

The Impact of Food Stamp Program on Relative Food Consumption and Food Choices

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Abstract

In this paper, the effects of the Food Stamp (FS) Program (now referred to as Supplemental Nutrition Assistance Program-SNAP) on individuals' food choices are evaluated. In other words, I examine how households' food choice or relative food consumption is changed by FS participation. For this purpose six food groups are created using 2016 Consumer Expenditure Diary Survey (CEDS) results and Consumer Price Index (CPI). Five of these food groups are food consumed at home which are bakery products, dairy products, meat and meat products, vegetables, and others. Also food consumed away from home is included as sixth group. Multinomial probit and conditional logit models are applied to analyze the data set. The analyses results show that FS can change individuals' food choices by decreasing the price effect on food since FS is a kind of income transfer which subsequently affects participants' price sensitivity. In addition, the results show that FS usage may increase the relative meat consumption of households and food consumed away from home in comparison to other food groups.

Keywords: Consumption, Conditional Logit, Food Choices, Food Demand, Food Stamp Program, Multinomial Probit, SNAP.

JEL Classification: D90, D91, E21, I38.

1. Introduction

The United States offers numerous important governmental support programs, such as the Supplemental Nutrition Assistance Program (SNAP) (formerly known as Food Stamp Program²), National School Lunch Program (NSLP), and the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). The purpose of these programs is to increase food security, and more importantly the quality and quantity of food available to individuals. Considering its nutritional perspective, the WIC includes specific goods lists, such as

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2. Consistency of the literature, I use Food Stamp Program instead of SNAP.

milk, eggs, and vegetables. Similarly, the NSLP stipulates that each meal for children must include vitamins A, and C, iron, calcium, protein and less than 10% saturated fat. Hence, both the NSLP and WIC address not only the quantity of food available but also the quality. On the contrary to NSLP and WIC, food stamp program does not have these types of restrictions¹.

The body of literature regarding investigations of FS is broad. Some studies indicate positive results, namely that FS participation reduces food insecurity (FI) (Kabbani and Kmeid, 2005). Ratcliffe et al. (2011) investigated the effectiveness of FS in reducing FI by using a dummy endogenous variable model with instrumental variable (IV estimator) to manage the most significant issue highlighted in the literature which is selection bias problem. The results showed that by using a strong IV model on nationally representative (Self Invested Personal Pension) SIPP, FS reduced the food-related hardship of a household. Furthermore, Mykerezi and Mills (2010) evaluated the impact of FS on FI using the Panel Survey of Income Dynamics (PSID) 1999 data. The authors investigated FS participants endogenously to estimate treatment impacts as a binary choice by using state-level errors in over payments or underpayments of FS benefits and a one year FI scale. The results of study provided strong positive evidence that FI may decrease at least 19% by participating in FS.

The decrease of FI is deemed to increase participants' health. However, some issues, such as obesity and diabetes have arisen with program. It supplies additional food, but the goods chosen depend on participants' preferences. In other words, FS does not restrict people's food choices unlike the WIC or NSLP as mentioned previously. Minnesota requested permission from the U.S. Department of Agriculture (USDA) to prohibit the purchase of candy and soft drinks with FS benefits (Guthrie et al., 2007). This proposal was intended to promote diet quality by limiting the purchase of empty calories but it was rejected. California, on the other hand, has passed a "Healthy Purchase" pilot program. For every \$1 of FS spent on fresh produce,

1. FS only has restriction about alcoholic beverage, tobacco and non-food items, such as pet foods and household supplies. For more information see: <http://www.fns.usda.gov/snap/eligible-food-items>.

participants refunded a specific portion as a bonus under this program (Guthrie et al., 2007). Nevertheless, no specific restrictions or limitations exist regarding the purchasing of junk food such as candy, soft drinks, or fatty foods.

Huang et al. (1981) conducted one of the early studies regarding FS participants' food choices. The authors used Consumer Expenditure Dairy Survey (CEDS) to examine the impact of FS on low-income families' food patterns. Their results indicated that behavior related to the amount of food purchased by households may be influenced by FS. These researchers focused only on the low-income group, but the sample for current study includes different income groups.

