PROJECT DESCRIPTION

I. Introduction

A. Project Overview

Food security among children is a key indicator of well-being that has been linked to positive health outcomes and improved child development. Food security, however, is not universal. According to the most recently available data, 15.8 percent of all U.S. households with children were food insecure at some point during the previous year (Nord 2009). In about half those households (8.3 percent), children experienced food insecurity. These statistics mask substantial variation across demographic groups. Estimates based on the Early Child Longitudinal Study indicate that immigrant households with children are about twice as likely as native-born households with children to be food insecure (Capps et al. 2009).

Immigrant eligibility for the federal Supplemental Nutrition Assistance Program (SNAP)—the primary public assistance program to reduce food insecurity—has changed over time, and the eligibility rules differ for adult and child immigrants. Welfare reform in 1996 eliminated SNAP eligibility (previously known as the Food Stamp Program) for legal, noncitizen adult immigrants,[1] although some states maintained their own supplemental programs for immigrants. The 2002 Farm Bill reversed welfare reform restrictions by restoring eligibility to adult immigrants who have lived legally in the United States for more than five years. SNAP eligibility rules for immigrant children are more inclusive. Although welfare reform restricted legal immigrant children from SNAP eligibility as it did for adults, eligibility was restored in 1998 for legal immigrant children who moved to the United States before welfare reform. The 2002 Farm Bill expanded this eligibility by making all legal immigrant children eligible for SNAP. Furthermore, children of immigrants who are born in the United States, regardless of their parents' legal status, are eligible for SNAP.

Given the importance of food security for fostering child well-being, the high rate of food insecurity in immigrant households, and the ongoing changes in SNAP eligibility rules, it is necessary to examine the relationship between SNAP participation and the food insecurity of children of immigrants. The participation of children of immigrants in SNAP is a far-reaching and complex policy issue. About one in four children (16 million children) lives with at least one immigrant parent (Terrazas and Batalova 2010). Many children of immigrants live in "mixed-status" households in which they are eligible for SNAP, although their parents are not. For example, 4 million native-born children live with unauthorized immigrant parents. Current policy extends SNAP eligibility to most children of immigrants. However, the ineligibility of their parents might limit children's access if parents do not pursue benefits. In addition, even if mixed-status families participate in SNAP, immigrant households will be eligible for fewer benefits relative to children in similar households with native-born adults.

[1] There are 38 million immigrants in the United States. Unauthorized immigrants have never been eligible for SNAP, and naturalized citizen immigrants have always been eligible for SNAP. There are 12 million (32 percent) unauthorized immigrants (Passel and Cohn 2009) and 16 million (43 percent) immigrants who are naturalized citizens (Terrazas and Batalova 2010). The remaining 10 million (25 percent) are legal noncitizen immigrants.

Our research addresses the Food Assistance and Child Well-Being priority area by analyzing the relationships between immigrant SNAP eligibility, SNAP participation and benefits among immigrant households with children, and the level of food insecurity in these households. We will analyze the Current Population Survey-Food Security Supplement (CPS-FSS), the CPS Annual Social and Economic Survey Supplement (CPS-ASEC), and information gleaned from the Microanalysis of Transfer to Households (MATH-CPS) model to meet our research objectives.

B. Project Objectives and Research Questions

This project has three substantive objectives. First, we will assess the effects of changes in immigrant eligibility for SNAP on the participation and benefit levels of immigrant households with children. Second, we will examine the characteristics of immigrant households that are associated with SNAP participation. Third, we will examine the effects of SNAP participation on food insecurity.

The project also has a methodological objective, which is to shed light on the relationship between SNAP participation and food insecurity. Research that examines the effect of SNAP on food insecurity is challenging because households are more likely to apply for SNAP when they are experiencing food insecurity (Nord and Golla 2009; Gundersen and Kreider 2009; Yen et al. 2008). Insofar as SNAP eligibility rules for immigrants are exogenous, we will use them as an instrument for SNAP participation to examine whether SNAP participation reduces food insecurity. The results of our analysis primarily apply to immigrant households with children, but we will consider the extent to which they are applicable to otherwise similar native households.

