Participation in Food Stamps and its Impact on Children's Health, Education, and Behavioral Outcomes

October, 2012

Department of Economics

University of Michigan

Ji Yoon Kim

junekim@umich.edu

Introduction

A report from the U.S. Agricultural Department showed that more than 46.5 million households were enrolled in the Supplemental Nutrition Assistance Program[1] (SNAP, commonly known as Food Stamps Program) in December 2011, the highest share of the population since the program's inception. More than a half of households served by Food Stamps included children (Brown and Cunnyngham, 2004). It is striking that 49.2 percent of all U.S. children eat meals at some point during their childhood paid for by Food Stamps (Hirschl and Rank, 2009). In the same study, the percentage was shown to be even higher for children living in single-parent households: around 90 percent. An overwhelming majority of black children receive Food Stamps, and face far greater exposure to food insecurity, or the inability to afford enough food. Poverty and food insecurity are called "two of the most detrimental economic conditions affecting a child's health" (Hirschl and Rank, 2009). As children's height and weight are highly affected in a relatively short term by what they eat, access to adequate food is critical in their growth period. However, it is ironic that hunger and obesity coexist as twin problems for children in U.S., both of which are mainly caused by unbalanced nutrition intake. To a larger extent, these health deficiencies are more commonly observed in low income populations (Urban Institute Report, 2005). Consequently, children in an underprivileged environment are more likely to face impaired development and lower educational attainment.

During the 2008 campaign, President Obama announced a goal of ending childhood hunger by the year 2015. Since Food Stamps Program has been the largest of the federal Food and Nutrition Service programs, I would like to examine how Food Stamps Program has influenced children's outcomes by using Panel Study of Income Dynamics (PSID) and Child Development Supplement (CDS) data. It will contribute to assess whether the original goal of Food Stamps Program is being reached: "to provide for improved levels of nutrition among low-income households" as stated in the Food and Nutrition Act of 2008.

[1]The Food Stamps program was renamed the Supplemental Nutrition Assistance Program (SNAP) as of October, 2008. I use the former name as my analysis period is from 1997 to 2007.

Overview of Food Stamps Program and Eligibility Requirements

The Food Stamps Program plays a larger role than ever before in the overall U.S. food economy. In an average month, nearly one out of seven Americans receives the benefits (CBO report, April 2012). The federal government spent $78 billion in fiscal year 2011, and it is now the second largest welfare program behind Medicaid in terms of annual spending. Because of its large size and prevalence, there is substantial policy interest in evaluating program's effectiveness.

Food Stamps provides eligible low-income families a fixed amount of money distributed in the form of Electronic Benefit Transfers (EBT) card. On average, the program offers a monthly benefit of $160 to $200 per person, helping low income households to increase food expenditures and expand purchasing power. Benefits can be used to buy all kinds of food, except prepared foods, tobacco, alcohol, pet foods, and medicines. Households have to meet income tests unless all members are receiving Temporary Assistance for Needy Families (TANF), Supplemental Security Income (SSI), or in some places General Assistance. The income test consists of gross and net income tests; specifically, gross income cannot exceed 130 percent of the poverty line and net income no more than the poverty line (Food and Nutrition Service, USDA, 2012). Households may have assets worth as much as $2,000 in the form of checking/savings account, cash, or stocks/bonds. But if there is at least one household member who is disabled or age 60 or older, they may have up to $3,000 in countable resources.

Since Food Stamps recipients are not randomly selected, a selection bias is a main concern when accounting for the impact of Food Stamps on various outcomes. There could be two possible types of selection bias in play: first, households who receive Food Stamps are more likely to suffer from health problems such as obesity and diabetes in the first place, since Food Stamps is primarily targeted to low income households. Furthermore, poor children are at much greater risk of nutritional deficiencies. In this type of bias, the effect of Food Stamps would be underestimated. Second, among eligible households, those who are concerned about quality of life as well as children's physical and psychological health are more motivated to self-select into the program. These families may make

other unobserved investments for the child's stable growth. Thus, the effect of Food Stamps would be overestimated in this case, compared to eligible households who are not participating.

Accordingly, many researchers have attempted to isolate the effect of Food Stamps by correcting for the endogeneity problem, in that unobserved differences in individual and household characteristics may be correlated with both program participation and outcome variables.

The common solution to the selection issue described above is to employ a fixed effect model or a two-stage instrument variable (IV) technique. My main model specifications use instrum ental variables that exploit state variations in recertification period lengths and fingerprinting requirement. Both variables are predicted to be exogenous to children's outcome, but highly correlated with the cost of participation. In other words, I estimate a causal pathway by taking advantage of state-by-state variations in Food Stamps policies that directly affect the participation, but have no direct effect on the outcomes of interest.

Interestingly, I find that Ordinary Least Squares (OLS) estimates and Instrument Variable (IV) estimates show the opposite sign, addressing the possibility of selection bias. OLS estimates reaffirms that families with less privileged background are the ones who select into the program. Thus, simple OLS produces results suggesting that Food Stamps Program actually has negative effects on children. After correcting for endogeneity by using instruments, all the signs of coefficients are reverse, showing that Food Stamps Program has a positive effect not just on health, but also on education and behavioral outcomes. Another finding on multiple program participation deepens our understanding of how changes in one policy are correlated with participation in other programs. Easier access and simple administration process would invite more eligible people to the assistance programs, which affect the well-being of children with important consequences. Such cross-program effects imply possible policy interventions that could boost take-up rates of the eligible populations.

Literature Review

It has been very difficult for researchers to isolate the causal impact of the Food Stamps program due to little variation in program parameters and uniform benefit levels across the nation. A broad spectrum of literatures has attempted to assess the overall effectiveness of the Food Stamps Program, using various identification strategies.

Almond et al. (2009) evaluated the health impact of the Food Stamps roll out during the 1960s and early 1970s. They found that pregnancies exposed to the Food Stamps program three months prior to birth yielded deliveries with increased birth weight, especially largest gain at the lowest ends. The sizable increase in income from Food Stamps benefit improved birth outcomes for both Whites and African-American, with greater impact on African-American mothers.

