The Effect of Food Stamps on Children's Health: Evidence from Immigrants' Changing Eligibility

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August 6, 2017

Abstract

The Food Stamp program is currently one of the largest safety net programs in the United States and is especially important for families with children: 25% of all children received Food Stamp benefits in 2011. The existing evidence on the effects of Food Stamps on children's and families' outcomes is limited, however, because it is a federal program with little quasi-experimental variation. I utilize a large, recent source of quasi-experimental variation–changes in documented immigrants' eligibility across states and over time from 1996 to 2003–to estimate the effect of Food Stamps on children's health. I study the medium-run health effects of these policy changes on U.S.-born children of immigrants, whose parents were subject to the changes in eligibility. I find loss of parental eligibility has large effects on contemporaneous program receipt, and an additional year of parental eligibility, between the time children are in utero to age 4, leads to improvements in developmental health outcomes and parent-reported overall health at ages 6-16. This provides some of the first evidence that early-life resource shocks impact later-life health as early as school age.

JEL Codes: H5, I1, I3

I am grateful for helpful comments from Liz Ananat, Marianne Bitler, Kathryn Edwards, Hilary Hoynes, Lucia Kaiser, Price Fishback, Doug Miller, Marianne Page, Giovanni Peri, Diane Schanzenbach, Todd Sorenson, and Ann Stevens, as well as the participants of the Allied Social Science Association Annual Meeting, the RIDGE Conference, the Association for Public Policy and Management Annual Conference, the Society of Labor Economists Annual Conference, the Western Economic Association Annual Conference, the All California Labor Conference, the seminar series at UN Reno and Sonoma State University, the UC Davis Center for Poverty Research Graduate Student Retreat, and the Applied Micro Brownbag at UC Davis. I would also like to thank Adrienne Jones and the staff at the Center for Disease Control Research Data Center in Maryland for support in accessing my data, and David Simon for guidance in the data application process. The findings and conclusions in this paper are those of the author and do not necessarily represent the views of the Research Data Center, the National Center for Health Statistics, or the Centers for Disease Control and Prevention. This research was made possible through generous funding from the RIDGE Center for Targeted Studies Doctoral Dissertation Grant, the Bilinksi Foundation, and the Office of Research Services at UC Denver. All errors are my own.

"Doctors are warning that if Congress cuts food stamps, the federal government could be socked with bigger health bills. Maybe not immediately, they say, but over time if the poor wind up in doctors' offices or hospitals as a result."

Associated Press, January 9, 2014

1 Introduction

The Food Stamp program is the largest cash or near-cash means-tested safety net program in the United States.[1] Nearly 15% of the total population and 25% of all children received benefits from the program in 2011, up from 6-10% of the population in the 1990s and early 2000s. Among families with children that participate in the program, Food Stamps play a crucial role in their total resources; if benefits were counted at their cash-equivalent value, they would reduce the poverty rate among participators by 16% in 2011.[2] As a result of the growing importance of this program, there has been increased interest among policy-makers and economists about the *costs* of the program, in terms of direct expenditures and labor supply disincentives (Mulligan, 2012; Ganong and Liebman, 2013), as well as the *benefits* of the program, especially the effects of the program on families' nutrition and children's outcomes (Kreider et al., 2012; Beatty and Tuttle, 2014; Schmidt, Shore-Sheppard and Watson, 2015). Concerns over increased spending resulted in several cuts to Food Stamp generosity in the past several years, with potentially larger cuts on the horizon (Grovum, 2014; Dewey and Jan, 2017).[3]

Despite all this, very little is known about the effects of the Food Stamp program, because it is a federal program with little variation in eligibility rules or benefit amounts

[1] In 2008 the Food Stamp program was renamed the Supplemental Nutrition Assistance Program (SNAP), but I use the name Food Stamps throughout this paper.

[2] Sources are Moffitt (2013), the The Center on Budget and Policy Priorities (2013*a*), Murray (2011), and the Food Research and Action Center (2012). The calculation of the effect on the poverty rate ignores behavioral responses.

[3] In 2013, Congress allowed the benefit increase from the American Recovery and Reinvestment Act of 2009 to expire (Dean and Rosenbaum, 2013). In 2014, Congress eliminated the "heat and eat loophole" (Chokshi, 2014), which is a procedure by which states give households with no heating bill (e.g. many renters) Low-Income Home Energy Assistance that allows them to receive slightly larger Food Stamp benefit amounts.

across geographic locations or over time (Currie, 2003), which would typically be used to conduct quasi-experimental analysis. Existing quasi-experimental estimates of the effects of the program on children's and families' outcomes rely on the program's roll-out in the 1960-1970s (Almond, Hoynes and Schanzenbach, 2011; Hoynes, Schanzenbach and Almond, 2016) and the applicability of those estimates to current generations is unclear, as there have been major changes over time to the Food Stamp program and other safety net programs, as well as changes in health care technology, average health, and the demographics of the overall population. For more recent cohorts, researchers compare children's outcomes among families that participate to those that do not (Kreider et al., 2012), which may suffer from biases due to endogenous program participation, or they utilize recent state changes in application procedures and eligibility rules as instruments for participation, but these changes had mostly small effects on participation (Ganong and Liebman, 2013; Ziliak, 2015).[4] Therefore, all in all, the effect of Food Stamps on current children's outcomes is still largely unknown.

In this paper, I take advantage of recent, large changes in Food Stamp eligibility for a well-defined and easily identifiable group, to provide new quasi-experimental estimates of Food Stamps on children's health. Specifically, I utilize changes in eligibility among documented immigrant families: many foreign-born lost eligibility for the Food Stamp program in 1996 as part of welfare reform (the Personal Responsibility and Work Opportunity Reconciliation Act) and eligibility was subsequently restored to them at different times across different states from 1998 to 2003. Welfare reform caused immigrants' participation in Food Stamps to decline significantly (Fix and Passel, 1999; Haider et al., 2004) and I examine the effects of this loss of eligibility, as well as the restoration of eligibility, on children's health.[5] These policy changes create a very rich source of variation in eligibility to exploit in my empirical strategy: eligibility depends on state and year of residence, and country of birth (U.S.

[4]The papers using this latter methodology examine a variety of effects of the program including the effects on children's health, and are summarized by Hoynes and Schanzenbach (2015).

[5]Some researchers suggested that the decline in immigrant participation may have been due in part to "chilling effects" from a harsh policy environment in addition to the changes in eligibility rules (Fix and Passel, 1999; Borjas, 2003; Haider et al., 2004).

or not). Moreover, as eligibility is turned "off" and then back "on", it is very unlikely that trends in children's health would be driving the results. Prior to welfare reform, children of immigrants made up 20% of all children receiving Food Stamps and 30% of all children in poverty, so this is a particularly policy-relevant population likely to be affected by changes to the Food Stamp program.[6] Additionally, recent policy proposals have suggested additional barriers to immigrants' participation in safety net programs specifically, so understanding the effect of similar previous restrictions is crucially important (Fix and Capps, 2017).

In the primary analysis, I investigate the effects of early-life Food Stamp eligibility on health at school age (6-16), but I first examine the direct effect of the changes in eligibility on program receipt. Because I am linking early-life changes in Food Stamp eligibility to health in later life, I restrict the sample to U.S.-born children of immigrants to ensure that, other than changes in Food Stamp eligibility, the early life experiences of these children are as similar as possible. This restriction means that all children in my analysis are U.S. citizens and it is their parents who lose eligibility for the program. Despite the fact that children remain eligible, loss of parental eligibility reduces the benefit amount families are eligible to receive, because this amount is a function of the number of eligible household members.[7] This has two potential implications: families continue to receive benefits, but the benefit amount falls substantially, or families no longer participate in the program, because these lower benefits do not outweigh the costs of participating (Daponte, Sanders and Taylor, 1999; Van Hook and Balistreri, 2006). To focus on children most likely to be affected by these changes, my primary sample is U.S.-born children whose mothers have a high school education or less, because this group participated in the program at higher rates than the full population before welfare reform. With the 1995-2007 Annual Social and Economic Supplement (ASEC) to the Current Population Survey (CPS), I find that the changes in

[6]Children of immigrants defined as children with at least one foreign-born parent. Author's calculations from the Food Stamp Quality Control Data and the Current Population Survey.

[7]For example, for a family of three with two foreign-born parents and one U.S.-born child, loss of parental eligibility reduces the maximum benefits the family can receive by almost 66% ($200 per month in 1998$s).

parental eligibility led to large changes in program receipt–loss of parental eligibility reduced participation by 50% and average benefits received by 36% in my sample.

Building off of these findings, I utilize restricted access data from the National Health Interview Survey (NHIS) to examine the effect of parental eligibility from the time children are in utero to age 4, on their health at ages 6 to 16. These medium-run effects are of interest for two reasons. First, the early years of life are critical for development: poor nutrition and lack of resources during this time can have lasting detrimental impacts on children's health and cognitive ability (Prado and Dewey, 2012). Second, changes in health may occur slowly in response to changes in resources, so examining contemporaneous measures of health may understate the total effect of Food Stamps on health (Grossman, 2000; Currie, 2009). I find that among U.S.-born children of immigrants, whose mothers have a high school education or less, an additional year of parental eligibility in early life reduces the likelihood children are reported in "Poor", "Fair" or "Good" health (relative to "Excellent" or "Very Good" health). Moreover, I find a reduction in the incidence of developmental health conditions, but no evidence of changes in physical health conditions or mental health. The estimates are robust to the inclusion of children of natives as a "control" group in a triple difference model, as well as accounting for changes in the generosity of other safety net programs.

In addition to providing one of the only quasi-experimental evaluations of the modern Food Stamp program on children's health, this paper also contributes to the literature examining the effects of early-life resource shocks on individuals' long-run outcomes in adulthood (summarized by Almond and Currie (2011) and Currie and Almond (2011)). More recently, this literature has also documented the longer-run effects of childhood access to the safety net, including the mother's pension program in the 1910-30s (Aizer et al., 2016), and expansions to public health insurance programs in the 1980-90s (Brown, Kowalski and Lurie, 2015; Cohodes et al., 2015; Currie, Decker and Lin, 2008; Miller and Wherry, 2014; Wherry et al., 2015; Wherry and Meyer, 2015).[8] In this paper, I focus on the largest cash or near-

[8]There is also a literature looking at the contemporaneous effects of safety net programs on children's

cash program in the modern safety net, and my findings illustrate that near-cash programs have large beneficial effects on modern children's medium-run health outcomes.[9] Moreover, understanding the effects in the medium-run is important because this impacts welfare analysis of early-life interventions, as well as provides insight into the mechanisms behind the long-run effects.