Our specific research questions are

1. Do SNAP eligibility rules for immigrants affect the likelihood of receiving SNAP and the benefit amount in immigrant households with children?
2. What demographic and labor market characteristics, beyond eligibility rules, predict whether immigrant households with children receive SNAP benefits?

3. What is the effect of SNAP benefits on food insecurity among children in immigrant households?

C. Study Background

Defining Food Insecurity. The USDA defines food insecurity as a lack of consistent access "to enough food for an active, healthy life." Food insecurity differs from hunger in that it is defined as limited access to food within a household (or among the children in a household). In contrast, hunger is "an individual-level physiological condition that may result from food insecurity" (United States Department of Agriculture Economic Research Service 2009).

The USDA determines incidences of food insecurity using subjective responses of household members to questions included in the CPS-FSS. Food security may be defined either for the household as a whole or for the children in the household (Nord 2009). The CPS-FSS contains 18 questions about household food security conditions, 8 of which are used to measure food security among children. Research shows that in some households, only adults experience food insecurity, suggesting that adults protect children from food insecurity (Nord 2009). Adults appear particularly likely to shield young children from food insecurity. According to the most recent data available, six million households with children (or 15.8 percent) are food insecure (Nord 2009). More than half those households (slightly more than three million or 8.3 percent) were child food insecure.

Food security can be low (defined as two to four conditions among children) or very low (defined as five or more conditions). Low food security among children reflects that adults in the household cannot afford to feed children balanced meals. Very low food security indicates that during the past year, adults could not afford to buy enough food for all the children in the household (Nord 2009). The vast majority of households with children who are child food insecure experience low food security rather than very low food security (Nord 2009).

Children of Immigrants Experience Greater Food Insecurity. Children of immigrants are more likely to be food insecure than the children of native-born citizens (Capps et al. 2009). This might be due to the lower average income of immigrant parents. Immigrants earn low wages in part because they lack key human capital characteristics, such as English language skills or specific educational credentials (Grenier 1984). Even after controlling for household income and other economic factors, children of immigrants still experience higher levels of food insecurity than do children of native-born Americans (Capps 2001). This raises the question of whether lack of eligibility for SNAP and other public assistance programs is a contributing factor. The lack of eligibility for SNAP has been hypothesized to produce a chilling effect among immigrant parents in accessing these benefits (Capps et al. 2004). Ineligible immigrant parents might believe their children are not eligible or might be afraid to access benefits for their children because of their unauthorized legal status.

Food Insecurity Can Harm Children. Research studies suggest that food insecurity can be harmful to children's well-being. Both household and child food insecurity may reduce the likelihood that children are in good health (for example, see Chilton et al. [2009]). Furthermore, recent evidence suggests that food insecurity decreases the likelihood that children will be a healthy weight (Gundersen and Kreider 2009). Food insecurity is also related to lower levels of on-track development among young children (Cook and Frank 2008).

In a review of more than 20 studies Cook and Frank (2008) demonstrate that household and child food insecurity are associated with a range of poor health outcomes in young children, including subjective measures, such as rated health, and more objective measures, such as being hospitalized. The evidence for other health outcomes, such as nutritional deficits, is not as clear (Bhattacharya et al. 2004). However, food-insecure children appear more likely to have poor health outcomes after accounting for selection effects (Gundersen and Kreider 2009). The poor health and development of children can have lifelong consequences. In particular, young children who lag in development may experience poor academic outcomes as they age, leading to a host of poor labor market and social outcomes as adults (Stagner, Bell, and Lansing 2008). Children who have unhealthy body weights are at much higher risk for being at an unhealthy weight as an adult, which can have serious health implications (Gunnell et al. 1998).

Immigrant Eligibility for SNAP Is Limited. Legal noncitizen immigrant eligibility for SNAP has changed several times in the past 15 years, particularly in 1996, 1998, and 2002. As described earlier, the 1996 Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA), or welfare reform, restricted most adult and child legal noncitizen immigrants from receiving benefits from SNAP and other public assistance programs. Eight states, primarily those with large immigrant populations, used state-funded assistance programs to provide SNAP-like benefits to many legal immigrants who were barred from participating in SNAP (Table II.1).