Similarly, Hoynes and Schanzenbach (2009) exploit variations in timing of implementation of the Food Stamps Program (from 1963 to 1975) across counties to show that the introduction of the Food Stamps Program led to an overall increase in household total food expenditures, but also to a decrease in propensity to eat out, and mixed results for cash food expenditures (out-of-pocket expenditure). Variations in timing of the program introduction provides a fair amount of exogeneity in the causal inference, but we are restricted to use this parameter only over the period when the program was first adopted and thus cannot identify the recent impact of the program.

More recent literatures by Baum (2007), Kaushal (2007), Meyerhoefer and Pylypchuk (2008) and Schmeiser (2011) used instrument variable approach by exploiting variation in participation generated by state-by-state variation in program administration. To be specific, Baum (2007) estimates the effect of Food Stamps program on adult obesity by exploiting the state differences in program eligibility – the frequency under which recipients report their income to determine eligibility, whether state disqualifies those who are not eligible for other welfare programs, and the value of the vehicle a recipient can own without losing eligibility. Kaushal (2007) examined the effect of Food Stamps Program on BMI for the female immigrants. The IV strategy exploited changes in federal and state eligibility rules for immigrants. Meyerhoefer and Pylypchuk (2008) used panel data as well as

exclusion restrictions that exploit state variation in the program. They focused on per capita spending on outreach to increase Food Stamps Program participation, the proportion of recipients with less than 3 month recertification period, and state requirement for fingerprinting to estimate the effect of Food Stamps on obesity and health care spending. They found that participation increases obesity among adult women, as well as health expenditures. Lastly, Schmeiser (2011) used National Longitudinal Survey of Youth 1979 Children and Young Adults data to examine the marginal effect of Food Stamps participation on BMI percentile and probability of being overweight or obese for children. He used similar state-level instruments as Meyerhoefer and Pylypchuk (2008), as well as a two-year lag of the state's yearly maximum value of Earned Income Tax Credit (EITC) benefit. He found Food Stamps participation significantly reduces BMI percentile and probability of being overweight for boys of all ages and girls ages 5 through 11, suggesting that expansion of the program is a possible intervention to combat the increasing prevalence of child obesity.

In terms of the effect of Food Stamps program, findings have been mixed. Analyzing data from the Continuing Survey of Food Intake by Individuals, Rose, Habicht and Devaney (1998) found increases in the intake of five nutrients among preschool children who received Food Stamps. Devaney and Moffitt (1991), examining food energy and nutrient availability at the household level, found significant effects of Food Stamps participation across a range of ten nutrients.

However, Baum (2007), and Gibson (2003, 2006) demonstrated that Food Stamps participation actually increases obesity. The effects are found to differ by gender, level and duration of benefits, but they gave the evidence that program participation increases BMI as well as the probability of being obese for women, but insignificant for men. It has also been documented that Food Stamps recipients consume fewer servings of fruits and vegetables than income-eligible non-participants as well as the income-ineligible (Fox and Cole, 2004), which might be one of explanations supporting the hypothesis Food Stamps participation can increase BMI. These negative consequences are plausible since there is no restriction on how the benefit can be used.

The effects of Food Stamps program on children's outcomes other than BMI and obesity have not been well examined in previous literatures. Using PSID and CDS data, I investigate how the

exposure to Food Stamps program of the households has affected on children aged 10 to 13 – not only BMI and obesity, but also various outcomes such as development delay, ever sick last month, limit on school work, grade repetition, test score, behavior index, and eating habit. I use a two-stage instrumental variables (IV) approach by exploiting state-by-state variation in program policies that are highly correlated with participation to account for the potential endogeneity bias.

Data and the Empirical Model

I. Data and Main Analysis Sample

Child Development Supplement (CDS) provides a broad array of developmental outcomes, social relationship, physical health, and emotional well-being of children and youth under 18. It originated with CDS I in 1997 by supplementing PSID with additional information on 0-12 year old children and their parents. Five years later, CDS II (2002-3) re-interviewed 2,907 children ages 5-18. CDS III (2007-8) re-interviewed 1,506 children ages 10-18 from CDS II wave[2].From each wave, I extract children ages 10-13 who live within eligible households headed by non-elderly.

In terms of defining eligibility, I simulate the actual criteria of gross income at or below 130 percent of poverty line. Yet, I ignore asset test and net income test, which entails complicated deduction rules. Mykerezi and Mills (2010) and Ratcliffe et al. (2011), however, defined households as eligible if their gross income is at or below 150 percent of poverty line. They argue that the most important reason for using a slightly higher threshold for sample selection rather than simulating Food Stamps eligibility is that there are concerns that income may be endogenous to participation. Households near the eligibility threshold may modify their earnings or assets in ways that makes them eligible (Ashenfelter, 1983). Therefore, I did additional robustness check using different cutoffs for eligibility: 100%, 130% and 150%, all of which show consistent results.

[2] Detailed information about the CDS is available at: http://psidonline.isr.umich.edu/Studies.aspx

II. Descriptive Analysis

I explored demographic characteristics for Food Stamps participants and eligible non-participants. Determinants of children's outcomes not only include participation in Food Stamps but also baseline socio-economic status. Table 1 presents the result.

Descriptive analysis at the baseline provides us with a general sense of how participants and eligible non-participants differ across a number of dimensions. The heads of participating households are more likely to be black, female, and less educated than those from non-participating households. The probability of head's working is lower for participants, which aligns with the recent finding that significant proportion of participants are unemployed, laid off, or looking for a job. Also, they are less likely to be married, which coincides with more female headed households. These differences in demographic backgrounds can affect the participation in the program as well as outcomes of interest simultaneously, leading to a biased estimator.

The most significant heterogeneity comes from the gap in income between the two groups: participating households have a lower income by $14,475 to begin with. This suggests that family income plays a key role as a proxy for the participation. Even though both groups are eligible, implying that their gross income is at or below 130 percent of poverty line, those who receive Food Stamps are from lower ends of income distribution. This result also suggests that the perceived benefits and costs associated with the program depend largely on households' income level. If costs such as stigma attached to accepting the assistance and the cost incurred in administration process exceed benefits, then households will not bother to participate. Participation seems to be a decreasing function of income for Food Stamps eligible households. Therefore, those near the margin of eligibility criteria are likely to opt out of the program. This difference in income will be able to predict which families end up participating in the program, and it may also be associated with impaired outcomes of children of participating households, to start with. Thus, ameliorative effect of Food Stamps will be underestimated.