The rest of the paper proceeds as follows. In section (2) I describe the Food Stamp program and the policy variation I utilize and review the related literature. I describe the data I use to estimate the effects on program receipt and children's health in section (3). In section (4) I outline my empirical strategy. I discuss the results on Food Stamp participation and child health in section (5). Section (6) concludes.

2 Background

The Food Stamp program is a federal program whose benefit amounts are determined as a function of family income and family size. The benefits are available to all families with total family income below 130% of the poverty line (the "gross income test"), regardless of their size or household structure, and are intended to allow families to maintain a minimum level of adequate nutrition, assuming the family spends 30% of its income on food. A family's benefit amount is determined by a maximum benefit, which is set nationally and is a function of the number of eligible members in the family, minus 30% of (adjusted) family income :

$$\text{Benefit Amount} = \text{Max Benefit}(\text{Number Eligible in Family}) - .30*[\text{Family Income}]$$

well-being. See, for example, Currie and Cole (1993), who look at the effects of the AFDC program on infant health, as well as Milligan and Stabile (2011); Dahl and Lochner (2012); Hoynes, Miller and Simon (2015) who look at the effects of refundable tax credits on children's well-being on a number of dimensions.

[9]Most quasi-experimental and experimental research finds the marginal propensity to consume food out of Food Stamp benefits is similar to that of cash income (Currie, 2003; Schanzenbach, 2007; Hoynes and Schanzenbach, 2009; Bruich, 2014) and currently most eligible families consume more food than their Food Stamp benefits, suggesting they will behave infra-marginally (Hoynes, McGranahan and Schanzenbach, 2015). However, Beatty and Tuttle (2014) found that Food Stamp benefits may distort individuals' behavior and cause them to consume more food than they would have with an equivalent cash transfer.

Typically all members of the family are eligible, but as I describe in more detail below, the immigrant-specific changes to eligibility led to changes in the number of eligible family members and, therefore, changes in the maximum benefit amount. In 1998 the maximum Food Stamp benefit amount for family of three was $321 per month and the average benefits received were roughly $100 below this maximum. These eligibility rules and benefit amounts are set nationally and have varied little since the program began. I describe the non-immigrant-specific program rules in more detail in the Appendix.

There are several mechanisms through which early-life access to Food Stamps may affect later life health. First, the early life period is a critical one for development, so exposure to a negative environment during this period may lead to worse cognitive and physical outcomes in later childhood and adulthood (Cunha and Heckman, 2007; Almond and Currie, 2011; Almond, Currie and Duque, 2017). Initial theories emphasized the long-run effects of in utero insults on cardiovascular disease (Barker, 1990). Recent work has expanded this "Fetal Origins Hypothesis" to the broader model of the "Developmental Origins of Health and Disease", which highlights the importance of periods after the in utero one as also being important for determining long-run outcomes, as well as the potential for long-run effects on outcomes beyond cardiovascular ones (Lewis et al., 2014). Importantly for this paper, theory predicts that poor nutrition in early life is especially detrimental to cognitive outcomes and immune system functionality in later childhood (Prado and Dewey, 2012; Save the Children, 2012) and there is strong correlational evidence of these relationships (Grantham-McGregor, 1995; Chandra, 1997). However, short term studies of deficiencies in nutrition "seem unable to detect the real influence of nutrition in early life [because] the brain takes a long time to mature" (University of Granada, 2013) so this paper provides an important test of this hypothesis by looking at outcomes in the medium-run.

In addition to any effects on nutrition, access to Food Stamps represent a large increase in overall family resources, which may result in increases in other forms of investment in

children's health. The boost in family resources may also reduce stress in the family (Evans and Garthwaite, 2014), which is also linked to improved cognitive outcomes for children, through both biological and behavioral channels (Lewis et al., 2014). A final potential channel is through the reduction in parental labor supply accompanying Food Stamp access (Hoynes and Schanzenbach, 2012; East, 2016). This may lead to more time spent with parents, which could have positive impacts on children's health if they are exposed to illnesses in daycare (Ruhm, 2000; Schaller and Zerpa, 2015).

Much of the existing quasi-experimental evidence on the effects of the Food Stamp program utilizes the county by county roll-out of the program in the 1960s and 1970s. Almond, Hoynes and Schanzenbach (2011) find that access to the Food Stamp program in utero decreases the likelihood children are born of low birth weight, and Hoynes, Schanzenbach and Almond (2016) build off of this work by examining how exposure to Food Stamps from the time a child is in utero to age five impacts their adult health and labor market outcomes. They find more Food Stamp exposure in early-life causes statistically significant reductions in "metabolic syndrome" (obesity, high blood pressure and diabetes) and, for women, improvements in labor market and educational outcomes.

Studies on more recent cohorts take several different approaches to circumvent the fact that the modern program provides little quasi-experimental variation (summarized by Currie (2003) and Hoynes and Schanzenbach (2015)). Kreider et al. (2012) use bounding exercises to account for endogeneity in the decision to participate, as well as under-reporting of participation, and they cannot rule out positive or negative effects on children's health. Closer to the approach I take in this paper, Schmeiser (2012) uses changes in state-specific Food Stamp application procedures and vehicle ownership rules, as well as state maximum EITC benefits, as instruments for Food Stamp participation and finds participation in the program reduces child BMI.[10] My work fills in the gap in this literature by examining the

[10]However, EITC benefits directly affect children's health (Hoynes, Miller and Simon, 2015).

effects of a recent, large change in Food Stamp access on modern cohorts of children. Moreover, contemporaneous analysis may understate the total effects on health, so extending into the medium-run may be important.

2.1 Policy Changes Affecting Immigrants' Eligibility

I take advantage of a mix of federal and state laws governing immigrants' eligibility for Food Stamps for my analysis. Prior to welfare reform in 1996 (the Personal Responsibility and Work Opportunity Reconciliation Act or "PRWORA") there was no difference in Food Stamp eligibility for most documented non-citizen immigrants and natives. Welfare reform changed this by making documented non-citizen immigrants ineligible for Food Stamps. States were given the option to use their own funds to restore benefits to this group, and nine states chose to provide these benefits to all newly federally-ineligible immigrants without additional eligibility restrictions.[11] These nine "Fill-In" states were California, Connecticut, Maine, Massachusetts, Minnesota, Nebraska, Rhode Island, Washington and Wisconsin. I call the other 41 states and the District of Columbia the "No-Fill-In" states. The "fill-in" programs began in 1998 and 1999, shown in Figure (1). Then, as part of the 2002 Farm Bill, eligibility was restored to large groups of documented non-citizen immigrants–the disabled, children, or those who had lived in the U.S. for at least five years.[12] I show a timeline of these events and how they affected children's eligibility in Figure (2).

I take advantage of all of these changes in eligibility to estimate the effect of Food Stamps on children's health. But, because I am interested in the effects of eligibility in early childhood on outcomes in later childhood, I focus only on U.S.-born children of immigrants to ensure that the children in my sample had experiences that were similar early in life, except for differences in parental eligibility for Food Stamps. Focusing on these children means their

[11]For example, some states required that immigrants apply for citizenship after receiving Food Stamp benefits, and I do not consider these states to be Fill-in states. I define the presence of a fill-in program based on information from the USDA SNAP Policy Database, the California Department of Social Services, and Bitler and Hoynes (2013).

[12]This discussion drawn primarily from Zimmermann and Tumlin (1999), Capps (2004), and Bitler and Hoynes (2013).

parents lose eligibility, but they themselves remain eligible.[13] When family members become ineligible, the maximum Food Stamp benefit the family can receive falls significantly; for example, for a family of 3, with one citizen child and two non-citizen parents, benefits could fall by as much as $2400 annually in 1998 dollars (almost 66%).[14]

Several groups of immigrants were unaffected by these eligibility changes. Immigrants who had worked in the U.S. for 40 quarters and met minimum earnings requirements in each quarter, those who had served in the military, or those who were refugees, asylees, or naturalized citizens remained eligible. Additionally, immigrants on temporary visas or who were undocumented were never eligible, and therefore remained ineligible. Immigrants who entered the U.S. after the passage of PRWORA in 1996, were subject to additional restrictions on eligibility for Medicaid/SCHIP, Supplemental Security Income (SSI), and Temporary Assistance for Needy Families (TANF, formerly Aid to Families with Dependent Child, AFDC) for at least their first five years of residence in the U.S. (unless their state of residence provided these benefits with state funds). Therefore, my primary sample is composed of U.S.-born children to foreign-born parents, whose parents report entering the U.S. between 1985-1996–I call this group "treated immigrants". The 1985 cutoff drops from the sample immigrants likely to not be affected by the Food Stamp eligibility changes, because they have lived in the U.S. long enough to either satisfy the 40 quarters of work exemption, or to have applied for and received citizenship. The 1996 cutoff drops from the sample immigrants likely affected by changes in eligibility for other safety net programs.

A potential concern with utilizing this variation to estimate the effects of Food Stamps

[13] Any foreign-born siblings of U.S.-born children were made eligible as part of the Agriculture, Research Extension and Education Reform Act in 1998. In the ASEC, among families with U.S.-born children and foreign-born parents, more than 90% of the children in the household were U.S.-born.

[14] Additionally, states were given the option of discounting the income of ineligible immigrants by the share that they represented in the household when determining the benefit amount (U.S. Department of Agriculture Food and Nutrition Service, 2011). Because of this, when eligibility was restored, if the parents' earnings were substantially large, the benefit amount could actually decrease. Anecdotal evidence suggests that this was extremely rare: in one Texas region 5% of mixed citizenship households had benefits decline and 6% had benefits stay the same (Swarns, 1997).

is that Fill-In states are not randomly selected. I test if state observable characteristics before PRWORA–political party, demographics, and attitudes towards immigrants–predict the decision to provide a fill-in program and find no evidence that they do (results shown in Appendix Tables (A.2), (A.3), (A.4)). In the regression models discussed below, I include state fixed effects, so of greater concern is whether *time-varying* state characteristics are correlated with state fill-in programs. I examine if treated immigrants' eligibility is correlated with the state unemployment rate, the spending per pupil on education, and the generosity of other safety net programs. As shown in Appendix Table (A.5), there is a marginally statistically significant relationship between fill-in programs and the unemployment rate as well as Medicaid/SCHIP generosity, but these relationships are economically small and none of the other estimates are statistically different from zero. Finally, if these policy changes affected the composition of children in different states, either through selective migration, fertility, or changes in their parents' citizenship status, this could affect my estimates on program receipt and health, so I test for these channels directly and find no evidence of these types of changes (results shown in Appendix Table (A.6)).

Initial findings indicated that immigrants' participation in safety net programs fell dramatically relative to natives' participation after welfare reform (Fix and Passel, 1999; Borjas, 2003; Royer, 2005). These large declines caused some researchers to conclude that chilling effects–fear of participation affecting immigration status or confusion about the eligibility rules–rather than just changes in eligibility, were driving the declines in participation. However, once demographic characteristics and state economic conditions were accounted for, the differential decline among immigrants relative to natives fell to zero for all programs except Food Stamps (Borjas, 1999; Haider et al., 2004).