Table II.1. States Extending SNAP-Like Benefits to Legal Immigrants Following Welfare Reform

State	Date of Implementation
California	September 1, 1997
Connecticut	April 1, 1998
Maine	September 1, 1998
Minnesota	September 1, 1997
Nebraska	August 1, 1997
New York	September 1, 1997
Washington	November 1, 1999
Wisconsin	August 1, 1998

Source: USDA website (http://www.fns.usda.gov/snap/rules/Memo/PRWORA/StatePrograms.htm), accessed March 25, 2010.

In 1998, the Agriculture Research, Extension, and Education Reform Act restored benefits for certain groups of legal noncitizen immigrants, including children, the elderly, and the disabled who entered the United States before PRWORA. The 2002 Farm Bill was more comprehensive, as it made adult noncitizen immigrants who have lived legally in the United States for more than five years and all legal immigrant children eligible for SNAP.

In addition to immigration status, other household and individual characteristics are used to determine SNAP eligibility and benefits. The main household criteria include low income (gross income less than 130 percent of the federal poverty level and net income less than 100 percent of the federal poverty level) and limited assets. At the individual level, with some exceptions, most nondisabled adults must meet work requirements to receive benefits. For immigrants, sponsor deeming rules that count the income of immigrants' sponsors toward their household income may affect the eligibility of immigrant households. SNAP benefits are calculated based on a SNAP unit,

which includes the members of a household who prepare meals together, but they must include spouses and their dependent children (Smith 2004).

A large number of children of immigrants live in mixed-status families in which the children are eligible for SNAP but their parents are not. Native-born and legal immigrant children in these households are currently eligible for SNAP. However, their immigrant parents are a diverse group. One in four immigrant children has a parent who is unauthorized (Terrazas and Batalova 2010). In addition, legal immigrant parents are eligible for SNAP only after five years of residence in the United States.

The differential rules regarding SNAP eligibility for children of immigrants and their parents create mixed incentives for families. Public policy makes children of immigrants, who would otherwise qualify, eligible to receive SNAP. However, restrictions on their parents' eligibility could limit children's access to benefits. Parents might not seek SNAP benefits if they are ineligible themselves, particularly if they are fearful of contact with government agencies because they lack legal status. Research that compares the years directly before and after the 2002 Farm Bill suggests that it increased immigrant participation in SNAP the year after the bill was implemented (Henderson et al. 2008). The proposed research builds on this work by examining the long-term effects of the 2002 Farm Bill, over the course of several years after implementation. Further, as described in more detail later in the proposal, we also assess the effects of the Farm Bill on household benefit levels and children's food security.

Even if immigrant adults seek SNAP for their children, the benefit levels available to the household will be reduced due to the adults' immigration status. Research on the effects of the 1996 welfare reform restrictions suggests that restricting immigrants' access to SNAP reduced the amount of benefits received by immigrant households with children (Van Hook and Balistreri 2006). This research used a data set (Survey of Program Dynamics) with a 50 percent attrition rate and a small sample of immigrants. The proposed research builds on existing studies by analyzing the large sample of the CPS, which has a higher response rate than the Survey of Program Dynamics.

The Effect of SNAP on Food Insecurity. One goal of our proposed research is to determine whether SNAP participation improves the well-being of children of immigrants as measured by food security. A key problem in assessing the relationship between SNAP participation and food insecurity is that households tend to seek SNAP benefits in response to experiencing food insecurity (Nord and Golla 2009). Unless properly accounted for in statistical models, this selection effect will reduce the observed effect of SNAP on food insecurity. Researchers have attempted to untangle the issue through multiple analytic techniques and approaches, including natural experiments primarily based on state variation in eligibility rules, instrumental variable approaches (Yen et al. 2008), and detailed longitudinal analysis.

Most recently, Nord and Golla (2009) used detailed month-by-month longitudinal data from matched CPS samples to assess food insecurity prior to SNAP receipt. They found that just prior to entering the SNAP program, food insecurity rose significantly. Following entry into the program, food insecurity dropped sharply, suggesting that SNAP benefits reduce food insecurity. With the careful treatment of the selection effects, SNAP participation has been shown to reduce food insecurity; however, few if any of the studies to date have focused specifically on children or children of immigrants.

