t$ represents the policy dummy that takes on the value of 0 before the policy implementation and 1 after the policy implementation within each household's time period in the survey; δ_m and γ_t represent month and year fixed effects to control for seasonality and yearly changes that affect all households; the variable X_h represents household demographics including age, race,

gender, employment status, number of earners in households, family size, and marital status. We run this model using two specifications and, therefore, FS_{ht} represents two distinct food stamp variables run separately: (a) a food stamp participation dummy which takes on the value of zero if households are non–participants and one if households are participants; the difference–in–difference estimator is the interaction of the food stamp dummy and $After$, the policy dummy; (b) the log of food stamp benefits received by participating households; the difference–in–difference estimator is the interaction between the log of food stamp benefits variable and the policy dummy. This specification allows us to distinguish between how participation affects food–at–home expenditure and share of total expenditure and how benefit levels affect food–at–home expenditure and share of expenditure.

Our second model represents the Engel curve which estimates the effects of a benefit level change on the food share of total expenditure, w_{iht}.

(7)

$$w_{iht} = \alpha_1 + X_h\eta_h + \alpha_2 FS_{ht} + \alpha_3 \text{After}_t + \beta(FS_{ht} * \text{After}_t) + \alpha_4 TotExp_{iht} + \alpha_5 TotExp^2_{iht} + \delta_m + \gamma_t + \epsilon_{iht},$$

where $TotExp_{iht}$ represents total households expenditure during the time period. As in Model (1), FS_{ht} represents the distinct food stamp variables run separately.

6 Results

Table 3 reports our main results. Note that in the Engel curve specification, budget shares were multiplied by 100 in order to interpret results as percentages. We find statistically significant expenditure responses as a result of benefit increases. In the food–at–home expenditure model, the effect of food stamp participation, $FS\ Dummy$, is insignificant, but the corresponding difference–in–difference variable, DD_1 is positive and significant. This indicates that the policy change due to the ARRA cause participating households to increase food–at–home expenditure. In other words, the increase in benefits resulted in higher levels of household spending on food–at–home. Food stamp participants increased their food–at–home expenditure by 6.0% after the policy change.

The estimates from $Log\ FS\ Benefits$ are predictably negative and significant in the expenditure model indicating an increase in the food stamp benefit results in a 1.5% decrease in food–at–home expenditure, all else equal. The corresponding difference–in–difference estimator, DD_2, indicates participating households increase their food–at–home expenditure by 1% after the implementation of the policy.

The Engel Curve model yields similar results. Food Stamp participation, $FS\ Dummy$, is significant, indicating a 1.3% drop in food–at–home expenditure as a share of total expenditure given participation. The corresponding difference–in–difference estimator indicates participating house-

holds increased the share of total expenditure allocated toward food–at–home by nearly 1%. Similarly, $Log\ FS\ Benefit$ is negative but insignificant. The corresponding difference–in–difference estimator, however, is significant and indicates participating households increase their share of total expenditure allocated toward food–at–home by 0.14%.

Consistently, these results reveal that food stamp households spend more on food–at–home as a result of increased benefits. What's more, food–at–home as a share of total expenditure increases significantly in each model, confirming previous results that households have a higher marginal propensity to spend on food–at–home out of food stamps than equivalent cash.

7 Robustness

The difference–in–difference model assumes that participants and non–participants should experience similar trends in food–at–home expenditure absent the policy change. To investigate deviations from this maintained assumption, we consider a placebo period where benefits were roughly constant in real terms, and a placebo good, food–away–from–home, which cannot be purchased with food stamp benefits.

7.1 Placebo Period

We found evidence that households responded to an unusually large increase in the value of an in-kind transfer by spending more on the tied good than is consistent with the predictions from theory. If important increases in benefit levels are driving observed spending behavior, we would expect to observe no change when benefits are stable. To investigate this possibility, we rerun models (1) and (2) during the time period between 1988 until 1991 when benefits were relatively stable. As above, the share outcome variable was multiplied by 100 to ease interpretation. These results are shown in Table 4.

In both models, the difference–in–difference estimators are not statistically significant. This implies households did not significant alter food–at–home expenditure during this relatively stable time period. The lack of significant results in the placebo period suggest that the increase in benefits due to the ARRA did prompt household to spend more on food–at–home than they otherwise would have spend during stable periods.