Basiotis et al. (1983) evaluated the nutrition consumption patterns of low-income FS receivers. They used the Engel curve and data from 1977-1978 Nationwide Food Consumption survey. The authors applied a simultaneous equation system for the estimation of food costs and diet component availability levels of food at home. The results of the study showed that diet component availability level was relatively constant across households with different income levels. Because different income levels are addressed in the current study, I believe it may provide more comprehensive knowledge about FS participants' food choices than Huang et al. (1981) and Basiotis et al. (1983) did.

Furthermore, Wilde and Ranney (2000) evaluated the mean of food spending among FS users and found that participants spend increased amounts within the first three days of receiving benefits. These spending patterns represent shopping frequency and food intake decisions over time in light of FS benefits. The researchers used a non-linear Engel curve on CEDS data set. The results indicated that the frequency of households' grocery shopping may be influenced by involvement in the program.

Guthrie et al. (2007) mentioned the significance of FS participants choosing food with high nutritional quality rather than focusing on quantity. Their results suggested that the efficiency of the program may be affected by economic factors such as, the budget share of FS and food expenditure patterns of participants. Correspondingly, Wiig and Smith (2009) investigated the relationship between low-income women's shopping behavior and participation in FS to examine food

choices. They applied a demographic and diet/ health perception questionnaire before measuring participants' weight, height, and body mass index (BMI). The results showed that food choices and grocery shopping behavior depend on participants' economic, environmental conditions and preferences. Although the study was similar to the current study because it considered the FS users' food choices, Wiig and Smith (2009) restricted their study only to low-income women.

Larson and Story (2009) indicated the importance of the influence of environmental conditions on households' food choices as Wiig and Smith (2009) mentioned before. Their findings showed that a diet-related environment and supplemental nutrition program, such as FS or policy interventions were supported at a population level due to individual changes. The authors thought possibly ease and sustain if the environment within which choices were made supports healthful food options.

Kreider et al. (2012) analyzed the impact of FS on children's health outcomes by applying a binary outcome model and calculating average treatment impact (ATE) for FS recipients on each of the health related outcomes, namely anemia, obesity, and poor general health. Beatty and Tuttle (2015) investigated the effects of large benefit changes in FS on the food expenditure of participants during the economic crisis. The authors used Consumer Expenditure Quarterly Interview Survey (CEX) data from 2007 to 2010, a period during which FS benefits increased significantly several times. Additionally, they used difference-in-difference method, a placebo policy dummy, to check the robustness of the results on expenditure on food eaten away from home collected by CPS. The results showed that households change their purchase behavior because of an increase in in-kind transfer. In other words, FS participants significantly increased spending on food at home due to benefit increases, and FS participation might affect the receivers' health.

In summary, the studies mentioned provide some insights into how food choices may be influenced by environmental effects, policy intervention and individuals' income level, which is increased through involvement in FS. Subsequently, people's general health may be affected due to indirect cost of FS program (Guneysu Atasoy, 2018). Therefore, the purpose of this study is to examine how FS

participation influences households' food choices or relative food consumption.

2. Data

The Consumer Expenditure Diary Survey (CEDS) data was obtained from a study conducted by Bureau of Labor Statistics in 2016. The program produces quarterly data set. In this study, 1 year data were used which included 4 quarterly data sets. It covers households' weekly and monthly food expenditures and consumers' characteristics, such as education, race, age, gender, and income level of individuals. For the analysis, the data was divided into income categories, namely low-income and high-income. For the income variable, CEDS has different categories, so the factors were separated depending on FS eligibility maximum income criteria. Thus, people who are eligible for FS benefits have been categorized into low-income, and high-income groups (1=high-income group; 0=low-income group). Similar to the study by Huang et al. (1981), food consumed at home was categorized into five groups:

- 1- Cereals and bakery products (Bakery products)
- 2- Meat, fish, poultry, and eggs (Meat Products)
- 3- Dairy (Milk and other dairy products)
- 4- Vegetables (Fresh fruit and veggies, Fruit production, Veggies production)
- 5- Others (Sweet, nonalcoholic beverages, miscellaneous food, fats and oils)

In addition to these five categories, food consumed away from home was included because restaurant can be authorized to accept FS benefits; this makes a total of 6 food groups.