Kalil and Ziol-Guest (2009) examine the effect of welfare reform on the contemporaneous health of children of immigrants. They find that nationally, non-citizen immigrant children were more likely to be in parent-reported poor health, and more likely to have post-

poned health care after welfare reform, as compared to natives and naturalized immigrants. Similarly, Kaushal (2007) utilizes the changes due to welfare reform and the state fill-in programs to identify the impact of Food Stamp eligibility on contemporaneous adult obesity and finds no effect. My work builds upon this literature by taking advantage of a richer source of policy variation and by looking at the longer-run effects of Food Stamp access in critical periods of children's development.

3 Data

The primary data for my analysis is the National Health Interview Survey (NHIS) from 1998-2015, which I use to measure medium-run health outcomes. The NHIS in a nationally representative cross-sectional survey that collects information on 30-40,000 households per year. There are two components of the NHIS: 1) the "person" file, which collects information on the demographics and health of each household member, and 2) the "sample child" file, which collects more detailed health information about a randomly selected child within each household. Importantly for my analysis, year of birth, country or state of birth, and year of immigration for foreign-born are available for every individual. Detailed geographic information and year of immigration are restricted variables and were accessed through the Center for Disease Control's Research Data Center.[15]

I focus on U.S.-born children born in 1989-2005 and observed at ages 6-16, after early-life changes in eligibility, and before they might selectively move out of the household. I further restrict the sample to children of household heads whose mothers have a high school education or less, as these families are more likely to be affected by the changes in Food Stamp eligibility.[16] The main sample is composed of "children of treated immigrants" whose

[15]Geographic variables including state of birth and state of survey, along with year of birth and year of survey, were used to merge in information about Food Stamp eligibility and other contextual variables.

[16]Prior to PRWORA, 38% of immigrant households where the mother had a high school education or less, participated in the Food Stamp program, whereas 8% of similar households where the mother had more than a high school degree did.

mother and father (if present) were born outside of the U.S. and entered the U.S. between 1985 and 1996.[17] The restrictions on year of entry are intended to capture the group of immigrants likely to be affected by the changes in Food Stamp eligibility (as they are less likely to qualify for the 40 quarters of work exemption or to have become citizens) and likely to be unaffected by the changes in eligibility for other safety net programs. However, there are a number of measurement issues with reported year of entry to the U.S., therefore, this year of entry restriction should be interpreted as only a rough proxy for those likely to have experienced Food Stamp eligibility changes.[18] I also consider, as a potential control group, a sample of children of natives, whose mother and father (if present) were U.S.-born.

I examine a set of outcomes that measure children's overall health status, as well as children's physical health conditions, developmental conditions, and mental health. To measure overall health status, I utilize parent-reported child health, overnight hospitalizations, the number of school days missed, and the number of doctor visits. Importantly, while parent-reported health is a subjective measure, Case, Lubotsky and Paxson (2002) find that it is highly correlated with doctor's reports of children's health status. I follow the literature and create a dichotomous variable indicating if the child is in "Poor", "Fair" or "Good" health, which I take as a measure of bad health, because very few parents report their children to be

[17] I drop children who have one parent born in the U.S. and the other born outside the U.S.–about 5% of all children. I also drop 1% of children who do not have their biological mother present in the household. I cannot condition on parents' citizenship at the time of the child's early-life, which will lead to some measurement error, however in the ASEC among young children of treated immigrants in this time period only 10% had a mother who was naturalized citizen. Additionally, less than 0.5% of these children have a parent who reports being a veteran and less than 4% have mothers from countries which sent more than 100 refugees or asylees in 1998 (Department of Homeland Security, 1998). The data do not identify whether the foreign-born are documented or undocumented. In 1989-2005, between 2 and 9% of all births in the U.S. were to undocumented parents (Fix and Cohn, 2015), but it is not obvious how this number might differ in the specific subsample considered here. Moreover, it is unclear if the effect on U.S.-born children of undocumented immigrants will actually be zero, as the children remain eligible, but chilling effects might affect Food Stamp participation.

[18] Year of entry information is based off a question about when foreign-born individuals came to the U.S. "to stay" and previous research has documented that for only about 50% of respondents does the year they report they came to the U.S. "to stay" coincide with year that they became legal permanent residents. The latter of which is the relevant year for determining Food Stamp eligibility (U.S. Department of Agriculture Food and Nutrition Service, 2011). Often, this reported year of entry coincides instead with the date of either their first or most recent spell of time spent in the U.S.. For more information on these measurement issues see Redstone and Massey (2004) and Lubotsky (2007).

in "Poor" health (Currie and Stabile, 2003; Milligan and Stabile, 2011).[19] There are many outcome variables that capture physical, developmental, and mental health available in the NHIS, which raises issues of multiple inference. To address this, I create indices of these three types of health outcomes following Anderson (2008). The index of physical health outcomes captures the incidence of two specific health conditions predicted to be affected by poor early life nutrition: whether the child has ever been diagnosed as having diabetes, and whether the child experienced frequent diarrhea in the past 12 months.[20] The index of developmental health conditions includes whether the child has ever been diagnosed with autism, a learning disability, mental retardation, a developmental delay, or ADD/ADHD. Finally, I create a mental health index using the components of the Strengths and Difficulties Questionnaire, which captures children's mental health problems. Each index is constructed as a weighted sum of z-scores of the component outcome variables. To create the z-scores, I calculate the mean and standard deviation for each outcome among children of treated immigrants born before 1992, who were unaffected by the eligibility changes before age 5. The weights are constructed using the inverse of each group of outcomes' variance-covariance matrix. This makes more efficient use of the information, as outcomes that are highly correlated are given a lower weight. I then subtract each outcome's mean and divide by its standard deviation.

I also use the Annual Social and Economic (ASEC) Supplement to the Current Population Survey (CPS) from 1995-2007 to examine the effects on Food Stamp receipt (Flood et al., 2015). The ASEC is a nationally representative cross-sectional survey of 60-90,000

[19]To further validate this measure as an indicator of children's health, I conduct a similar analysis to that in Case, Lubotsky and Paxson (2002) by looking at the relationship between a variety of poor health indicators and health conditions, and parent-reported "Poor", "Fair" or "Good" overall health. The results, shown in Appendix Table (A.1) indicate that parent-reported health is strongly related to other indicators of poor health, and these results are largely consistent across both children of treated immigrants and children of natives.

[20]The NHIS measures children's BMI, which is likely influenced by the quality and quantity of food intake, however, the NHIS stated concerns about the coding of the variable prior to 2008 and improved their method of coding beginning in 2008 (National Center for Health Statistics, 2016). But, even after that, this information is only available for children ages 12+, so the sample size is small, thus I do not include this outcome variable in my analysis.

households every year. Unfortunately, country of birth of all individuals and the year of immigration to the U.S. for foreign-born was not consistently collected until 1995, so this is the first year in my sample.[21] I mimic the sample definitions described above for the NHIS, and construct a sample of children who are born in the U.S. in 1989-2005 and observed at ages 0-4, in order to capture the changes in eligibility faced during early childhood. The outcomes of interest in the ASEC are household Food Stamp participation and dollar value of Food Stamp benefits received.

Summary statistics for all main outcome variables and demographics of the sample are shown in Table (1). I use the NHIS and CPS-provided weights here and in the analysis to account for survey oversampling and nonrandom nonresponse (National Center for Health Statistics, 2005; Flood et al., 2015). The NHIS sample size is much larger (about 9000) in the person file than in the sample child file (about 3600). To these main data sets, I merge in information on state by year demographic characteristics, safety net policies, economic conditions, and attitudes towards immigrants. These auxiliary data sets are described in detail in the appendix.

4 Empirical Strategy

The policy changes create several dimensions of variation I can take advantage of in my empirical strategy: there is variation by state and year of birth among children of treated immigrants, and variation across foreign and native-born parents.[22] Figure (3) displays the number of years children of treated immigrants are eligible depending on their state of birth and year of birth. This shows the variation in eligibility across birth cohorts: children that were born well before and after welfare reform had full eligibility, whereas children born

[21] 1994 was the first year the ASEC asked about country of birth and year of immigration for all individuals, however the weights provided by the CPS were not fully adjusted to account for immigrants until 1996. See Schmidley and Robinson (1998) for more detail about the comparability of information about the foreign-born between 1994 and 1996.

[22] There is also variation among children of foreign-born parents, by their parents' year of entry into the U.S., however due to the issues of measurement error in year of entry I do not focus on this dimension.

around welfare reform had more limited eligibility. In addition, the figure demonstrates the variation across states, as the reduction in the number of years of eligibility around welfare reform is much smaller in the Fill-In states than the No-Fill-In states.

To evaluate the credibility of the state by year variation within children of treated immigrants, I plot the mean of their parent-reported health and the indices of health outcomes in the left column Figure (4) by birth year for children born in Fill-In States and No-Fill-In states separately. If Fill-In states serve as a good control group for No-Fill-In States, then the pre-policy-change trends should look similar across the two state groups, and this is the case for overall health for children born prior to 1993, when there is no difference in Food Stamp eligibility. As the eligibility changes are "phased-in" and "phased-out," shown in the dashed line in the figure, the difference in health across the state groups also becomes larger and then smaller. Recall, for all outcomes, higher values indicate worse health. For the indices, which are computed on a much smaller sample, the estimates are much noisier. There is some evidence of changes in the developmental and mental health indices that appear to move with the eligibility changes, but little evidence of this for the physical health index. To evaluate whether children of natives are a valid control group, I plot the same outcomes for this sample in the right column. For overall health, the pre-trends are different for children of natives relative to children of treated immigrants, and the noisiness of the indices make it difficult to assess pre-trends. However, reassuringly, for all outcomes I find no evidence of changes in children of native's health that are commensurate with the Food Stamp eligibility changes.