Table 3: Years 2007–2011

VARIABLES	(1) Log Food at Home	(2) Share	(3) Log Food at Home	(4) Share
After	-0.000	0.120	-0.007	0.186
	(0.020)	(0.296)	(0.019)	(0.300)
FS Dummy	-0.046	-1.252**		
	(0.048)	(0.530)		
DD_1	0.060*	0.970***		
	(0.036)	(0.343)		
Log FS Amount			-0.015**	-0.124
			(0.007)	(0.079)
DD_2			0.009*	0.138***
			(0.005)	(0.050)
Age	0.024	0.237	0.026	0.222
	(0.017)	(0.179)	(0.016)	(0.178)
Marital Status	-0.048*	0.118	-0.028	-0.042
	(0.026)	(0.277)	(0.023)	(0.284)
Education	0.084	-0.567	0.066	-0.430
	(0.057)	(0.415)	(0.056)	(0.414)
Children in HH	0.044	0.217	0.023	0.405
	(0.037)	(0.435)	(0.034)	(0.443)
Black	-0.155	-0.719	-0.166	-0.641
	(0.160)	(1.285)	(0.148)	(1.303)
Asian	0.000	-0.721	0.033	-1.067
	(0.103)	(1.970)	(0.132)	(1.489)
Other Race	-0.045	1.806	-0.160	1.505
	(0.097)	(2.376)	(0.119)	(2.008)
Employed	-0.036	-3.778	-0.053	-3.686
	(0.052)	(2.908)	(0.051)	(2.883)
No. of Earners	0.057***	-0.048	0.41	0.070
	(0.022)	(0.253)	(0.021)	(0.247)
Constant	5.035***	9.546	4.044***	17.097
	(0.899)	(10.943)	(0.874)	(11.706)
Observations	28,355	28,347	28,355	28,347
R-squared	0.003	0.006	0.055	0.018

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Robustness – Placebo Period 1988–1991

	(1)	(2)	(3)	(4)
VARIABLES	Log Food at Home	Share	Log Food at Home	Share
After	0.021	-0.741**	-0.001	-0.485
	(0.028)	(0.377)	(0.027)	(0.369)
FS Dummy	-0.023	-0.250		
	(0.058)	(0.687)		
DD_1	0.014	0.816		
	(0.057)	(0.620)		
Log FS Amount			-0.004	0.018
			(0.008)	(0.095)
DD_2			0.004	0.070
			(0.007)	(0.087)
Constant	6.019***	18.693	5.490***	24.912
	(1.354)	(15.834)	(1.330)	(15.599)
Observations	13,578	13,570	13,578	13,570
R-squared	0.008	0.011	0.070	0.054

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

7.2 Food Away From Home

Results above indicate that the large benefit level changes due to the ARRA has a disproportionate effect on household food–at–home expenditure. To check the robustness of our results, we run identical regressions as above using expenditure on food–away–from–home as our outcome variable. The Food Stamp program restricts the kinds of food participants can purchase; food–away–from–home such as restaurant and fast food are prohibited. Because of this, we would not expect to see any kind of excess spending on food–away–from–home as a result of increased food stamp benefits. Results are presented in Table 5.

Table 5: Robustness – Food Away From Home

	(1)	(2)	(3)	(4)
VARIABLES	Log Food Away	Share	Log Food Away	Share
After	-0.006	-0.238**	-0.026	-0.254**
	(0.052)	(0.108)	(0.051)	(0.107)
FS Dummy	-0.259**	-0.269		
	(0.115)	(0.208)		
DD_1	0.066	0.165		
	(0.081)	(0.144)		
Log FS Amount			-0.055***	-0.052*
			(0.017)	(0.031)
DD_2			0.015	0.031
			(0.012)	(0.021)
Constant	3.052	6.016	0.901	4.558
	(2.426)	(4.939)	(2.378)	(4.949)
Observations	28,355	28,347	28,355	28,347
R-squared	0.008	0.014	0.043	0.018

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

We see that the difference–in–difference estimates are small in magnitude and not statistically significant. In each model, food stamp participants do not significantly increase spending on food–away–from–home expenditure nor on food–away–from–home's share of total expenditure. These results imply that policy changes that occurred during this time period only affected households' decisions on expenditure on food–at–home but not in food–away–from–home.

8 Discussion

Given a statistically significant expenditure response, we now ask whether responses were economically important. There are four estimates of interest from our analysis. We first focus on the effects of benefit increases on food-at-home expenditure displayed in columns (1) and (3) in Table 3 and then consider the effects of benefit increases on budget shares displayed in columns (2) and (4) in Table 3.

We see that food stamp participants spend roughly 6% more on food stamps after the increase in benefits during the period in question. The average household in our sample spent of $986.30 per quarter on food–at–home, which translates into an increase of roughly $59 per quarter due to the increase in benefits. The average household in our sample experienced an increase in benefits of roughly $165 which translates into 36% of the benefit increase was spent on food–at–home. Continuous results tell a similar story. The results indicate that a one percent change in food stamp benefits translate into a 1% increase in food–at–home expenditure. The estimate translates to a nearly $10 increase in food–at–home expenditure given a 1% increase in benefits. If household benefits increase by $17, or 1% of the average $1,726 benefit, a household will spend $10 more on food–at–home or nearly 60% of the benefit increase.