Research specifically on immigrants has exploited the variation across states in food assistance programs for immigrants following the 1996 welfare reform. Using an instrumental variables approach in which SNAP participation depends on immigrant eligibility, Borjas (2004) determined that reducing the participation in food stamps by 10 percentage points increased household food insecurity by 5 percentage points. Another study found similar results using state variation in participation for food stamps (Yen et al. 2008). Our research builds on these studies by specifically focusing on child food insecurity and the effects of more recent policy changes due to the 2002 Farm Bill.

II. Rationale and Significance

We address Economic Research Service (ERS) priority area 1, Food Assistance and Child-Well-Being, by examining the effects of SNAP eligibility and participation on the food insecurity of households with children. Specifically, although public policy provides many children of immigrants with SNAP benefits, the ineligibility of parents may reduce their access. As described earlier, even children of immigrants who are U.S. citizens may have limited access to SNAP due to their parents' immigration status. Children of immigrants make up a large proportion of all children in the United States, and they are a particularly economically disadvantaged group. They face a disproportionately high risk of food insecurity, and even after controlling for income, children of immigrants are more likely to live in food-insecure households.

This research makes three novel contributions to the literature. First, it focuses on food insecurity among children and households with children. Few research studies have examined the relationship between SNAP benefits and child food insecurity. Second, it examines the changes in recent SNAP immigrant eligibility and the amount of benefits. This is particularly important in understanding the effects of SNAP immigrant restrictions because children may be eligible, even when their parents are not. Finally, it addresses the inherent difficulty of assessing the effects of SNAP on food insecurity by exploiting the variations in policy across states and over time.

III. Research Methods

We will use regression analysis to analyze empirical data from the CPS-FSS and the CPS-ASEC, merged with data on eligibility rules for federal and state food assistance programs. Specifically, we will merge the CPS data and the eligibility rules for adult and child immigrants by state and year to answer the three research questions discussed earlier.

A. Data Sources

The research project will study SNAP participation and food insecurity from 1997 to 2008. We will focus on this period for three reasons. First, many changes in SNAP (known then as the Food Stamp Program) occurred at the same time as welfare reform in 1996. Concurrent policy reforms make it difficult to attribute behavioral changes to changes in SNAP eligibility. Beginning our analysis after welfare reform enables us to focus on the effects of changes in SNAP eligibility[2].

[2] We will also consider beginning the analysis with the 1998 or 1999 data.

Second, previous studies typically focus on the relationship between welfare reform and food insecurity (Borjas 2004). Instead, we will analyze data during the years before and after the changes in SNAP eligibility due to the 2002 Farm Bill. There have not been any significant changes in immigrant SNAP eligibility since this legislation, so the eligibility rules from the Farm Bill represent the current policy environment. Third, we use data only through 2008 because it is the most recent available CPS-FSS data.

With this time period in mind, we will obtain two types of data for our analysis: data from the CPS-FSS and the CPS-ASEC and food assistance program eligibility rules for immigrants.

The Current Population Survey. We will analyze the CPS, a nationally representative sample of households conducted each month since 1940. The basic monthly survey is a key source of information on demographic and labor market characteristics. The CPS sample is based on a rotating panel of addresses, such that residents of each address are interviewed for four consecutive months, and then eight months later for four more consecutive months. This design results in a roughly 75 percent overlap of the sample from month to month, and about a 50 percent overlap in the sample from year to year.

The CPS-FSS forms the core analytical sample of our proposed study. As shown in Table III.1, between 1997 and 2008 the CPS included the FSS once a year and twice in 2001. Starting in 2001, CPS respondents completed the CPS-FSS in December. We will use these waves of the FSS to construct a repeated cross-section data set of households.