The expenditure of these food groups was divided by total expenditure before determining which of the food groups constituted the largest percentage among others. Subsequently, the highest percentage of group was used to identify individuals' food choice. This allowed the determination of relative food change between different food groups. Moreover, food quantities were obtained by using the consumer price index and individuals' food expenditure. In the study 3,261

observations were used. The choices' characteristic was price and quantity while the choosers' characteristics were gender, income, and FS participation. Because FS benefits affect individuals' income levels as an income increment would, their reaction or sensitivity to food prices and quantity may differ (Wiig and Smith, 2009). In this study, I did not include some variables such as race or marriage status of the households. In an econometric analysis omitted variables can limit the analysis results. However, FS is given any individual in a household based on their income or disability without looking their race, marriage status or even immigration status. For instance, in a consisting of 4 people, households can obtain max \$640 if all of them are eligible; otherwise it is \$194 per individual. Also in the literature studies about FS generally focused on income level of users. Therefore, in this study I only include income level of individuals.

3. Methodology

In this study, I used Conditional Logit and Multinomial Probit Model. I gave brief explanation of these models below.

The Conditional logit model (CLM) was used with alternative-invariant (or variant) regressors. The probability that observations chosen to alternative j is;

$$p_{ij} = \frac{\exp(x'_{ij}\beta + w'_i\gamma_j)}{\sum_{k=1}^m \exp(x'_{ik}\beta + w'_i\gamma_k)} \quad (1)$$

where X_{ij} are alternative-specific regressors and w_i are case specific regressors. The conditional logit model has $(j-1)$ sets of coefficients (γ_j) (with one set being normalized to zero) for case specific regressors and one set of coefficients (β) for alternative specific regressors. The probability of choosing each alternative is 1 as total.

The Multinomial probit model (MPM) can be estimated when there are relatively few small alternatives, like three or four, because of computational intention with evaluating multiple integrals (Maddalla, 1993). Since I used 6 different food groups, MPM is also convenient for this study. The model is very similar to multinomial logit model. The difference is that it uses the standard normal CDF. The probability that observation selected to alternative j is;

$$p_{ij} = p(y_i = j) = \phi(x_{ij}'\beta) \quad (2)$$

The coefficients are different from logit models by a scale factor, but marginal effect will be similar (Madalla, 1993; Cameron and Trivedi, 2005). Basically the differences these two models are that in a Conditional Logit model the distribution of errors is given. Moreover, Multinomial Probit errors identification lead to correlations between errors and it does not need to satisfy the independence of irrelevant alternatives assumption (IIA). Same data set was applied for these 2 methods, by this way I expected the results of this study may interpret as more robust.

4. Analysis of Results

First the descriptive statistics, which are represented in Table 1 were calculated. According to the results, bakery goods and dairy had the highest monthly expenditure level of the food groups. The lowest level of expenditure was on food consumed away from home. Furthermore, 49% of the sample (or SNAP user) was female, and 59% of the sample was classified as high income. To determine participant food choices, multinomial probit and conditional logit models were calculated from the 2016 CEDS data set. The multinomial probit model results were given in Table 2. People were more likely to choose food with a higher price such as cereal, meat, and vegetables in comparison to other food. In addition, it is logical assumption that people preferred larger quantities of food. Females were less likely than males to choose meat and food consumed away from home with higher prices, than the base group was. However, the quantities of different foods purchased were not statistically significant for females.

When considering to the interaction of FS participants with price, all estimations were negative which means FS users care less about the price of food than non-FS users do for all kinds of food groups. This result was accurate as FS benefits were in effect an income increment. FS participants were more likely to purchase more meat and food consumed away from home in comparison to the base category. Even if FS users were more likely to choose bakery, dairy, and vegetable products than others (sweet and nonalcoholic beverages), this was not statistically significant, and thus couldn't be

evaluated. High income group were less likely to be affected by prices across all food groups than the low-income group. Considering to high price products mean better quality, the results was significant. Moreover, all income*quantity estimations were negative for all food groups; thus high-income people considered less about the quantity of any kinds of food than the low-income group. In Table 3, the conditional logit model results were provided and all results were quite similar to multinomial probit model. Only the magnitude of estimations differed slightly.

5. Conclusion

This paper used 2016 CEDS data to examine how individuals' food choices may be altered by different choosers' characteristics, especially participation in FS. As total 6 different food groups were used.

Huang et al. (1981) used food consumed at home, for the food classifications in their study while, this research are included both food consumed at home and food eaten away from home. Also different income groups and food choices are included in the study. By this way results may provide more comprehensive perspective of the evaluation of food choices.