In addition, children from treatment groups are more likely to receive free or reduced cost

meals at school. They are more likely to be diagnosed with obesity, and development delay. Again, these factors can confound the result, if not taken into account, due to the selection bias.

In order to isolate the effect of Food Stamps on a number of outcomes that I am interested in, I will control for these demographic variables in addition to using instruments, so that the identification is not contaminated by the particular attributes of the treatment group.

III. Model

The main identification strategy that I employ is two-stage least squares (2SLS). A general model of the relationship between program participation status and children outcome variable can be shown as:

$$(1) FSP_{ist} = \beta_0 + \beta_1 Z_{ist} + \beta_2 X_{ist} + \beta_3 \mu_s + \beta_4 \tau_t + e_{ist}$$

$$(2) \quad Y_{ist} = \gamma_0 + \gamma_1 FSP_{ist} + \gamma_2 X_{ist} + \gamma_3 \mu_s + \gamma_4 \tau_t + \epsilon_{ist}$$

Where *i*= 1, 2, …, *n* denotes children in the family unit, *s*=1, 2, 3, …, *S* denotes states, and t=1997, 2001, 2007 denotes years. FSP_{ist} is the number of months the family spent on Food Stamps Program during the previous 13 months; X_{ist} represents a vector of individual characteristicssuch as child's age dummies, log of family income, sex of head, whether head is married or not, years of head's schooling, whether head is white or nonwhite, log of USDA needs[3], and age of head at birth of first child. I include state fixed effect (μ_s) and year fixed effect (τ_t) in both equations, and robust standard errors are clustered at state level.

Equation (2) regresses the outcome of interest on the number of months in the Food Stamps program. The coefficient γ_1 answers to the following question: For each one additional month in the

[3] PSID constructs this variable based on USDA food needs standard, the USDA's estimate of expected weekly food costs for a minimally acceptable diet for a family of the same size and composition.It reflects the family composition by capturing age and gender of each individual in family.(For example, 18-year-old boy has higher food needs than 75 year old woman.)

Food Stamps, what is the effect on the outcome Y_{ist}?

If I estimate an equation (2) only, it provides us with simple OLS estimate which clearly suffers from endogeneity. Unobserved characteristics of Food Stamps Program participants (ϵ_{ist}) may be correlated with Food Stamps participation (FSP_{ist}) and outcome (Y_{ist}) simultaneously, leading to a biased estimator.

Therefore, I run the first stage (1), which regresses the number of months spent on Food Stamps on states' Food Stamps policies. Z_{ist} is a vector of instruments that includes 1) the percent of a state's Food Stamps recipients with earnings having short recertification period (less than three months), and 2) an indicator whether state requires fingerprinting when applying[4].

Caution should be made, however, when assessing the validity of instruments. In principle, instruments should meet two conditions: 1) relevance and 2) exclusion restriction. First condition is met as these policy variables are highly related with actual participation -- a short recertification period requires earners to verify their income and reapply for the program every one to three months, which significantly raises the cost of Participation. Fingerprinting requirement may attach stigma when applying, which substantially discourages the motive to participate. With regard to the second condition, it may be invalid if the states changed Food Stamps policies in response to children's outcomes in each state. However, the change in program policies were mainly driven by economic condition and corresponding decisions made by federal government to control program enrollment rate. Figure 1 illustrates state variation in the percentage of the earners with a short recertification period averaged over 1997 to 2007 periods. Figure 2 and 3 reveal that there exist state-by-state variations in both policies over time, which supports both variables as exogenous instruments.

A set of full first-stage results for children ages 10-13 is presented in Table 2. First stage F statistics of a joint test is 24.31. Consistent with our priori-expectation, a short recertification length and fingerprinting requirement have significant and negative effect on the participation.

[4] These instruments are averaged over the 13-month period prior to the interview month, so that they coincide with the period over which months in Food Stamps participation were measured.

Findings

I. Health Outcomes

I investigated the extent to which Food Stamps affects children's health outcome. I find that participation in the Food Stamps Program is accompanied by some improvement in children's health. The estimates are presented in Table 3, which compares the estimates from OLS and IV. For the robustness check, I show all the results using different eligibility cutoffs: 130%, 150%, and 100%

I will provide explanations based on a sample using 130% cutoff.

The OLS estimates reveal that children who get help from Food Stamps Program are more likely to suffer from development delay, or learning disability. Coefficient of 0.003 is interpreted as a 0.3 percentage point increase of development delay as a result of an additional month spent on Food Stamps. However, when we predict Food Stamps participation with the instruments in the first stage, the IV coefficient flips the sign. It is now interpreted as a reduced likelihood of development delay by 6.5 percentage point as a result of one more month in Food Stamps program.

Also, Food Stamps program seems to have an ameliorative effect on children's BMI percentile and the probability of diabetes, showing negative IV estimates.

However, development delay and diabetes are from questions asking *"Has a doctor ever said a child has….?"* Therefore, these might not be instantaneous, but a cumulative probability, maybe determined genetically or in earlier ages. Appropriate measures would be the recent onset of these problems, indicating causal inference of Food Stamps program more clearly.

A similar pattern of results occurs for other outcomes as well. OLS estimates show that Food Stamps participation increases the probability of having any physical or mental condition that limits or prevents ability to do usual childhood activities. IV estimates, on the other hand, predict that additional month in Food Stamps indeed reduces this probability by 3.2 percentage points. Similar interpretation goes with limit on school work. These two variables, limit on athletic and limit on school work, appropriately measure current status of children.

Lastly, primary caregiver reports number of days a child missed school because of illness in the past 12 months. For boys and girls ages 10-13, an additional month of Food Stamps Program participation is estimated to increase missing days of school by 0.008 days. Once I run IV estimate, Food Stamps participation is associated with less likelihood of missing school by 0.81 days.

All in all, IV results suggest that Food Stamps Program yields benefits for children's health and development, which may in turn lead to reduction in long-term poverty in future. This positive effect of Food Stamps program on health can improve the longer-term life chances of poor children.