Motivated by this visual evidence, my primary analysis uses a double difference model taking advantage of the variation in eligibility among children of treated immigrants depending on the child's year of birth and state of birth (since all children in my sample are born in the U.S.). I estimate the following equation:

$$Y_{isbt} = \alpha + \beta NumYrsTIElig(IU->4)_{sb} + \gamma_1 X_{isbt} + \gamma_2 Z_{st} + \gamma_3 W_{sb} + \nu_s + \lambda_b + \epsilon_{isbt} \quad (1)$$

where Y_{isbt} is the outcome of interest for child i born in state s and year b, and observed in survey year t. $NumYrsTIElig(IU->4)_{sb}$ indicates the number of years treated immigrants parents would have been eligible from the time the child was in utero to their 5th birthday, and is a function only of the state and year of birth of the child (regardless of whether families were "income-eligible" for the program). I control for demographic characteristics in X_{isbt}, including gender of the child, fixed effects for the age of the child when surveyed, age of the mother at the child's birth, mother's education, number of siblings of the child, number of years the parents had been in the U.S. before having the child, and race/ethnicity of the child (Hispanic white, non-Hispanic white, non-Hispanic black, other Hispanic, and other races). I account for fixed characteristics of the child's state of birth with state of birth fixed effects ν_s, and for national shocks to child health with birth year fixed effects λ_b. I also include controls for state characteristics, including the unemployment rate and Medicaid/SCHIP generosity, at the time of birth, W_{sb}, and the time of survey, Z_{st}.[23] The identifying assumption is that, after controlling for the state and individual-level characteristics, there are no other changes occurring differentially across Fill-In and No-Fill-In states over time that are correlated with the Food Stamp eligibility changes and that affect children's health. I cluster standard errors at the state of birth level and I estimate linear probability models when the dependent variable is dichotomous.

The coefficient β indicates how an additional year of parental Food Stamp eligibility for children in early-life affects their medium-run outcomes. Because all health outcomes are "bad" I expect β to be negative. This estimated effect is the Intent to Treat estimate as it captures the effect of parents' eligibility.

To examine the contemporaneous effects of the Food Stamp eligibility changes, I estimate analogous regressions as those described above, using variation in the state of *residence*

[23]The survey state and state of birth are the same for roughly 80% of the sample. The measures of Medicaid/SCHIP generosity are the maximum eligibility threshold for Medicaid/SCHIP expressed as a percentage of the poverty line which varies by children's age, state and year. Additionally, I control for whether there was a SCHIP fill-in program in the year of the survey since this changes markedly across my sample period.

and year of *observation* among children of treated immigrants:

$$Y_{ist} = \alpha + \beta TIElig_{st} + \gamma_1 X_{ist} + \gamma_2 Z_{st} + \nu_s + \lambda_t + \epsilon_{ist} \quad (2)$$

Here Y_{ist} is the outcome of interest for child i living in state s and observed in year t and $TIElig_{st}$ is equal to one (or zero) if treated immigrants are eligible (or ineligible) for Food Stamps at the time the child is observed. Therefore β indicates how contemporaneous parental eligibility affects the outcome of interest. In this model, I include state of residence and year of observation fixed effects, as well as the same demographic controls and state of residence by year of observation controls as in equation (1).

5 Results

5.1 Effect of Eligibility on Program Participation

Before examining the effects on children's health, it is important to understand how the changes in eligibility affected annual participation in, and income from, the Food Stamp program. While I utilize sharp changes in parents' eligibility, this essentially amounts to changes in the maximum benefit the family can receive, which may cause participation to fall, as there may be costs to participating in safety net programs either because of stigma (Moffitt, 1983) or transaction costs (Currie et al., 2001). Therefore, this analysis is also informative more generally about the responsiveness of program participation to a large change in benefit generosity.

As shown in Appendix Figure (A.1), the differences between the average Food Stamp participation and benefit amount received across Fill-In and No-Fill-In states among children of treated immigrants tracks the differences in parental eligibility fairly well. These visual findings are confirmed in Panels A and B of Table (2). Among children of treated immigrants, when their parents are eligible for the program, the likelihood of participation increases by 8.0 percentage points ($p<0.01$). This is an increase of about 50% compared to the 16%

participation rate for children whose parents are all ineligible (this baseline mean calculated on a sample of children with treated immigrant parents in No-Fill-In states observed in 1998-2002). Similarly, when parents are eligible, the household receives $185 more annually in Food Stamp benefits in 2009$s ($p<0.05$), a 36% increase over the baseline mean of $511. Previous findings indicate welfare reform reduced immigrants' participation in the Food Stamp program by 27% nationally, relative to natives' participation (Haider et al., 2004) and my estimates are larger, possibly due to the fact that I take account of the state differences in eligibility. Because of under-reporting of program receipt in the CPS (Meyer, Mok and Sullivan, 2009), I interpret these estimates as a lower bound of the total effect on participation and benefits received. I return to this issue of under-reporting below, as it is important to interpreting the effects on child health.

I conduct a back of the envelope calculation to see if the changes in participation can explain the changes in the benefit amount received. Multiplying the average benefits received by participants (about $3000 in 2009$s) by the change in participation, 8 percentage points, the expected change in benefits received due only to changes in participation is $240, larger than the point estimate.[24] Therefore, changes in participation may be an important margin through which the effects on health operate. However, in interpreting these effects, I am unable to distinguish whether the changes in participation are due to the costs of participating versus "chilling effects" (because of confusion about eligibility rules, complicated application procedures, and fear of participation affecting immigration status (Capps et al., 2004; Watson, 2014)).[25]

[24]This is similar to the methodology used by McDonald and Moffitt (1980) and Hastings and Washington (2010). However, the validity of this calculation relies upon the marginal participant being the same as the average participant, which may not be the case. I also estimate the effect of the eligibility changes on the dollar amount of benefits received among participants shown in column 2 of Appendix Table (A.7). These results should be interpreted with the caveat that the changes in participation may lead to selection into participation that affects these estimates. I find a statistically insignificant reduction in the dollar amount received.

[25]An important potential secondary effect of these policy changes is that they may cause immigrant families to change participation in other safety net programs, because changes in participation in one safety net program may be linked to changes in participation in other programs, if the applications for several programs are linked, or the office in which individuals apply is the same (Baicker et al., 2014). In addition,

5.2 Effect of Eligibility on Children's Health

Next, I use the National Health Interview Survey to estimate the effect of early-life Food Stamp access–from the time children are in utero to their fifth birthday–on the health of children at ages 6-16. The results, shown in Panels C-G of Table (2), confirm the visual evidence discussed previously. An additional year of parental Food Stamp access reduces the likelihood the child is reported in "Poor", "Fair", or "Good" health (relative to "Very Good" or "Excellent") health by 1.7 percentage points and results in a decrease in the developmental health index of 0.08 standard deviations. The point estimates on the indices of physical health outcomes and mental health outcomes are negative, but not statistically different from zero. To put these effect sizes into context, I compare the estimated marginal effect of one additional year of eligibility to the baseline mean incidence of "Poor", "Fair", or "Good" health among children of treated immigrants with no exposure to Food Stamps (those born in No-Fill-In states in 1998). This suggests that one additional year of Food Stamp access, relative to no Food Stamp access, reduces the likelihood the child is in "Poor", "Fair", or "Good" by about 5%. Similarly, the magnitude of the marginal effect on the developmental index is about 16% of the difference between children with low and high-educated mothers in the cohort with no Food Stamp access.[26] Since there are many outcome variables, I show the unadjusted p-values in the second column, and the p-values after adjusting for multiple hypothesis testing using the method suggested by Romano and Wolf (2005) in the third column. The overall conclusions are unchanged by this adjustment.

I next explore the effects on other health outcomes including the likelihood the child

welfare reform may have had "chilling effects" on safety net participation. I find little evidence of effects on participation in other programs. These results are shown in Appendix Table (A.7). I detail in the Appendix the differences between my empirical strategy and those used in the "chilling effect" literature that explain the discrepancy between the findings: primarily, differences in the policy variation used and control variables included.

[26] As shown in Appendix Table (A.8), the point estimates indicate a decline in all the conditions captured by the developmental index, but only the estimates on the diagnoses of autism, learning disabilities, and mental retardation are statistically significant. The effects range from a roughly 10% reduction for autism to a 24% reduction for learning disabilities, relative to the baseline mean of children with no Food Stamp access, however the confidence intervals are wide.

was hospitalized overnight in the past year, the number of school days missed and chronic school absence (>15 days) in the past year, and the likelihood the child visited the doctor at all or 2 or more times in the past year. This latter measure of doctor visits captures poor overall health, as for children in this age range, it is recommended they have one well-child checkup per year (Simon, 2016). As shown in Table (3) the point estimates on all the outcomes measuring poor health are negative, but the standard errors are large. The only estimate that is statistically different from zero is chronic school absence, although the confidence interval includes zero once the adjustment for multiple hypothesis testing is conducted (shown in the third column). Interestingly, there appears to be no effect on the likelihood of going to the doctor at all within a year in the medium-run, although this does not rule out the possibility that changes in health care utilization in earlier years contribute to the effects on medium-run health outcomes.

While the estimates are large, they are in line with others in the literature. Almond and Mazumder (2011) find that exposure to Ramadan while in utero leads to a roughly doubling of the rates of mental/learning disabilities in adulthood. Adhvaryu et al. (2014) document that a one standard deviation in cocoa prices in early life reduced the incidence of mental distress in adulthood by 50%. Since one innovation of my study is to focus on medium-run, rather than long-run outcomes, there are fewer points of comparison for outcomes experienced in childhood. One such study is Persson and Rossin-Slater (forthcoming) who examine the effects of maternal stress on children, and find that a maternal bereavement experienced in utero increases the likelihood children will use ADHD medication in later childhood by 25%. Moreover, Persson and Rossin-Slaytor also find larger effects on developmental outcomes relative to physical health conditions in the medium-run, and this may be due to the fact that physical health consequences take longer to manifest.

Another important point of comparison is the estimates from Hoynes et al, who look at the long-run effects of the Food Stamp roll-out in the 1960-70s. To compare across the

studies, I transform my Intent to Treat (ITT) estimates of parents eligibility, to the Treatment on the Treated (TOT) effect of receiving an additional $1000 of Food Stamp benefits. I start with the estimated change in dollars of benefits received from the ASEC analysis: $185 (2009$s). This effect is likely to be an under-estimate, because Food Stamp receipt is under-reported in the ASEC; only about 60% of families in my sample that participate in Food Stamps report receiving benefits (Meyer, Mok and Sullivan, 2009).[27] If the under-reporting is random, this will lead to measurement error and smaller estimates of the effect on Food Stamp benefit amount received than the true effect, which will cause me to overestimate the true TOT effect on health (Stephens and Unayama, 2015). Dividing the estimated effect by 0.60 indicates an increase in benefit receipt of $308. Given this adjusted estimate, for each $1000 increase in benefits received, the likelihood of children being reported in "Poor", "Fair", or "Good" health is reduced by 5.5 percentage points. This effect is quite large, a roughly 17% increase relative to the mean of children with no Food Stamp exposure. However, given that family income and child health are highly correlated (Case, Lubotsky and Paxson, 2002), it is likely the estimated marginal effect is smaller relative to baseline mean for individuals who actually received Food Stamps, who are more disadvantaged than the full sample. Comparing this to the effect at the time of the program roll-out, Hoynes, Schanzenbach and Almond (2016) estimate that one year of participation in Food Stamps in early life reduces the likelihood an individual reports being in poor health in adulthood by 9-14%. Using the average Food Stamp benefit amount received among participants in the 1960-70s, this implies an additional $1000 in Food Stamps received early in life reduces poor health by 4-7% in adulthood, which is smaller than the point estimate in this paper, although the confidence intervals overlap.[28]

[27] Immigrants are more likely to under-report Food Stamp participation than citizens (Meyer and Goerge, 2011), and I account for this in calculating that only 60% of participants will report receiving benefits. The other measurement issue that may cause me to under-state the effect on participation is that I cannot identify pregnant women in the CPS, who participate in the Food Stamp program at very high rates (Yelowitz, 2002) and therefore may have experienced large changes in participation.