Table III.1. Sample Sizes in the CPS Food Security Supplement, 1997–2008

Data Set	All Households	Immigrant Households	Foreign-Born Children in Immigrant Households	Native-Born Children in Immigrant Households
April 1997	47,306	6,502	1,477	4,906
August 1998	47,761	6,678	1,385	5,095
April 1999	47,500	6,673	1,282	5,007
September 2000	47,878	6,986	1,439	5,067
April 2001	55,375	7,718	1,601	5,656
December 2001	56,443	8,135	1,661	5,954
December 2002	56,967	8,244	1,719	6,247
December 2003	55,411	8,158	1,601	6,304
December 2004	55,307	8,195	1,551	6,199
December 2005	54,556	8,484	1,550	6,293
December 2006	54,471	8,555	1,527	6,317
December 2007	53,960	8,617	1,515	6,505
December 2008	52,815	8,509	1,336	6,334

CPS = Current Population Survey.

The unit of analysis is the household. Our preliminary analysis indicates that the overall sample size is sufficiently large to produce meaningful statistics about immigrant households with children. As shown in Table III.1, 53,000 households received the CPS-FSS supplement in each wave, on average. Of these households, on average, 7,800 contain at least one foreign-born household

member, which we define in this proposal as immigrant households. The total number of households in the table is slightly more than 100,000; however, because the CPS interviews the same address in two consecutive years, there are roughly 50,000 independent households in the sample[3].

Although not all immigrant households include children and some households include more than one child, the right two columns of Table III.1 suggest that a sufficiently large number of children are present in immigrant households. In each wave of the CPS-FSS, about 1,500 foreign-born children and 5,800 native-born children live in immigrant households. These sample sizes demonstrate the feasibility of our proposed study.

We will also perform supplementary analyses by merging the CPS-ASEC with the CPS-FSS. The longitudinal nature of the CPS means that we can merge addresses over time. We will condition the longitudinal matches based on a standard set of demographic characteristics used in the literature to ensure that we will match people to themselves (Madrian and Lefgren 2000). Starting in 2001, these two surveys were fielded three months apart (December and March), which means that about one-quarter of the CPS-FSS samples completed the CPS-ASEC survey[4]. The advantage of the CPS-ASEC is that it includes more detailed information on the financial characteristics of households, data which is necessary for the MATH-CPS model that we describe in greater detail later in this proposal. The disadvantage of this procedure is that it substantially reduces the size of our sample.

Federal and State Food Assistance Program Rules. We will create indicators of federal and state policies that measure food assistance program eligibility for immigrants. We will begin by creating a variable based on federal rules that indicate the eligibility of adult and child immigrants for SNAP. We will precisely code the timing of implementation of federal rules between 1997 and 2008, paying particular attention to 2002 when the Farm Bill was passed. We will also review the implementation of state-funded food assistance programs to pinpoint their timing. As shown in Table II.1, some states extended food assistance benefits to adult immigrants prior to the 2002 Farm Bill. Thus, the eligibility of immigrants in some states was consistent throughout the period; in other states the eligibility changed over time.

MATH-CPS. We will use the MATH-CPS model to determine SNAP eligibility more precisely in the supplementary analyses, using the CPS-ASEC and CPS-FSS matched sample. Developed for the USDA, the Mathematica's MATH-CPS model operates like an electronic SNAP caseworker by applying eligibility rules to households in the CPS-ASEC. The model provides estimates of the number and characteristics of eligible households. We will create variables that classify families and individuals by certain characteristics, such as student status, family heads, and principal earners. These variables are required to determine eligibility for SNAP and other public assistance programs. We will simulate eligibility and participation in the Supplemental Security Income (SSI) program because participation is underreported in the CPS and because there are important interactions between SNAP and SSI. We will also define General Assistance and Temporary Assistance to Needy Families units to ensure that the reported income levels from these programs are allocated to the

[3] Between 1997 and 2001, there are more independent households per wave because of the survey timing.

[4] In recent administrations of the survey, some respondents completed the CPS-ASEC in February, which will increase the number of households that completed both CPS-ASEC and the CPS-FSS.

correct individuals in the household. Lastly, we will impute child care, medical, and shelter expenses. These expenses are not reported in the CPS-ASEC, but they affect the net monthly income that determines SNAP eligibility. We will use all of these factors to simulate household SNAP eligibility for the subset of households that completed both the CPS-FSS and the CPS-ASEC.