II. School and Behavioral Outcomes

Table 4 reports OLS and IV estimates for schooling outcomes and behavior problem indexes. Though not significant, one more month spent on Food Stamps program reduces the probability of grade repetition by 0.6 percentage points. It increases broad reading score (created from passage comprehension and letter word scores) by 1.73 points out of the full score of 200.

Particularly, Food Stamps Program seems to have a promising effect on children's behavior. Behavior problem index, which ranges from 0 to 32, measures child's problematic behavior and attitude observed by primary caregiver. Higher scores imply a greater level of behavior problems. Participation seems to be significantly associated with problematic children with both internal and external behavior, but these indexes are not significant anymore, and flip the sign after going through the first stage. This may provide evidence that stable food consumption which is made possible by Food Stamps program improves not only physical, but also mental health of vulnerable children.

These results are consistent whichever cutoffs I use for the analysis.

III. Children's Eating Pattern

Lastly, I investigate how the eating habits of children are affected by Food Stamps. CDS asks children about food consumption pattern for the past 7 days, as well as what they usually consume

for breakfast. Table 5 presents estimates of OLS and IV coefficients.

Interestingly, an additional month on Food Stamps significantly decreases the number of days consuming sweets by 2.7 days per week, soda by 1.8 days, and fast food by 1.2 days. This may imply that children substitute away from unhealthy food to more nutritious options. Though not significant, the marginal effect of Food stamps participation increases average weekly consumption of meat and fruit. Significant and negative sign shown in OLS estimate of fruit indicates participating children are less likely to eat fresh fruit to begin with.

These results help understand that children get to encounter more diverse and nutritious diets, who otherwise are at a higher risk of nutrition deficiency and lack of food choices. However, eating patterns are reported only in the last two waves of CDS, resulting in small sample size across all the outcomes.

Further Discussion

I. Prior Food Stamps Program Participation as Omitted Variable

Interpretation corresponding to some of large coefficients, however, should be made with caution. Although we counted the number of months in Food Stamps program in the preceding years (i.e. 13 months), we might also want to take into account prior history of program participation since the child was conceived. If my instruments can predict the program participation in earlier periods as well, the additional month in the study is actually a month of participation plus months in previous period. In this case, somewhat striking results will be interpreted in a more attenuated way.

II. Multiple Program Participation

Readers can formulate questions and cast doubt as to whether the above results are truly

ascribed to Food Stamps program participation. Multiple program participation by low income households are commonly observed, since eligibility rules for many of these programs overlap. In particular, I ran a regression of Food Stamps participation on TANF, and Federal school meal programs participation, separately. Table 6 reinforces the argument that a high correlation exists among participation in these welfare programs for those who have children and are eligible for Food Stamps. In other words, if a family is participating in TANF, then it is significantly associated with 4.8 more months in the Food Stamps program in the preceding year. Similarly, if a child is receiving school breakfast/lunch, then it is associated with 3 more months in Food Stamps program. As such, the results above might be attributed to other welfare programs that also enable low income households to cope with considerable economic shocks; this misattribution can seriously jeopardize the entire framework of this paper.

However, recent reports from U.S. Department of Agriculture (USDA) have constantly revealed that the majority of Food Stamps households did not receive cash welfare benefits – only 13 percent of all Food Stamps households received TANF benefits in 2006 and this proportion has been declining over time. In addition, they showed that the primary source of income among Food Stamps participants shifted from welfare to work (Food and Nutrition Service, USDA, 2007). This trend may support the causal effect of Food Stamp program in this paper. But, it is hard to completely ignore the possibility that Food Stamps Program participation may also pick up participation in other programs, especially school meal program, in the first stage of the analysis.

III. Does a Food Stamps Policy Affect Participation in Food Stamps Only?

Additionally, I ran a simple regression of participation in other programs on the instruments used in the analysis. The results are reported in table 7. Surprisingly, a short recertification period in Food Stamps has a significant and negative effect on participation in other welfare programs as well. I divided the sample into male-headed and female-headed households in order to see the influence of Food Stamps rules on TANF eligible groups – single mothers with children. As expected, a short

recertification period of Food Stamps does not have any impact on male headed households who are less likely to be a TANF recipient. Fingerprinting requirement in Food Stamps program actually increases the participation in TANF for male-headed households, and no effect on female-headed households, which we can interpret as no effect overall. Yet, it seems to negatively affect school food programs. This makes sense, as Food Stamps recipients are automatically eligible for free school meals. If the finger printing requirement is imposed on Food Stamps, decrease in participation in Food Stamps program will also decrease the participation in School meal program.

All in all, Food Stamps policies seem to affect the participation in other assistance programs. It indicates that cost of participating in one program is highly correlated with the cost associated with other programs. Empirically, people go to the same local office to apply for both Food Stamps and TANF. It is likely that TANF participating households with kids would also enroll in Food Stamps as well as school breakfast/lunch programs due to automatic eligibility. This sheds light on important policy implication – a policy of one program plays a pivotal role on households' participation in overall public assistance programs. Such cross-program effects are an important consideration in shifting the take-up rate of Government assistance programs for eligible population. The lower the bar, the more people are likely to have easy access to the programs.

The findings in the paper strongly suggest that participation in Food Stamps can have important consequences on children's outcomes in multiple ways. Therefore, welfare policies that are more accessible and approachable would reach out to disconnected population and eventually benefit children in long-term by providing resources through these programs.

IV. Non-participation and the Implication of LATE Estimate

Just over half of all eligible recipients and seventy percent of eligible children participate in Food Stamps Program (Gundersen, 2009). The reasons for nonparticipation can be ascribed to four

main factors. First, people might feel ashamed of getting and using Food Stamps in public places.[5] Second, transaction costs and complex administrative process can diminish the attractiveness of participation. Third, low participation may result from lack of information or incorrect recognition about the program. Some people assume that Food Stamps are for extremely poor people, and don't think about applying for it by believing themselves ineligible. A large fraction of the population is not aware of the fact that they may be eligible yet live above the poverty line. Fourth, the benefit level can be quite small especially for relatively higher income eligible families. Accordingly, marginal utility gained from Food Stamps ends up being lower than marginal cost incurred by the participation for those who do not participate even if they meet their income criteria for eligibility.