[28] Author's calculation using the Panel Study of Income Dynamics.

5.2.1 Sensitivity Analysis

The key assumption underlying the double difference model is that no other changes were occurring across Fill-In and No-Fill-In states that were correlated with both the Food Stamp policy changes and children's health. If there were other changes occurring across states and over time, e.g. expansions to public health insurance, that were correlated with the Food Stamp policy changes, and children of natives are a valid control group, then including them in the sample would account for these common shocks to children's health across states and over time. Table (4) explores including children of natives as a control group in a triple difference model for the main outcome variables that were estimated to be statistically significant: Food Stamp participation and benefit amount, parent-reported overall health, and the index of developmental conditions. Column (1) replicates the baseline results and column (2) includes children of natives in the sample, and the regression equation includes the measure of children of treated immigrants' eligibility based on state and year of birth ($NumYrsTIElig(IU->4)_{sb}$), as well as this measure interacted with whether the child's parents are treated immigrants or natives (and I make the analogous changes in the ASEC analysis). The uninteracted term captures the effect of changes in treated immigrants' eligibility on children of natives' outcomes. The coefficient on this term is very close to zero as expected. Moreover, the main results, captured by the interaction term, remain very similar. In column (3), I include state of birth by year of birth fixed effects, so I drop the uninteracted term, and again the results remain very similar. Overall, the evidence indicates that no other shocks to health, which affect children of treated immigrants and natives similarly, are driving the results.

An alternative way of accounting for potential state changes over time is to directly control for state-year characteristics. I explore the robustness of the main results to including additional controls at the time the child was born (or the time they were observed in the ASEC) in columns (4)-(7) of Table (4) including other safety net program generosity

(AFDC/TANF generosity, welfare reform and waivers, state EITC generosity), whether the state chose to "fill-in" other safety-net programs for immigrants arriving in the U.S. after 1996, state attitudes towards immigrants, and other changes the state made to the Food Stamp program. For most specifications the point estimates are very similar to the baseline estimate, but for some outcomes the standard errors increase causing the effect to become insignificant.[29]

I did not find any relationship between state's observable characteristics and the decision to fill-in, however as Zimmermann and Tumlin (1999) suggest that states' safety net generosity and income were correlated with the presence of a fill-in program, it is possible that states with generous safety nets or high average incomes were experiencing differential trends in children's health, and this is driving my estimated effects. Therefore, I include states' welfare and public health insurance generosity, as well as the unemployment rate in 1990, interacted with state linear trends. As shown in column (8), the estimated effects remain similar. In column (9) I add in state of birth linear birth year trends (or state of residence linear time trends in the ASEC) to flexibly account for the fact that some states may have had different trends in children's health over this time period. The estimates shrink slightly and the standard errors increase, causing the NHIS estimates to become statistically indistinguishable from zero, however the pattern of results is similar.

As California contains almost 90% of treated immigrant families in Fill-In states, I check the robustness of the estimates to dropping California from the sample in column (2) of Table (5). I also isolate the changes in Food Stamp eligibility due only to changes in federal policy by dropping observations from Fill-In states and relying on children of natives to be the primary control group in column (3) of Table (5). Identification in this model comes only from across-cohort differences in eligibility across children of treated immigrants relative to

[29]The results are also similar in the NHIS if controls for these state characteristics in the *survey* year and *survey* state are included, or if the state unemployment rate from the time the child was in utero to their 5th birthday is included, analogous to my main specification. These control variables described in more detail in the Appendix.

children of natives. I also test the robustness of the results to alternative definitions of Fill-In states following Zimmermann and Tumlin (1999) and modeling teen mother's eligibility under the "child" Food Stamp eligibility rules for immigrants, rather than the "adult" rules. The results are shown in columns (4)-(5) of Table (5). The estimated effects are sensitive to the inclusion of California and to using the alternative source of variation and become statistically indistinguishable from zero for most outcomes. Although across all these checks the pattern of results remains similar.

5.2.2 Subgroup Analysis

Food Stamp participation rates vary across demographic groups, so to investigate possible heterogeneous effects, I test whether the demographic groups that experienced the largest effects on participation, also experienced the largest effects on medium-run health. I divide the ASEC and NHIS samples into subgroups based on mother's education (less than high school, high school, some college, and college or more), mother's ethnicity (Hispanic or not), mother's age at child's birth (teens, 20s, 30+s), and mother's marital status (never married or ever married), and estimate the effect on Food Stamp participation and medium-run health for each subgroup.[30] I expect that the more disadvantaged groups–with lower levels of education, Hispanic, teen mothers, and single mothers–will experience larger effects on both participation and health, as they are more likely to be eligible for, and participate in, the Food Stamp program.

Figure (5) shows the relationship between the effect on participation and the effect on "Poor", "Fair", or "Good" health, as well as the Developmental Health Index for different demographic subgroups. The x-axis indicates the effect of Food Stamp participation, β from equation (2) and the y-axis indicates the effect on health, β from equation (1). As expected, the effects on both participation and health are largest for the more disadvantaged

[30]These samples may be overlapping. For example, a child could be in both the Hispanic group and the group where the mother has less than high school education.

groups. The figure also shows additional falsification tests: for groups with little impact on participation, such as those with a college education or more, and non-Hispanics, the effect on health is very close to zero or "wrong-signed".

5.2.3 Mechanisms

To shed light on the potential mechanisms, I explore whether access to Food Stamps in utero improves health outcomes at birth. This would suggest that the medium-run health effects may in part be affected by changes in individuals' initial health "stock" (Currie, 2009). To do this I use the national Vital Statistics data, described in detail in the Appendix. Because of limitations of the Vital Statistics data, I examine outcomes for birth cohorts 2000-2007 for the full sample of births to foreign-born women, regardless of mothers' education, or year of entry to the U.S.. Therefore, the effects estimated here are not for the same sample of children as the main analysis with the NHIS, but can nonetheless shed light on this potential mechanism. To implement this, I examine how mother's eligibility in the third trimester affects birth weight (in grams) and the likelihood of being born of low birth weight (< 2500 grams), which are common measures of health at birth (Currie, 2011).[31] I show the effects of estimating equation (2) in Panels A-B of Table (6). The likelihood of low birth weight is reduced by 0.01 percentage points ($p<0.01$) and average birth weight increases by 6.5 grams ($p<0.01$).

To compare my estimates to the previous findings of the effect of Food Stamps on infant health, I calculate the TOT effect as above.[32] For an additional \$1000 in Food Stamp benefits received in the year before a child's birth, the likelihood of a child being born of low birth weight decreases by 5% and increases average birth weight by 0.5% (relative to the baseline mean among children whose parents had no access to Food Stamps). These

[31]The 3rd trimester is the most important for nutrient intake (Rush, Stein and Susser, 1979).

[32]For these calculations I mimic the sample construction in the Vital Statistics data within the ASEC and restrict the years of analysis in the ASEC to 2000-2007 to estimate the effects on the dollars in Food Stamp benefits received among women with children under age 2.

estimates are similar to those in Almond, Hoynes and Schanzenbach (2011), whose findings imply for $1000 of Food Stamps at the time the program was rolled out, the likelihood of a child being born of low birth weight decreased by 1.5-3% and average birth weight increased by 0.2%.

I investigate the relationship between the effects on infant and medium-run health, by plotting the estimated effects in both time periods for different demographic subgroups in Figure (6). Figure (6) shows the relationship between the effect on low birth weight (x-axis), and the effect on medium-run "Poor", "Fair", or "Good" parent-reported health, as well as the Developmental Health Index (y-axis). Overall there appears to be a strong positive relationship between the effects on health at birth and health in the medium-run. To further explore whether the effects on infant health can explain the medium-run effects, I split the main measure of Food Stamp eligibility in the medium-run analysis into two variables: one measures in utero to age one eligibility, and one measures age 2-4 eligibility. These results are shown in column (6) of Table (5). The point estimates are larger for the younger ages, but I cannot rule out the effects are the same across both age ranges. Therefore, while the effects in these two time periods are related, I cannot conclude that the effects in the medium-run are *caused* by the effects at birth. Interesting, it appears that eligibility at age 5 and beyond is unimportant for determining medium-run health (shown in column (7) of Table (5)).

An important issue in interpreting the health effects is to understand how Food Stamp benefits affect food consumption. Unfortunately, the only data set I am aware of that contains food consumption measures and the necessary information to identify immigrant families is the Food Security Supplement to the CPS from 2001-2007. I use this to examine how Food Stamp access affected food consumption using equation (2). Likely due to small sample sizes (N=685) the results are very imprecisely estimated, although the point estimates indicate an increase in consumption, as shown in Panels C-D of Table (6) (sample

described in detail in the Appendix). This, along with previous findings that Food Stamps increase household consumption (Hoynes and Schanzenbach, 2009; Bruich, 2014) and reduce household food insecurity (Borjas, 2004), suggest an increase in food consumption may be one mechanism behind the effects on child health. Although, I am unable to separately examine the consumption of children within the household, and it may be the case that children are buffered by shocks to family nutrition (Moffitt and Ribar, 2016). Additionally, whether Food Stamps improves the nutritional content of families' diets remains an open question that I am unable to address in this paper due to the limitations of the data.

As discussed above, there are other mechanisms that are possible including changes in other dimensions of consumption, child care and changes in family stress, but investigating these outcomes is beyond the scope of this paper.

5.3 Economic Significance of Effects

To better understand the economic significance of the effects, I conduct a back of the envelope calculation to convert the estimates into dollar amounts. With the Medical Expenditure Panel Survey, I tabulate that the average health care costs of a child who is in "Poor", "Fair", or "Good" health is $2450, compared to $1462 for children in "Excellent" or "Very Good" health. Assuming these health benefits are constant from ages 6 to 16, an additional year of parental eligibility for Food Stamps in early life leads to about $140 in benefits, due to reductions in health expenditures in the medium-run.[33] The benefits captured through parent-reported health may accrue to different sources: first, a reduction in medical costs

[33]For each age (-1 to 4) I calculate the present discounted value of these future benefits at ages 6-16. For example, I calculate the present discounted value of an additional year of access to Food Stamps at age 2 on changes in parent-reported health at ages 6-16 and then I sum the effects at ages 6-16. Then I take the average of these estimates for each age of the changes in eligibility (-1 to 4) to obtain an estimate of the present discounted value of the benefits of one year of early-life access on health outcomes at ages 6-16. Alternatively, I could use estimates of the costs of the specific developmental health conditions analyzed in Appendix Table (A.8). For example, autism is associated with an increase in health care costs of $2895 for children per year (Lavelle et al., 2014), implying a similar size reduction in costs as calculated above for overall health. However, as some of these costs may be captured in the estimated effect on "Poor", "Fair", or "Good" health, I take the estimate on this latter outcome as my summary measure of total "benefits" of parental Food Stamp eligibility due to changes in medium-run health.

directly benefits these children's families, and, as these children participate in Medicaid and SCHIP, the reduction in medical expenditures may also represent government savings.