B. Key Variables and Measures

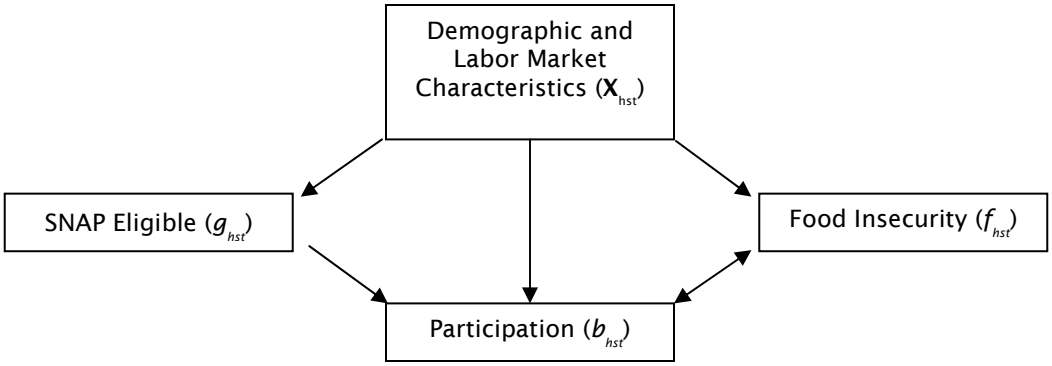
The CPS-FSS is particularly useful for our proposed study. Specifically, it contains the following information:

- **Demographic and labor market characteristics:** ages of children, gender, race, ethnicity, country of birth, citizenship status, years since migration, labor force participation, employment status, and earnings
- **SNAP participation:** whether the household received any SNAP benefits and the amount of SNAP benefits received
- **Food insecurity:** household food insecurity and child food insecurity; the CPS-FSS contains an 18-item scale about food insecurity, 8 of these items refer specifically to children in the household

C. Analytic Approach

We will use multivariate analysis to answer the key research questions. This method enables us to isolate the associations of different factors with program participation and food insecurity. We will use the program rules by year and state to determine the SNAP eligibility of each household member in CPS-FSS. We will also extract data on demographic and labor market characteristics, SNAP participation, and food insecurity in immigrant households from the CPS-FSS.

Figure III.1. Household Characteristics, Program Eligibility, Program Participation, and Food Insecurity



We present our conceptual framework in Figure III.1. We assume that household demographic and labor market characteristics directly affect SNAP eligibility. The federal government sets

eligibility based in part on household income, assets, and the number of eligible members. Demographic and labor market characteristics and SNAP eligibility then jointly determine SNAP participation. Participation in SNAP is not universal among those who are eligible (Van Hook and Balistreri 2006; Borjas 2004), so the framework includes both eligibility and other characteristics affecting participation. Finally, the framework shows that demographic and labor market characteristics and SNAP participation affect food insecurity. We explicitly assume that SNAP eligibility affects food insecurity only through its effect on program participation.

D. Model Specification and Variables

Research Questions 1 and 2. The first two research questions ask how immigrant eligibility, demographic, and labor market characteristics affect SNAP participation and benefit levels. We propose to answer these questions jointly with the empirical specification presented in Equation (1). The specification is a logistic regression model where the dependent variable is SNAP participation, which is equal to one if the household receives any SNAP benefits (b_{hst}) and zero otherwise. The unit of observation is the household *h* in state *s* in year *t*.

To answer research question 1, we will estimate the effects of the eligibility for SNAP benefits, g_{hst}, on benefit receipt. As described above, we determine eligibility using demographic and income characteristics of each household member and SNAP eligibility rules. We will test different measures of g_{hst}, including eligibility (1) at the household level, (2) among the immigrant parents of children, and (3) as the ratio of eligible members to household size. To answer research question 2, we will estimate the effects of the independent variables $\mathbf{X}_{hst}$, which consists of household demographic and labor market characteristics, such as the householder's citizenship status, years since migration, and country of origin.