The first three points could be well addressed by policy makers by improving the administrative system and program structure. For example, this paper suggests the possibility of encouraging participation of eligible people by lowering transaction cost and easing the administrative process.

The IV method employed in this study enables me to effectively capture a local average treatment effect (LATE). Basically, people who change their participation decision based on the instruments would be different from people who participate no matter what. In this case, eligible households who shift their decision due to a recertification period restriction or fingerprinting requirement can be distinguished from eligible people who do not care about these policies. People in the former group are more likely to be on the margin of eligibility, and more responsive to policies of the programs. Therefore, tweaking policies will effectively influence these people's behavior at the margin. In the future research, I will examine the common characteristics of those who are more likely to be affected by the instruments. By looking at the first stage, I will be able to capture and investigate what types of eligible households are more influenced by these policies. Answering this question would enable policy makers to reach out to the group of eligible people who are in need of government assistance but are hardly recognized or are disconnected, having neither welfare nor work.

[5] But this stigma has been reduced as EBT(Electronic Benefit Transfer) card was adopted in all states by the year of 2008

Conclusion

Building upon a wide body of empirical literatures that evaluate the impact of Food Stamps on economic, social, and intergenerational outcomes, this paper specifically investigates the effect on children's health, eating habit, behavioral and education outcomes using PSID and CDS data. It shares similar features with a large corpus of existing literatures, illustrating mostly positive consequences and the strength of Food Stamps program that helps low income households by providing extra resources.

I exploited identification strategy using instruments that stem from state variation as well as time variation in eligibility rules. The analysis sample is children aged 10-13 residing in eligible households headed by the non-elderly. I examine various outcomes such as school days missed, behavior index, and consumption pattern for each food category, which have not been much assessed by researchers. Specifically, I found that children whose family is getting the benefit are less likely to suffer from physical or mental condition that would limit or prevent school activities. Moreover, an additional month in the Food Stamps Program significantly reduces the probability of development delay by 6.5 percentage points and likelihood of diabetes by 1.7 percentage points. These striking results may stem from not accounting for prior Food Stamp program participation, which we can think of it as a potentially omitted variable. If instruments predict the past participation as well, then the estimates legitimately take into account the effect of prior participation.

It is also notable that Food Stamps Program has a substantial effect on children's behaviors. Not only physical health but also mental conditions seem to be improved with the help of Food Stamps program. Lastly, marginal effect of Food Stamps participation had some positive impact on children's eating habit. Consumption of sweets, fast food, and soda has significantly reduced for participating children. It helps to add more variation and nutrition on food categories.

This paper contributes to further variations on top of a number of existing literatures evaluating the effectiveness of Food Stamps Program. These positive findings align with the original goal of the program, which is to provide for improved levels of nutrition among low-income

households. Especially, promising effects on children may be interpreted as important findings with the concerns magnified for younger children in low-income families. Without the ability to improve their health they will likely enter adulthood at a disadvantage. As childhood obesity and malnutrition are conditions that pose both immediate and long term health threats, helping low-income children who are at the greatest risk requires an expansion of governmental programs aimed at alleviating these problems. In this sense, this paper enlightens us with the possibility of Food Stamps Program to work as one of the possible mechanisms through which children's physical and mental health are positively affected.

Furthermore, exploring the multiple program participation and high correlation among the costs of government assistance programs sheds much light on policy implications. My work supports the hypothesis that people react to the change in policy, and shift their behavior in one way toward multiple programs. In other words, negative impact of a particular policy on the participation in one program may also negatively affect the participation in other programs.

Due to this correlation, it is hard to find a set of completely exogenous instruments which only affect the participation in Food Stamps, but nothing else. But such cross-program effects provide an important implication in encouraging take-up of government assistance programs for eligible population. Expansion of low participation cost structure in TANF would be a possible intervention to invite disconnected people to Food Stamps program, and combat the prevalence of child hunger and malnutrition. Evidence I produce here informs the design and implementation of policies and programs, which profoundly affects the lives of low-income families and their children.

This study helps to shape legislation and suggest operational practices across the country. The recent trend of removing fingerprinting requirement, expanding a categorical eligibility and extending a recertification period for earners would effectively promote usage of the programs, therefore facilitating better health among children from lower-income families. Further improvements in the policy could maximize the positive aspects of public assistance programs and achieve the intended goal, reshaping America to a much healthier nation.

REFERENCES

Almond, Douglas, Hilary W. Hoynes, and Diane Whitmore Schanzenbach (2009) "Inside the War on Poverty:The Impact of Food Stampss on Birth Outcomes"*NBER Working Paper No. 14306*

Ardington, Cally, Anne Case, and Vicky Hosegood (2009) "Labor Supply Responses to Large Social Transfers: Longitudinal Evidence from South Africa," *American Economic Journal: Applied Economics* 1(1): 22–48.

Ashenfelter, O. (1983)"Determining participation in income tested social programs".*Journal of the American statistical association, 78(383), 517-25.*

Baum, C. (2007)*"The Effects of Food Stamps of Obesity."* USDA, Economic Research Service, CCR-34.

Brown, Beth, and Karen Cunnyngham (2004) "Characteristics of Food Stamps households: Fiscal year 2003"*Food and Nutrition Service, USDA. Report* No. FSP-04-CHAR

Devaney, Barbara, and Robert Moffitt.(1991) "Dietary Effects of the Food Stamps Program."*American Journal of Agricultural Economics*, 73 (1): 202-211.

Duncan, Greg J. and Lori Kowaleski-Jones (2000) "Effects of participation in the WIC FoodAssistance Program on children's health and development: Evidence from NLSYchildren."*Institute for Research on Poverty, Discussion Paper* no. 1207-00

Fox, M. K., and N. Cole.2004.**"**Nutrition and Health Characteristics of Low-Income Population."*Volume 1, Food Stamps Program Participants and Nonparticipants*. Washington, DC:U.S. Department of Agriculture, Economic Research Service. E-FAN-04-014-1, 2004.

Gibson, D. (2003) "Food Stamps Program Participation is Positively Related to Obesity in Low Income Women." *J. Nutr.* 133: 2225-2231

Gibson, D. (2006) "Long-Term Food Stamps Program Participation Is Positively Related to Simultaneous Overweight in Young Daughters and Obesity in Mothers." *J. Nutr.* 136: 1081-1085.