In 2009, the administrative costs of operating the Food Stamp program were $45 per participating household and I estimate the average cost per family of making parents eligible is $308 per year (recall this adjusts for under-reporting).[34] This suggests that through just the direct effects on medium-run parent-reported "Poor" "Fair" or "Good" health, 42% of the direct costs are recouped. However, as there may be more benefits (for example, increases in lifetime earnings due to the reduction in poor health) as well as additional costs (for example, labor supply disincentives), I am cautious about concluding anything about the total value of the program solely from the numbers estimated here.

6 Conclusion

The Food Stamp program has grown significantly over the past 15 years, but not much is known about its effects, because it is a federal program with little quasi-experimental variation in policy parameters to exploit. I take advantage of the loss, and subsequent restoration, of eligibility among immigrant families to examine how access to the Food Stamp program affects children's health. I find that the loss of parental Food Stamp eligibility has a large effect on contemporaneous Food Stamp receipt and on children's health in the medium-run at ages 6-16. Because most existing evidence suggests that Food Stamp recipients treat the benefits the same they would an equivalent cash transfer, these estimates can be thought of more broadly as the effect of changes in cash income on children's well-being.

The results are robust to including children of natives as a control group in a triple difference model, which allows me to include state of birth by year of birth fixed effects, as well as to directly controlling for other state-year characteristics and policies. Finally, subgroup analyses indicate the changes in eligibility are not correlated with changes in the

[34] Administrative costs are from the USDA's State Activity Report.

health of subgroups of children of immigrants whose parents were likely unaffected by the policy changes.

The efficacy of the Food Stamp program is still a contentious issue and in recent years there have been several cuts to the program. With additional cuts currently proposed, and in particular cuts to immigrants' access being considered, the evidence in this paper speaks to what the effects of a large cut in program generosity would be today. In particular, the elimination of one year of parental eligibility for Food Stamps in early life leads to a $140 increase in health expenditures per child, due solely to the effects on health at school age. However, because there are other benefits I am unable to measure directly, this is likely smaller than the total benefits of the program.

References

Adhvaryu, Achyuta, James Fenske, Anant Nyshadham, et al. 2014. "Early life circumstance and mental health in ghana." *Working Paper*.

Aizer, Anna, Shari Eli, Joseph P Ferrie, and Adriana Lleras-Muney. 2016. "The Long-Run Impact of Cash Transfers to Poor Families." *American Economic Review*, 106(4): 935–71.

Almond, Douglas, and Bhashkar Mazumder. 2011. "Health capital and the prenatal environment: the effect of Ramadan observance during pregnancy." *American Economic Journal-Applied Economics*, 3(4): 56.

Almond, Douglas, and Janet Currie. 2011. "Killing me softly: The fetal origins hypothesis." *The Journal of Economic Perspectives*, 153–172.

Almond, Douglas, Hilary W Hoynes, and Diane Whitmore Schanzenbach. 2011. "Inside the war on poverty: the impact of food stamps on birth outcomes." *The Review of Economics and Statistics*, 93(2): 387–403.

Almond, Douglas, Janet Currie, and Valentina Duque. 2017. "Childhood Circumstances and Adult Outcomes: Act II." National Bureau of Economic Research.

Anderson, Michael L. 2008. "Multiple inference and gender differences in the effects of early intervention: A reevaluation of the Abecedarian, Perry Preschool, and Early Training Projects." *Journal of the American statistical Association*, 103(484): 1481–1495.

Associated Press. 2014. "Doctors say Cutting Food Stamps Could Backfire."

Baicker, Katherine, Amy Finkelstein, Jae Song, and Sarah Taubman. 2014. "The Impact of Medicaid on Labor Market Activity and Program Participation: Evidence from the Oregon Health Insurance Experiment." *The American Economic Review*, 104(5): 322–328.

Barker, David J. 1990. "The fetal and infant origins of adult disease." *BMJ: British Medical Journal*, 301(6761): 1111.

Beatty, Timothy KM, and Charlotte J Tuttle. 2014. "Expenditure response to increases in in-kind transfers: Evidence from the Supplemental Nutrition Assistance Program." *American Journal of Agricultural Economics*.

Bitler, Marianne P, and Hilary W Hoynes. 2013. "Immigrants, Welfare Reform, and the US Safety Net." *Immigration, Poverty, and Socioeconomic Inequality*, 315.

Bitler, Marianne P, Jonah B Gelbach, and Hilary W Hoynes. 2006. "Welfare reform and children's living arrangements." *Journal of Human Resources*, 41(1): 1–27.

Borjas, George. 1999. "Immigration and the food stamp program." *Joint Center for Poverty Research Working Paper*.

Borjas, George J. 2003. "Welfare reform, labor supply, and health insurance in the immigrant population." *Journal of Health Economics*, 22(6): 933–958.

Borjas, George J. 2004. "Food insecurity and public assistance." *Journal of Public Economics*, 88(7): 1421–1443.

Bronchetti, Erin Todd. 2014. "Public insurance expansions and the health of immigrant and native children." *Journal of Public Economics*, 120: 205–219.

Brown, David W, Amanda E Kowalski, and Ithai Z Lurie. 2015. "Medicaid as an Investment in Children: What is the Long-Term Impact on Tax Receipts?" National Bureau of Economic Research.

Bruich, Gregory A. 2014. "The effect of SNAP benefits on expenditures: New evidence from scanner data and the November 2013 benefit cuts." *mimeo*.

Capps, Randolph. 2004. "Assessing Implementation of the 2002 Farm Bill's Legal Immigrant Food Stamp Restorations: Final Report to the United States Department of Agriculture Food and Nutrition Service."

Capps, Randolph, Leighton Ku, Michael E Fix, Chris Furgiuele, Jefferey S Passel, Rajeev Ramchand, Scott McNiven, and Dan Perez-Lopez. 2004. "How Are Immigrants Faring After Welfare Reform?: Preliminary Evidence from Los Angeles and New York City-Final Report." *The Urban Institute*.

Case, Anne, Darren Lubotsky, and Christina Paxson. 2002. "Economic Status and Health in Childhood: The Origins of the Gradient." *American Economic Review*, 92(5): 1308–1334.

Chandra, Ranjit Kumar. 1997. "Nutrition and the immune system: an introduction." *The American Journal of Clinical Nutrition*, 66(2): 460S–463S.

Chokshi, Niraj. 2014. "Why the food stamp cuts in the farm bill affect only a third of states." *The Washington Post*.

Cohodes, Sarah R, Daniel S Grossman, Samuel A Kleiner, and Michael F Lovenheim. 2015. "The effect of child health insurance access on schooling: Evidence from public insurance expansions." *Journal of Human Resources*.

Cunha, Flavio, and James Heckman. 2007. "The Technology of Skill Formation." *American Economic Review*, 97(2): 31–47.

Currie, Janet. 2003. "US food and nutrition programs." In *Means-tested transfer programs in the United States*. 199–290. University of Chicago Press.

Currie, Janet. 2009. "Healthy, Wealthy, and Wise: Socioeconomic Status, Poor Health in Childhood, and Human Capital Development." *Journal of Economic Literature*, 47(1): 87–122.

Currie, Janet. 2011. "Inequality at Birth: Some Causes and Consequences." *The American Economic Review*, 1–22.

Currie, Janet, and Douglas Almond. 2011. "Human capital development before age five." *Handbook of Labor Economics*, 4: 1315–1486.

Currie, Janet, and Jonathan Gruber. 1996. "Saving Babies: The Efficacy and Cost of Recent Changes in the Medicaid Eligibility of Pregnant Women." *Journal of Political Economy*, 1263–1296.

Currie, Janet, and Mark Stabile. 2003. "Socioeconomic Status and Child Health: Why Is the Relationship Stronger for Older Children?" *The American Economic Review*, 93(5): 1813.

Currie, Janet, and Nancy Cole. 1993. "Welfare and child health: The link between AFDC participation and birth weight." *The American Economic Review*, 83(4): 971–985.

Currie, Janet, Jeffrey Grogger, Gary Burtless, and Robert F Schoeni. 2001. "Explaining recent declines in food stamp program participation [with comments]." *Brookings-Wharton papers on urban affairs*, 203–244.

Currie, Janet, Sandra Decker, and Wanchuan Lin. 2008. "Has public health insurance for older children reduced disparities in access to care and health outcomes?" *Journal of Health Economics*, 27(6): 1567–1581.

Dahl, Gordon B, and Lance Lochner. 2012. "The Impact of Family Income on Child Achievement: Evidence from the Earned Income Tax Credit." *The American Economic Review*, 102(5): 1927–1956.

Daponte, Beth Osborne, Seth Sanders, and Lowell Taylor. 1999. "Why do low-income households not use food stamps? Evidence from an experiment." *Journal of Human Resources*, 612–628.

Dean, Stacy, and Dottie Rosenbaum. 2013. "SNAP Benefits Will Be Cut for Nearly All Participants in November 2013." *The Center for Budget and Policy Priorities*.

Dehejia, Rajeev, and Adriana Lleras-Muney. 2004. "Booms, Busts, and Babies' Health*." *The Quarterly Journal of Economics*, 119(3): 1091–1130.

Department of Homeland Security. 1998. "Fiscal Year 1998 Statistical Yearbook-Refugees & Asylees." Statistical Yearbook of the Immigration and Naturalization Service.

Dewey, Caitlin, and Tracy Jan. 2017. "Trumps plans to cut food stamps could hit his supporters hardest." *Washington Post*.

East, Chloe N. 2016. "The Labor Supply Response to Food Stamp Access." *mimeo*.

Evans, William N, and Craig L Garthwaite. 2014. "Giving Mom a Break: The Impact of Higher EITC Payments on Maternal Health." *American Economic Journal: Economic Policy*, 6(2): 258–90.

Fix, Michael, and D'Vera Cohn. 2015. "Number of babies born in U.S. to unauthorized immigrants declines." *Pew Research Center*.

Fix, Michael E, and Jeffery S Passel. 1999. "Trends in noncitizens' and citizens' use of public benefits following welfare reform: 1994-97." *The Urban Institute*.