$$(1) \quad \Pr(b_{hst} > 0) = \frac{\exp(\mathbf{X}_{hst}\beta + g_{hst}\gamma + \mu_t + \nu_s)}{1 + \exp(\mathbf{X}_{hst}\beta + g_{hst}\gamma + \mu_t + \nu_s)}$$

The core analysis will consist of immigrant households with children in the CPS-FSS sample. In our initial analyses, we will restrict the sample to households that meet the income guidelines for SNAP eligibility (gross income less than 130 percent of the federal poverty level). We will assess whether there is an "eligibility effect," such that households with restored eligibility due to the 2002 Farm Bill are more likely to receive SNAP benefits, controlling for a range of demographic and labor market characteristics. Furthermore, we will assess whether the effect is greater in the states that did not expand SNAP eligibility to immigrants prior to the 2002 Farm Bill. In other words, we will assess whether the immigrant effect is more evident in those states most affected by the Farm Bill. Lastly, the model includes state and year fixed effects to control for other factors that affect SNAP participation. We will use the same approach to estimate tobit models with a dependent variable of SNAP benefit amounts.

In the supplemental analysis, we will utilize more specific eligibility information by merging the CPS-FSS and CPS-ASEC[5]. The CPS-FSS data do not contain all of the necessary information to determine eligibility for SNAP, such as household assets. As described earlier in the proposal, we will build on Mathematica's prior work simulating SNAP eligibility for USDA by using the rules encoded in the MATH-CPS simulation program to more precisely estimate SNAP eligibility for members of immigrant households. In the analysis of the merged CPS-FSS and CPS-ASEC, we will use the sample of low-income immigrant households and estimate whether the eligibility rule change from the 2002 Farm Bill affected SNAP participation. The merged sample will reduce our total sample size by up to three-quarters. Thus, the supplemental analysis will make a trade-off between eligibility measurement precision and statistical precision.

We will perform further sensitivity analyses to assess whether the results are stable across alternative specifications. For example, we will consider using alternative measures of low income to define our sample. We will also test different sets of demographic and labor market characteristics and include interaction terms to examine whether the relationship between eligibility and participation varies by these characteristics.

Research Question 3. The third research question explores how SNAP benefits affect the food insecurity of children. The conceptual framework in Figure III.1 shows that the relationship between SNAP participation and food insecurity operates in both directions. That is, although SNAP participation may lessen food insecurity, households with food insecurity may be more likely to participate in SNAP. We propose to use an instrumental variables specification to address the endogeneity of program participation. Specifically, we will use changes in immigrant eligibility rules due to the 2002 Farm Bill as an instrument for SNAP participation. As shown in the conceptual framework, we assume SNAP eligibility affects food insecurity only through its effect on program participation.

Our empirical specification relating SNAP benefits to food insecurity is given in Equation (2). The model specification consists of a logistic regression model. The dependent variable will be food insecurity. We use both measures of food insecurity discussed earlier—food insecurity among children and food insecurity in households with children—in separate models. Because research suggests that parent protect their children from food insecurity (Nord and Golla 2009), parents' first use of SNAP benefits might be to buy sufficient nutritious food for their children. Thus, child food insecurity might be more responsive to SNAP benefits than household level food insecurity. For the household food insecurity models, the dependent variable is equal to one if the household is classified as being food insecure based on the CPS-FSS full battery of 18 questions on food-related conditions. For child food insecurity, the measure is based on the restricted set of questions that pertain to the food security of children in the household. As discussed previously, households can be classified as having low food security or very low food security. Although the baseline model focuses on experiencing any food insecurity, we will also consider using multinomial logistic

[5] Although the CPS-ASEC is collected months after the CPS-FSS, the CPS-ASEC income questions refer to the previous 12 months. Thus the CPS-ASEC data refer to a time period that overlaps with the time period for the CPS-FSS data.

regressions that enable us to examine predictors of both low food insecurity and very low food insecurity.

$$\Pr(f_{hst}=1)=\frac{\exp(b_{hst}\delta+\mathbf{X}_{hst}\mathbf{\Pi}+\rho_s+\tau_t)}{1+\exp(b_{hst}\delta+\mathbf{X}_{hst}\mathbf{\Pi}+\rho_s+\tau_t)} \quad (2)$$

The empirical specification includes demographic and labor market characteristics, which may independently determine food insecurity. The specification also includes the level of SNAP benefits received by the household. As discussed earlier, we will use an instrumental variables method to instrument for received SNAP benefits with eligible benefits. And, as with the other empirical specification, the model will include a set of state and year fixed effects.