Gundersen, Craig, Dean Jolliffe, Brent Kreider, and John Pepper (2009) "Identifying the Effects of Food Stampss on Child Health Outcomes When Participation is Endogenous and Misreported", *Forthcoming in Journal of the American Statistical Association*

Hirschl, Thomas A. and Mark. RRank (2009) "Estimating the risk of Food Stamps use and impoverishment during childhood" *Issue of Archives of Pediatrics and Adolescent Medicine* 163: 994-99.

Huang, Chung L. and W. Keith Scearce.1982. "Impact of the Food Stamps program on selected food nutrients

purchased by low income households."Socio-Economic Planning SciencesVolume 16, Issue 1, Pages 1-7.

Kaushal N. (2007) "Do food stamps cause obesity?: evidence from immigrant experience" *Journal of Health Economics 26: 968-991.*

Lee, Bong Joo, Lucy Mackey-Bilaver, and Robert M. Goerge (2000)"The Patterns of Food Stamps and WIC Participation andTheir Effects on Health of Low-Income Children" *JCPR Working Paper No.127*

Lee, Bong Joo, and Lucy Mackey-Bilaver (2006) "Effects of WIC and Food Stamps ProgramParticipation on Child Outcomes"*Contractor and Cooperator Report No. 27*

Leftin, Joshua, and Kari Wolkwitx (2009) "Trends in Supplemental Nutrition Assistance Program Participation Rates: 2000 to 2007" *Office of Research Analysis, Food and Nutrition Service, U.S. Department of Agriculture*

Leftin, Joshua (2010) "Trends in Supplemental NutritionAssistance Program Participation Rates:2001 to 2008"*Office of Research and Analysis, Food and Nutrition Service, U.S. Department of Agriculture*

Meyer, Bruce D., and James X. Sullivan (2008) "Reporting Bias in Studiesof the Food Stamps Program"*Harris School Working Paper Series 08.01*

Meyerhoefer CD &Pylypchuk Y (2008) "Does participation in the food stamp program increase the prevalence of obesity and health care spending?" *American Journal of Agricultural Economics 90: 287-305*

Mykerezi, E. & Mills, B. (2010)"The impact of Food Stamps program participation on household food insecurity."*American journal of agricultural economics, 92(5), 1379-91.*

Ratcliffe, C. McKernan S., & Zhang, S. (2011)"How much does the Supplemental Nutrition Assistance Program reduce food insecurity?" *American journal of agricultural economics, 93(4), 1,082-98.*

Rose, D., J.P. Habicht, and B. Devaney. (1997) "Household Participation in the Food Stamps and WIC Programs Increases the Nutrient Intakes of Preschool Children." *Journal of Nutrition, 128: 548-55.*

Schmeiser, Maximilian D. (2011) "The Impact of Long Term Participation in the Supplemental Nutrition Assistance Program on Child Obesity"*Health Economics*, 20: n/a. doi: 10.1002/hec.1714

Figure 1. State variation in the percentage of earners with short recertification period –Averaged value over the period 1997 to 2007

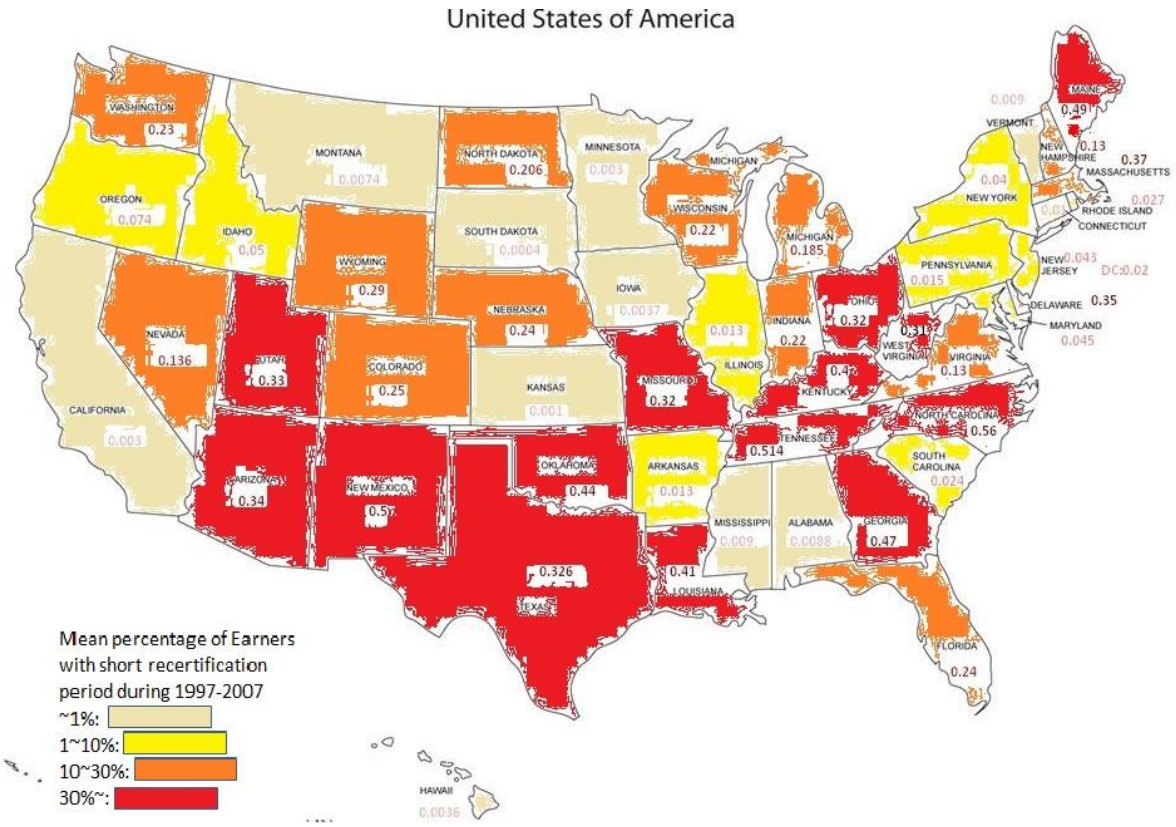

Figure 2. Number of states that required earners to recertify income within 3 month