Fix, Michael E, and Randolph Capps. 2017. "Leaked Draft of Possible Trump Executive Order on Public Benefits Would Spell Chilling Effects for Legal Immigrants." *Migration Policy Institute*.

Flood, Sarah, Miriam King, Steven Ruggles, and J. Robert. Warren. 2015. "Integrated Public Use Microdata Series, Current Population Survey: Version 4.0. [dataset]."

Ganong, Peter, and Jeffrey B Liebman. 2013. "The decline, rebound, and further rise in snap enrollment: Disentangling business cycle fluctuations and policy changes."

Grantham-McGregor, Sally. 1995. "A review of studies of the effect of severe malnutrition on mental development." *The Journal of Nutrition*, 125(8 Suppl): 2233S–2238S.

Grossman, Michael. 2000. "The human capital model." *Handbook of Health Economics*, 1: 347–408.

Grovum, Jake. 2014. "Another round of food stamp cuts in states." *USA Today*.

Haider, Steven J, Robert F Schoeni, Yuhua Bao, and Caroline Danielson. 2004. "Immigrants, welfare reform, and the economy." *Journal of Policy Analysis and Management*, 23(4): 745–764.

Hastings, Justine, and Ebonya Washington. 2010. "The First of the Month Effect: Consumer Behavior and Store Responses." *American Economic Journal: Economic Policy*, 2(2): 142–62.

Hoynes, Hilary, Diane Whitmore Schanzenbach, and Douglas Almond. 2016. "Long-Run Impacts of Childhood Access to the Safety Net." *The American Economic Review*, 106(4): 903–934.

Hoynes, Hilary, Doug Miller, and David Simon. 2015. "Income, the Earned Income Tax Credit, and Infant Health." *American Economic Journal: Economic Policy*, 7(1): 172–211.

Hoynes, Hilary W, and Diane Whitmore Schanzenbach. 2009. "Consumption responses to in-kind transfers: Evidence from the introduction of the food stamp program." *American Economic Journal: Applied Economics*, 109–139.

Hoynes, Hilary W, and Diane Whitmore Schanzenbach. 2015. "US Food and Nutrition Programs." National Bureau of Economic Research.

Hoynes, Hilary W, and Erzo FP Luttmer. 2011. "The insurance value of state tax-and-transfer programs." *Journal of Public Economics*, 95(11): 1466–1484.

Hoynes, Hilary Williamson, and Diane Whitmore Schanzenbach. 2012. "Work incentives and the food stamp program." *Journal of Public Economics*, 96(1): 151–162.

Hoynes, Hilary W, Leslie McGranahan, and Diane Whitmore Schanzenbach. 2015. "SNAP and Food Consumption." In *SNAP Matters: How Food Stamps Affect Health and Well-Being*. , ed. Timothy Smeeding Judith Bartfeld, Craig Gundersen and James P. Ziliak. Stanford University Press.

Kalil, Ariel, and Kathleen Ziol-Guest. 2009. "Welfare reform and health among the children of immigrants." *JP Ziliak, Welfare Reform and Its Long-Term Consequences for America's Poor*, 308–336.

Kandula, Namratha R, Colleen M Grogan, Paul J Rathouz, and Diane S Lauderdale. 2004. "The unintended impact of welfare reform on the Medicaid enrollment of eligible immigrants." *Health Services Research*, 39(5): 1509–1526.

Kaushal, Neeraj. 2007. "Do food stamps cause obesity?: Evidence from immigrant experience." *Journal of Health Economics*, 26(5): 968–991.

Kreider, Brent, John V Pepper, Craig Gundersen, and Dean Jolliffe. 2012. "Identifying the effects of SNAP (Food Stamps) on child health outcomes when participation is endogenous and misreported." *Journal of the American Statistical Association*, 107(499): 958–975.

Lavelle, Tara A, Milton C Weinstein, Joseph P Newhouse, Kerim Munir, Karen A Kuhlthau, and Lisa A Prosser. 2014. "Economic burden of childhood autism spectrum disorders." *Pediatrics*, 133(3): e520–e529.

Lewis, Andrew James, Megan Galbally, Tara Gannon, and Christos Symeonides. 2014. "Early life programming as a target for prevention of child and adolescent mental disorders." *BMC medicine*, 12(1): 33.

Lubotsky, Darren. 2007. "Chutes or ladders? A longitudinal analysis of immigrant earnings." *Journal of Political Economy*, 115(5): 820–867.

McDonald, John F, and Robert A Moffitt. 1980. "The uses of Tobit analysis." *The Review of Economics and Statistics*, 318–321.

Meyer, Bruce D, and Robert Goerge. 2011. "Errors in survey reporting and imputation and their effects on estimates of food stamp program participation." *US Census Bureau Center for Economic Studies Paper No. CES-WP-11-14*.

Meyer, Bruce D, Wallace KC Mok, and James X Sullivan. 2009. "The under-reporting of transfers in household surveys: its nature and consequences." National Bureau of Economic Research.

Miller, Sarah, and Laura Wherry. 2014. "The Long-Term Health Effects of Early Life Medicaid Coverage." *mimeo*.

Milligan, Kevin, and Mark Stabile. 2011. "Do Child Tax Benefits Affect the Well-being of Children? Evidence from Canadian Child Benefit Expansions." *American Economic Journal: Economic Policy*, 175–205.

Moffitt, Robert. 1983. "An economic model of welfare stigma." *The American Economic Review*, 1023–1035.

Moffitt, Robert A. 2013. "The Great Recession and the Social Safety Net." *Russell Sage Foundation and The Stanford Center on Poverty and Inequality*.

Moffitt, Robert A, and David C Ribar. 2016. "Child Age and Gender Differences in Food Security in a Low-Income Inner-City Population." National Bureau of Economic Research.

Mulligan, Casey. 2012. "The Redistribution Recession: How Labor Market Distortions Contracted the Economy." *Oxford University Press*.

Murray, Sara. 2011. "About 1 in 7 in U.S. Receive Food Stamps." *The Wall Street Journal*.

National Center for Health Statistics. 2005. "Survey Description, National Health Interview Survey, 2004."

National Center for Health Statistics. 2016. "Survey Description, National Health Interview Survey, 2015."

Persson, Petra, and Maya Rossin-Slater. forthcoming. "Family ruptures, stress, and the mental health of the next generation."

Prado, Elizabeth, and Kathryn Dewey. 2012. "Nutrition and brain development in early life." *Alive and Thrive*.

Redstone, Ilana, and Douglas S Massey. 2004. "Coming to stay: An analysis of the US Census question on immigrants' year of arrival." *Demography*, 41(4): 721–738.

Romano, Joseph P, and Michael Wolf. 2005. "Stepwise multiple testing as formalized data snooping." *Econometrica*, 73(4): 1237–1282.

Rosenbach, Margo, Marilyn Ellwood, John Czajka, Carol Irvin, Wendy Coupe, and Brian Quinn. 2001. "Implementation of the State Children's Health Insurance Program: Momentum is increasing after a modest start." *First annual report submitted to the Centers for Medicare & Medicaid Services. Cambridge, MA: Mathematica Policy Research, Inc.*

Royer, Heather. 2005. "The response to a loss in medicaid eligibility: pregnant immigrant mothers in the wake of welfare reform." *Unpublished manuscript, University of California-Santa Barbara.*

Ruhm, Christopher J. 2000. "Parental leave and child health." *Journal of Health Economics*, 19(6): 931–960.

Rush, David, Zena Stein, and Mervyn Susser. 1979. "Diet in pregnancy: a randomized controlled trial of nutritional supplements." *Birth defects original article series*, 16(3): i–xxvi.

Save the Children. 2012. "Nutrition in the First 1,000 Days."

Schaller, Jessamyn, and Mariana Zerpa. 2015. "Short-run effects of parental job loss on children's health." *University of Arizona Working Paper.*

Schanzenbach, Diane Whitmore. 2007. *What are food stamps worth?* Working paper, University of Chicago.

Schmeiser, Maximilian D. 2012. "The impact of long-term participation in the supplemental nutrition assistance program on child obesity." *Health economics*, 21(4): 386–404.

Schmidley, A. Dianne, and J. Gregory Robinson. 1998. "How Well Does The Current Population Survey Measure The Foreign Born Population In The United States?" Population Division Working Paper.

Schmidt, Lucie, Lara Shore-Sheppard, and Tara Watson. 2015. "The effect of safety net programs on food insecurity." *Journal of Human Resources.*

Simon, David. 2016. "Does early life exposure to cigarette smoke permanently harm childhood welfare? Evidence from cigarette tax hikes." *American Economic Journal: Applied Economics*, 8(4): 128–159.

Stephens, Melvin, and Takashi Unayama. 2015. "Estimating the Impacts of Program Benefits: Using Instrumental Variables with Underreported and Imputed Data." National Bureau of Economic Research Working Paper.

Swarns, Rachel L. 1997. "Denied Food Stamps, Many Immigrants Scrape for Meals." *The New York Times.*

The Center on Budget and Policy Priorities. 2013*a*. "November 1 SNAP Cuts Will Affect Millions of Children, Seniors, and People With Disabilities."

The Center on Budget and Policy Priorities. 2013*b*. "A Quick Guide to SNAP Eligibility and Benefits."

The SNAP Effect: Lifting Households Out of Poverty. 2012. "The SNAP Effect: Lifting Households Out of Poverty." *Food Research and Action Center*.

University of Granada. 2013. "Diet during pregnancy and early life may affect children's behavior and intelligence." *Science Daily*.

U.S. Department of Agriculture Food and Nutrition Service. 2011. "Supplemental Nutrition Assistance Program Guidance on Non-Citizen Eligibility."

Van Hook, Jennifer, and Kelly Stamper Balistreri. 2006. "Ineligible parents, eligible children: Food stamps receipt, allotments, and food insecurity among children of immigrants." *Social Science Research*, 35(1): 228–251.

Watson, Tara. 2014. "Inside the Refrigerator: Immigration Enforcement and Chilling Effects in Medicaid Participation." *American Economic Journal: Economic Policy*, 6(3): 313–338.

Wherry, Laura R, and Bruce D Meyer. 2015. "Saving teens: using a policy discontinuity to estimate the effects of Medicaid eligibility." *Journal of Human Resources*.

Wherry, Laura R., Sarah Miller, Robert Kaestner, and Bruce D. Meyer. 2015. "Childhood Medicaid Coverage and Later Life Health Care Utilization." National Bureau of Economic Research Working Paper 20929.