For analysis, Multinomial Probit and Conditional Logit Models were applied. Both analyses generated quite similar results, indicating FS participants considered less about the price of different food groups than non-participants in comparison to the base group. The difference between the effect of individuals' income and the effect of FS benefits was that real income might change the effects on food choices of both food price and food quantity. However, participating in FS changed mainly the effect of food price. From this perspective, it may imply that an increase in income is more reliable than using FS benefits when people encounter different kinds of foods in markets. This result corresponded to common sense because FS's benefits are temporary, while a high income was considered more reliable. Furthermore, FS changes the quantity of meat and food consumed away from home, yet it does not have any significant effect on the bakery, dairy and vegetable products. Overall, FS affects food choices, and this influence is transferred through participants'

sensitivity to prices, as they purchase more meat products and food consumed away from home compared to the base group.

Appendix

Table 1: Descriptive statistics

Variable	N	Mean	Std Dev	Minimum	Maximum
gender	3261	0.494327	0.500045	0	1
highincome	3261	0.592763	0.491395	0	1
Fstamp	3261	0.110089	0.313049	0	1
bakery	3261	10.3737	14.05038	0	303.67
meat	3261	17.22767	28.64452	0	535.47
Dairy	3261	8.19181	10.45895	0	108.34
veggie	3261	15.02768	19.11432	0	235.8981
other	3261	25.60772	30.0788	0	267.112
bakeryQ	3261	207.4739	281.0077	0	6073.4
meatQ	3261	9.57093	15.91362	0	297.4833
veggieQ	3261	30.05536	38.22863	0	471.7962
dairyQ	3261	9.102011	11.62106	0	120.3778
FoodAwayQ	3261	75.87251	106.8773	0	1565.12
otherQ	3261	10.24309	12.03152	0	106.8448
totalex	3261	886.8612	576.822	0	4239
bakex	3261	132.9171	164.7	0	1937.13
meatex	3261	87.16604	124.8279	0	1853.49
dairyex	3261	137.5791	143.7	0	2348
veggandex	3261	103.3132	165.5708	0	2835.51
otherex	3261	70.62611	144.1204	0	3261.11
FAHex	2261	49.60187	120.3698	0	1950.47

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Table 2: Multinomial Probit Results

Variables	Food Choices					
	Parameters	Bakery	Meat	Dairy	Veggies	Food Away
		estimate	estimate	estimate	estimate	estimate
Constant	Price	0.0045*	0.181*	-0.051*	0.381**	-0.078*
	Quantity	0.131*	1.019*	0.084*	0.491*	0.375
Gender* Price	Female	0.345*	-0.105*	0.078*	0.075*	-0.087*
Gender* Quantity	Female	-0.675	-0.789*	0.035	0.247	0.183
Income *Price	High Income	-0.907*	-0.109*	-0.165*	-0.115*	-0.123*
Income* Quantity	High Income	-0.075*	-0.679*	-0.705*	-0.678*	-1.078*
Snap* Price	SNAP users	-0.188*	-0.175*	0.118	-0.257*	-0.089*
Snap* Quantity	SNAP users	0.205	1.785*	1.354	0.552	1.987*
Log likelihood Ratio = 63. 55 prob>chi2 = 0.000						

* Significant at 5%. Base categories are male for gender, low income for income category and non-SNAP users. Also for food choices, other is chosen base category.

Table 3: Conditional Logit Model Results

Variables	Food Choices					
	Parameters	Bakery	Meat	Dairy	Veggies	Food Away
		estimate	estimate	estimate	estimate	estimate
Constant	Price	0.067*	0.225*	-0.039*	0.242*	-0.077*
	Quantity	0.102*	1.185*	0.089*	0.543*	0.334
Gender* Price	Female	-0.312*	-0.115*	-0.092*	0.079*	0.091*
Gender* Quantity	Female	-0.612	-0.714	0.098	0.188	0.099
Income *Price	High Income	-0.103*	-0.217*	-0.068*	-0.113*	-0.030*
Income* Quantity	High Income	-0.081*	-0.642*	-0.715*	-0.638*	-1.065*
Snap* Price	SNAP users	-0.167*	-0.0171*	0.215	-0.288*	-0.078*
Snap* Quantity	SNAP users	1.218	1.810*	1.336	0.478	1.984*
Log likelihood= 67.72		Prob>chi2=0.019				

* Significant at 5%. Base categories are male for gender, low income for income category and non-SNAP users. Also for food choices, other is chosen base category.

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