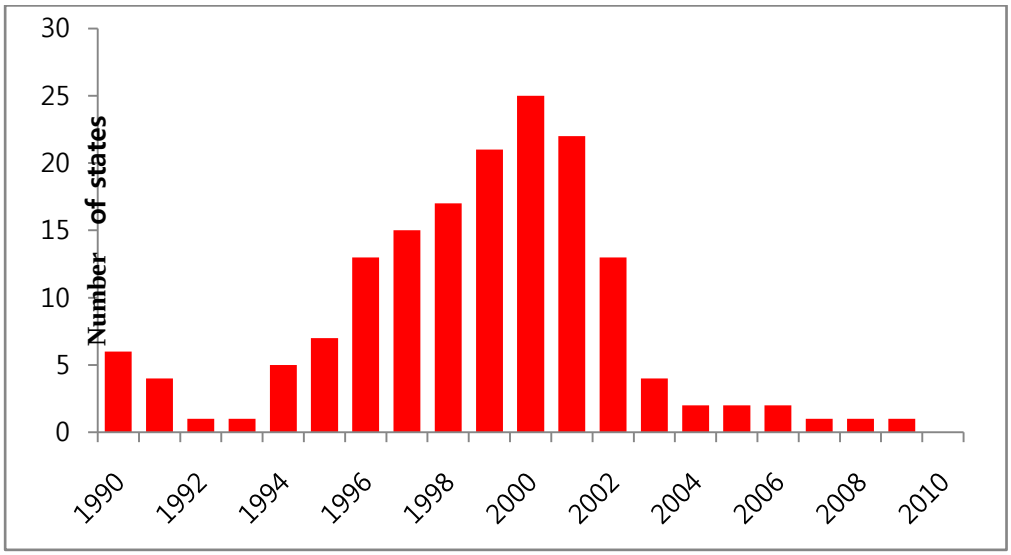

Figure 3. Number of states that required fingerprinting

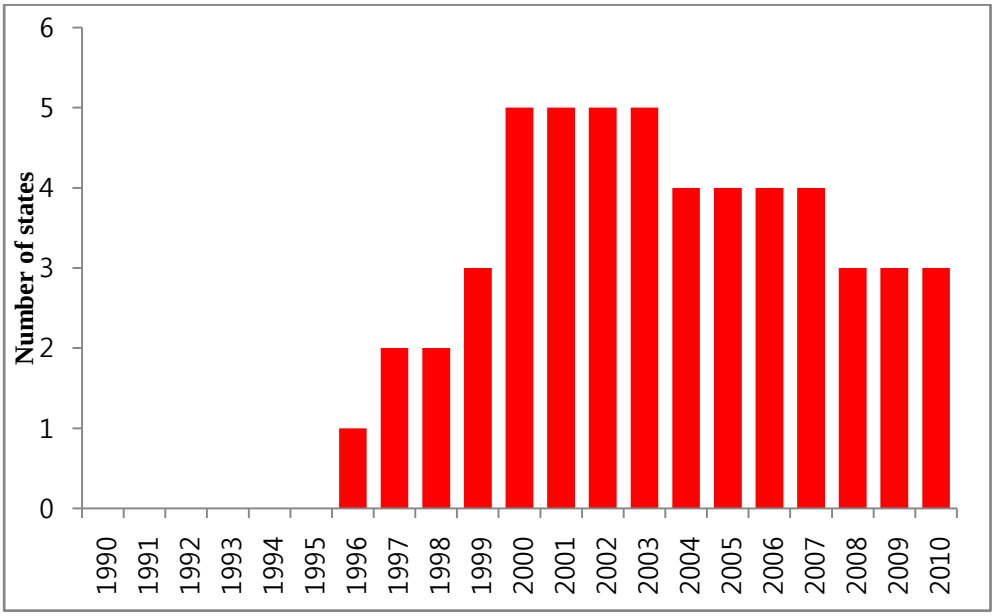

Table 1. Descriptive Analysis

: Food Stamps vs No Food Stamps among Eligible Households (gross income ≤ 130%)

Demographic Variables	Food Stamp	No Food Stamp	Difference (T statistics)
Member in family unit	4.74	4.68	0.06* (1.67)
Male head	0.35	0.63	-0.28*** (-26.8)
Number of children	2.97	2.55	0.42*** (13.14)
Total family income ($2000)	14,893.02	29,420.95	-14,527*** (-30.2)
Education of head	10.9	11.34	-0.47*** (-7.05)
TANF program participation	0.28	0.02	0.26*** (38.1)
WIC program participation	0.29	0.21	0.08*** (8.12)
Child In federal breakfast program	0.66	0.5	0.17*** (7.6)
Child In federal lunch program	0.91	0.82	0.09*** (5.73)
Head works?	0.5	0.8	-0.3*** (-29.3)
Wife works?	0.11	0.29	-0.17*** (-19.4)
Own home?	0.21	0.5	-0.29*** (-28.27)
Head white?	0.19	0.27	-0.07*** (-7.65)
Head married?	0.25	0.55	-0.3*** (-28.17)
Child birth weight	6.6	6.8	-0.2*** (-4.1)
Child Development delay	0.08	0.05	0.03*** (2.98)
Limit on school attendance, and work	0.51	0.56	-0.04** (-2.2)
Whether repeated grade	0.23	0.13	0.10*** (5.83)
Live with bio parents	0.18	0.45	-0.27*** (-14.6)
Mom's Age at the first birth was teenage	0.34	0.27	0.07*** (6.13)
BMI percentile	21.07	20.5	0.56* (1.83)
Child white?	0.15	0.26	-0.12*** (-7.6)
# observations	4683	3489	

*** p<0.01, ** p<0.05, * p<0.1

Table 2. First stage results using two instruments (F statistics= 24.31)

VARIABLES	# of months in Food Stamp Programs
Age=11	-0.132
	[0.387]
Age=12	0.067
	[0.290]
Age=13	-0.169
	[0.397]
Log(income)	-1.516***
	[0.313]
Log(USDA needs)	2.772***
	[0.819]
Male head	0.497
	[0.729]
Head white	-0.502
	[0.711]
Head married	-2.624***
	[0.912]
Teenage birth	1.034**
	[0.492]
Short Recertification period	-2.900***
	[0.780]
Fingerprinting Requirement	-1.846***
	[0.424]
Constant	-7.817
	[9.016]
Observations	1,006
R-squared	0.254