We now turn to the Engel Curve specification. In short, we ask how large was the change in budget share from B to C in Figure 3 was. The average household in our sample spent approximately 21% of total expenditure on food. For the discrete specification, we see that participating households respond to increases in benefits by increasing food's budget share by almost 1%. Therefore, this results in a slight increase from 21% to nearly 21.21% of total budget share. Continuous results are similar. A one percent increase in benefits leads to a 0.140% percent increase in food's share of total expenditure. The average household's benefits increased by 9.7% after the policy change. This results in an overall increase of food–at–home as a share of total expenditure by nearly 1.4%.

Our results indicate households increase their food–at–home expenditure due to the benefit level increase at a greater rate than other expenditure. This implies that households have a higher propensity to spend on food–at–home out of food stamps than income. To calculate a household's marginal propensity to spend from food stamps, we divide the change in food–at–home expenditure due to the policy change by the change in total expenditure over the same time period. Average changes due to the ARRA in food–at–home expenditure was around $59 for participant households. Likewise, change in total expenditure was $188. Therefore, participating households had a marginal propensity to spend from food stamps of around 0.31.

How do these results compare to previous works? Two papers have provided comprehensive reviews of studies that estimate the impact of the food stamp program and provide a number of estimates for marginal propensities to spend out of food stamps. Fraker (1990) found that most

estimates ranged from 0.17 to 0.47. Fox et al. (2004) summarized over 20 studies from 1976 until 2001 and found the estimates of the marginal propensity to spend from food stamp ranged from 0.17 to 0.86, although most estimates were between 0.20 and 0.40. Table 6 summarizes the reviews of Fraker and Fox et al. as well as estimates of marginal propensities to spend from other studies discussed in this paper. On average, studies have found households have a marginal propensity to spend out of food stamp of around 0.30, while households have a marginal propensity to spend out of cash income of 0.05. Comparing our calculation for the marginal propensity to spend from food stamps to the results in Table 6, we can see our results are consistent with these findings.

Table 6: Summary–Marginal Propensities to Spend

Authors	MPS from Food Stamps	MPS from Income	Time Period
Hoynes and Schazenbach (2009)	0.163	0.086	1968–1978
Breunig and Dasgupta (2005)	0.298	0.057	1990s
Fox et al (2004)	0.17 - 0.86	–	1970s–2000s
Levedahl (1995)			
Mean	0.263	0.066	1990s
Fraker (1990)	0.17 - 0.47	0.05 - 0.13	1970s–1980s
Moffitt (1989)			
Linear	0.16	0.13	1982
Log	0.11	0.12	1982
Senauer and Young (1986)			
PSID 1978	0.327	0.05	1978
PSID 1979	0.264	0.073	1979

9 Conclusion

Our results indicate that the increase in benefits as a result of the implementation of the ARRA caused participating households to increase food–at–home expenditure as well as the share of total expenditure spent on food–at–home. For households who participated in the program, the policy change brought about a 6% increase in food–at–home expenditure and a 1% increase in food–at–home as a share of total expenditure. Similarly, food–at–home expenditure increased by 1% as a result of an increase in benefits after the policy change. Moreover, we find a similar estimate of

the marginal propensity to spend out of food stamps to most observational studies of 0.31. This paper confirms previous findings that food stamp participating households do not necessarily follow standard economic theory which claims the marginal propensity to spend out of food stamps and cash are equivalent.

This paper makes several contributions to the literature. First, to identify the effects of in–kind transfers on household food–at–home expenditure, we used a plausibly exogenous and large increase in program benefits. Because this program implementation was exogenous to households, we were able to confirm results of a number of previous observational studies with a reliable identification procedure. Our results are in line with estimates of the marginal propensity to spend out of food stamps from other observational studies. As such, we can make a more credible conclusion that increases in benefits do cause increases food–at–home expenditures.

Second, this paper uses contemporary data on the current food stamp program. Previous studies used data from 20 to 40 years ago. Therefore, results from those papers may not be relevant to current participating households and current food stamp policy. On the other hand, this study uses the most recent data available on food stamp participating households' spending behavior and, therefore, is directly relevant to current participants as well as current policy.

Third, our study considers how current participants respond to *increases* in food stamp benefits. Previous studies have focused on the introduction of the program or "cashing out" on benefits without considering how changes in benefits levels affect households behavior. Our study confirms that increases in benefits alter household food–at–home expenditure.

Finally, this is the first paper to identify the effects of the ARRA and, as a result, has direct and current policy implications. Indeed, this study outlines significant behavioral effects of the stimulus policy which implies the food stamp program is effective in assisting households with obtaining more food when benefit levels increase.

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