E. Potential Uses of Results

Our proposed study will provide a range of useful empirical results. First, we will produce descriptive statistics on the participation of immigrant households with children in SNAP. We will also produce descriptive statistics on food insecurity among these households, which make up an economically vulnerable and growing population. Second, we will present regression coefficients and standard errors to show the statistical relationship between key variables, holding other variables constant. We will be particularly interested in the relationships between (1) eligibility and participation and (2) SNAP benefits and food insecurity in households with children.

The results will be useful to policymakers and researchers in two overlapping arenas. On the food assistance and nutrition side, the results will provide important information on SNAP take-up rates. Previous studies have documented an underutilization of SNAP, and the proposed study will shed light on the extent of this behavior among immigrant households. The results will also provide an estimate of the effect of SNAP benefits on child food insecurity. These results will help ERS understand how this public assistance program affects a key child outcome.

Policymakers and researchers interested in public policies related to immigrants will also benefit from the results. The federal government has been considering immigration policy reforms. Results of the proposed study can inform current debates about the extension or restriction of public assistance programs to immigrants. In addition, the results will inform state legislatures, which often decide on and implement immigrant access to public assistance programs. In both cases, the results of the proposed study will help policymakers understand the consequences of restoring or restricting immigrant eligibility for food assistance and nutrition programs.

F. Data Limitations, Potential Pitfalls, and Proposed Solutions

There are some important limitations to our proposed study. First, there are very few data sets that contain detailed information on immigrants' legal status, which is important to the proposed study because it underlies benefit eligibility. We selected the CPS-FSS data because they include the most comprehensive information on food security, income, and immigration status. Our best approach, however, is to base eligibility on foreign-born status, years since migration, and country of birth.

For undocumented immigrants, we will rely on prior work that documents their countries of origin. Previous studies suggest that undocumented immigrants come predominantly from Mexico and Central American countries (for example, Borjas 2004). As a sensitivity analysis, we will estimate empirical specifications for the subset of immigrants from countries that do not send a large proportion of undocumented immigrants. This approach has been used in another study of immigrant program participation (Passel 2006).

Because refugees are eligible for SNAP regardless of years since migration, we will use country-level data reported historically by the Immigrant and Naturalization Service and more recently by the Department of Homeland Security documents. These documents contain the ratio of refugees to all legal immigrants by country and year. In sensitivity analyses, we will assign a refugee probability to each immigrant based on his or her country of birth and year of arrival. Previous studies have used country-level statistics as a proxy for individual immigrant characteristics (Bollinger and Hagstrom 2008). We will use the refugee probability variable either as a control variable or as a variable to select subgroups of immigrants who are unlikely to be refugees.

A second limitation of our proposed study is that the CPS-FSS does not contain information about household assets. This variable is important because only households with assets below a certain thresholds are eligible for SNAP benefits. As described earlier, our primary strategy will be to restrict our analyses to low-income households as an indicator of eligibility. Further, we will use our supplementary analysis of the matched sample from the CPS-FSS and the CPS-ASEC, combined with the MATH-CPS model, to impute assets and eligibility.

A third limitation is that there might be national trends in SNAP participation that coincide with the 2002 Farm Bill[6]. One way we will address this possibility is to use a difference-in-difference approach. We can exploit state-level variation to identify states that provided benefits to legal immigrants prior to the 2002 Farm Bill, and examine changes in participation and food insecurity in states with eligibility changes compared to changes in states without any eligibility changes. We can also examine changes in the trends in participation and food security among immigrant households headed by adults with less than five years residency, whose eligibility did not change, relative to those with greater than five years' residency, whose eligibility did change. The results of these sensitivity analyses will address threats to internal validity.

[6] For example in 2003 the CPS reweighted its sample based on the 2000 decennial Census, which could affect estimated participation rates.

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