Robust standard errors in brackets, clustered at state level.
State dummies and Year dummies are included. *** p<0.01, ** p<0.05, * p<0.1

Table 3. The effect of Food Stamps on children's health outcomes

	Eligible if ≤ 130%			Eligible if ≤ 150%			Eligible if ≤ 100%		
Outcome	**OLS**	**IV**	**n**	**OLS**	**IV**	**n**	**OLS**	**IV**	**n**
Development delay (0,1)	0.003 (0.003)	-0.065*** (0.021)	673	0.004 (0.003)	-0.061*** (0.02)	732	0.003 (0.003)	-0.052*** (0.017)	595
Limit on Athletic (0,1)	0.001 (0.002)	-0.032* (0.02)	673	0.001 (0.002)	-0.03* (0.02)	732	0.001 (0.003)	-0.024 (0.015)	595
Limit on school work (0,1)	0.001 (0.003)	-0.023 (0.024)	673	0.002 (0.003)	-0.025 (0.025)	732	0.003 (0.003)	-0.01 (0.02)	595
Diabetes (0,1)	-0.001 (0.001)	-0.017** (0.007)	673	-0.00 (0.001)	-0.014** (0.007)	732	-0.001 (0.001)	-0.015*** (0.005)	595
BMI percentile (0.1~97.9%)	0.034 (0.044)	-0.12 (0.312)	605	0.03 (0.04)	-0.47 (0.44)	660	0.03 (0.054)	0.12 (0.22)	538
Missing days of school (1~97days)	0.008 (0.053)	-0.81 (0.563)	670	0.013 (0.05)	-0.68 (0.56)	729	-0.006 (0.06)	-0.9* (0.52)	592

Note: These regressions include control variables (please refer to "III. model" in the paper), state and year dummies. Robust standard error clustered atthe state level. *** p<0.01, ** p<0.05, * p<0.1

Table 4. The effect of Food Stamps on children's school and behavioral outcomes

	Eligible if ≤ 130%			Eligible if ≤ 150%			Eligible if ≤ 100%		
Outcome	**OLS**	**IV**	**n**	**OLS**	**IV**	**n**	**OLS**	**IV**	**n**
Reading score (0~200)	-0.33** (0.13)	1.73 (2.32)	580	-0.37*** (0.13)	2.83 (2.43)	634	-0.36** (0.16)	1.78 (2.08)	517
Grade repetition (0,1)	0.008** (0.004)	-0.006 (0.03)	654	0.008* (0.004)	-0.011 (0.037)	712	0.009** (0.004)	-0.001 (0.033)	580
Behavior Problem Index (0~32)	0.17*** (0.05)	-0.41 (0.5)	664	0.15*** (0.05)	-0.31 (0.5)	723	0.19*** (0.053)	-0.35 (0.46)	586
BPI-internal (0~17)	0.07*** (0.02)	-0.46 (0.32)	666	0.063*** (0.023)	-0.42 (0.3)	725	0.074*** (0.025)	-0.31 (0.28)	588
BPI-external (0~14)	0.11*** (0.035)	-0.12 (0.33)	669	0.09** (0.04)	-0.042 (0.34)	728	0.126*** (0.04)	-0.19 (0.3)	591

Note: These regressions include control variables (please refer to "III. model" in the paper), state and year dummies. Robust standard error clustered atthe state level. *** p<0.01, ** p<0.05, * p<0.1

Table 5. Estimates of the effect of Food Stamps on children's eating habit

		Eligible if ≤ 130%			Eligible if ≤ 150%			Eligible if ≤ 100%		
outcomes		**OLS**	**IV**	**n**	**OLS**	**IV**	**n**	**OLS**	**IV**	**n**
Breakfast food	Toast	-0.003 (0.005)	0.14 (0.16)	387	-0.002 (0.004)	0.18 (0.22)	419	-0.005 (0.006)	0.11 (0.115)	347
# of Days consumed Past week	Meat	-0.03 (0.03)	0.03 (0.09)	191	-0.03 (0.026)	0.044 (0.08)	213	-0.025 (0.037)	0.23 (0.16)	157
	Fruit	-0.23*** (0.07)	1.7 (2.77)	383	-0.2*** (0.07)	1.75 (3.41)	415	-0.22** (0.08)	1.99 (2.2)	343
	sweet	0.04 (0.075)	-2.67*** (2.47)	385	0.03 (0.07)	-3.04 (3.2)	417	0.01 (0.084)	-1.18 (1.28)	346
	Soda	-0.026 (0.27)	-1.79*** (0.32)	192	-0.05 (0.21)	-1.62*** (0.44)	202	-0.26 (0.27)	-1.88*** (0.24)	187
	Fast food	-0.004 (0.21)	-1.17*** (0.38)	192	0.09 (0.17)	-1.12** (0.46)	202	0.2 (0.17)	-1.13*** (0.34)	187

Note: These regressions include control variables (please refer to "III. model" in the paper), state and year dummies. Robust standard error clustered atthe state level. *** p<0.01, ** p<0.05, * p<0.1

Table 6. Evidence of the correlation among welfare programs

Outcome(Y)	Regressor(X)	
	School program	TANF
Number of months in Food Stamp	3.06*** (0.73)	4.83*** (0.68)
Observation	1006	1006

Note: These regressions include control variables (please refer to "III. model" in the paper), state and year dummies. Robust standard error clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table 7. The effect of the Food Stamp instruments on other programs

Regressor(X)	Outcome(Y)		
	School program	TANF	
		Male head	Female head
Short recertification period	-0.13* (0.07)	-0.07 (0.11)	-0.29*** (0.09)
Fingerprinting requirement	-0.11*** (0.04)	0.3*** (0.1)	0.134 (0.09)
F statistics	5.75	4.22	5.3
Observation	1041	354	687

Note: These regressions include control variables (please refer to "III. model" in the paper), state and year dummies. Robust standard error clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1