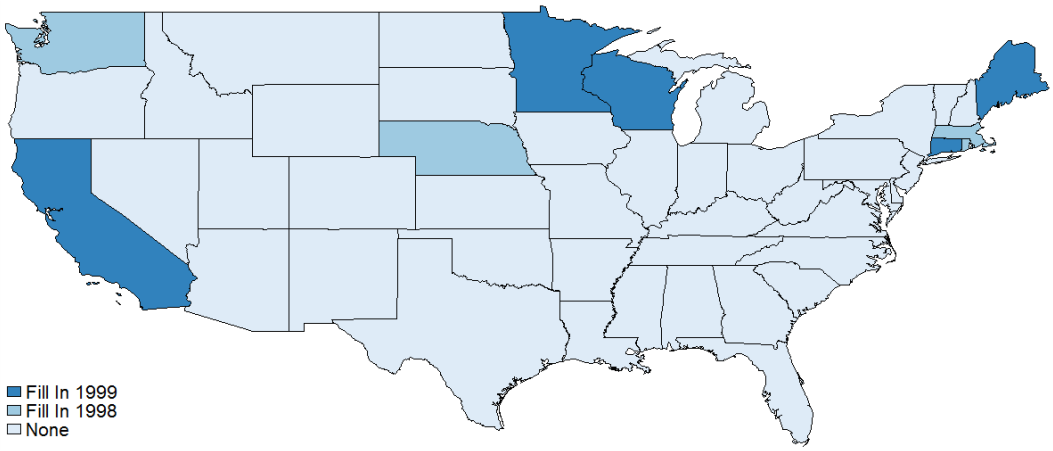
Wilde, Parke. 2001. "Understanding the Food Stamp benefit formula." *USDA, ERS*.

Yelowitz, Aaron S. 2002. "Income Variability and WIC Eligibility: Evidence from the SIPP." *mimeo*.

Ziliak, James P. 2015. "Why are so many Americans on food stamps? The role of the economy, policy, and demographics."

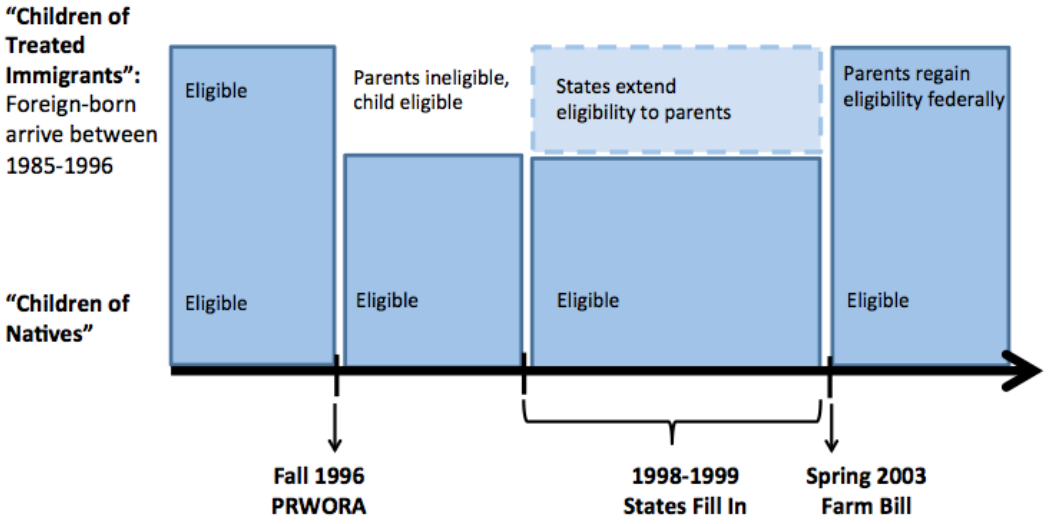
Zimmermann, Wendy, and Karen C Tumlin. 1999. "Patchwork policies: State assistance for immigrants under welfare reform." *The Urban Institute*.

Figure 1: States that Chose to Fill In Food Stamps for Immigrants



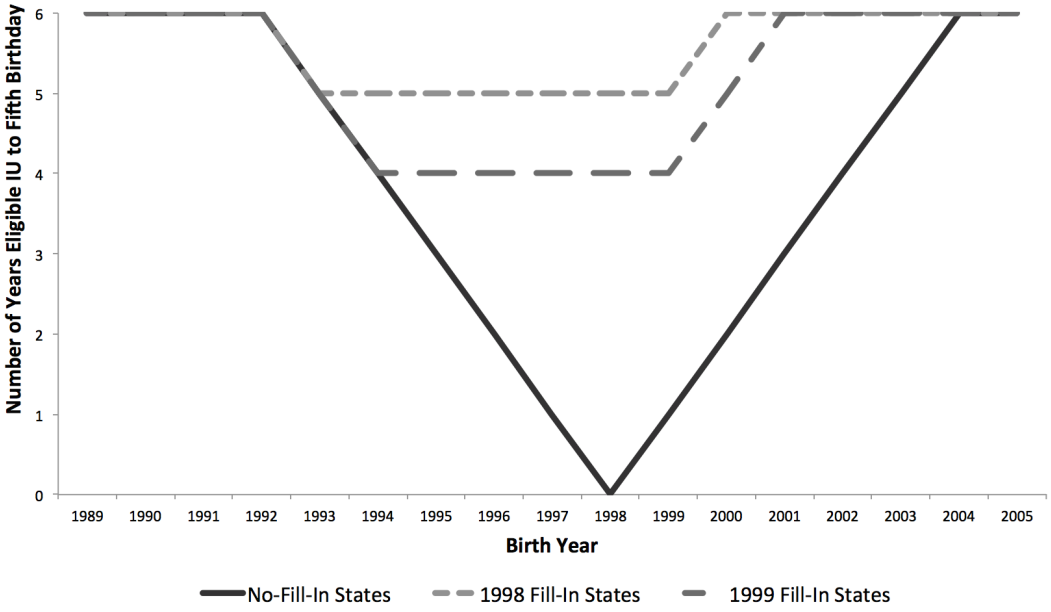
Notes: States are classified based on their availability of a Food Stamp fill-in program in January, February or March of a given year. Only fill-in programs that provided benefits to children and their parents are included here and fill-in programs for the elderly are not included. In addition, states that provided fill-in programs but had additional eligibility requirements beyond the federal ones are not counted as Fill-In states.

Figure 2: US-born Children's Eligibility for Food Stamps



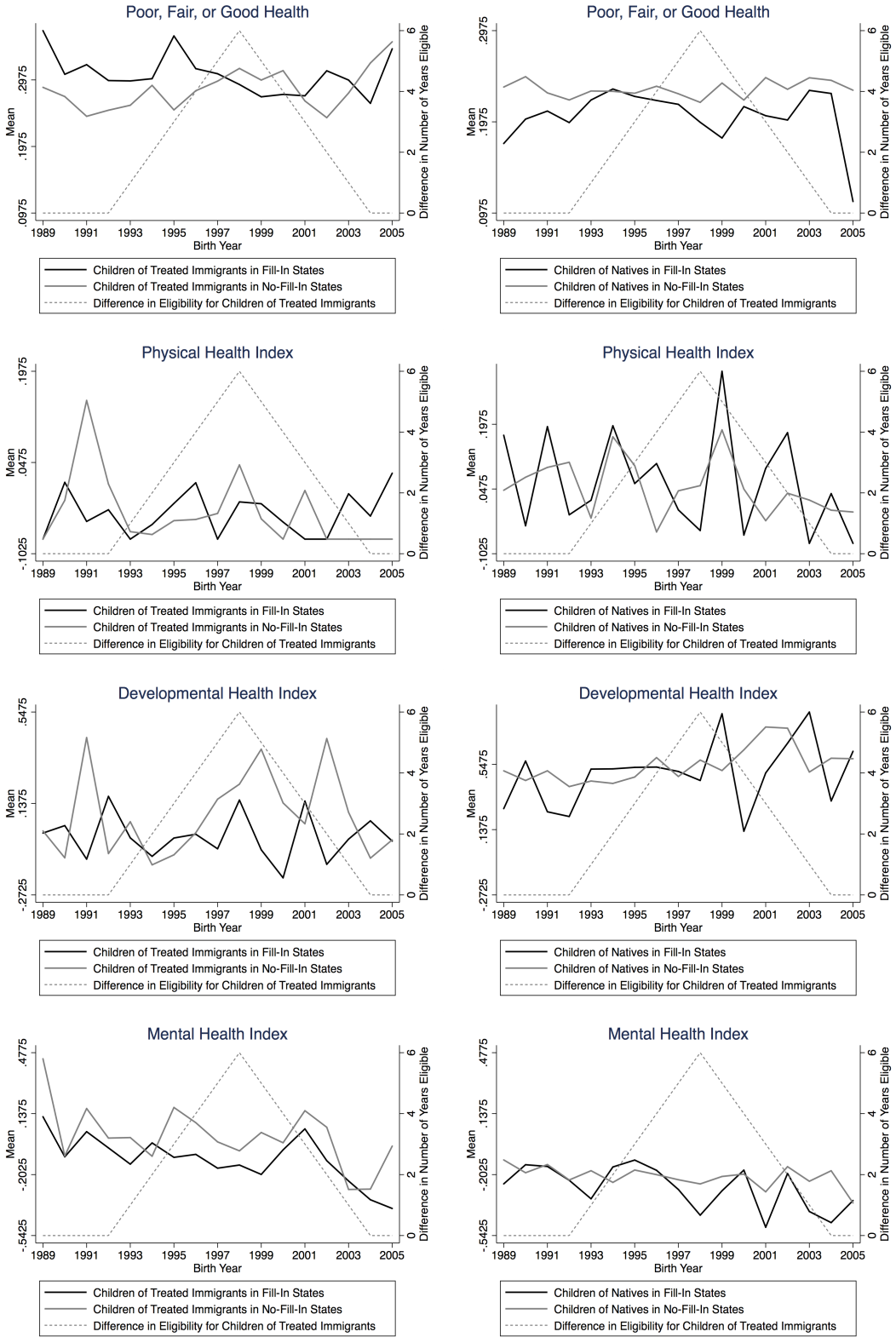
Notes: Children of treated immigrants defined as those whose parents were born outside of the U.S. and who immigrated between 1985 and 1996. The 1985 cutoff drops from the sample immigrants likely to not be affected by the Food Stamp eligibility changes, because they have lived in the U.S. long enough to either meet the 40 quarters requirement or to have applied for and received citizenship. The 1996 cutoff drops from the sample immigrants likely affected by changes in eligibility for other safety net programs. Children of natives defined as those whose parents were born in the U.S..

Figure 3: Eligibility for Food Stamps Among Children of Treated Immigrants by Birth Year



Notes: States are classified based on their availability of a Food Stamp fill-in program in January, February or March of a given year. 1998 Fill-In States are Massachusetts, Nebraska, Rhode Island, and Washington. 1999 Fill-In States are California, Connecticut, Maine, Minnesota, and Wisconsin. The No-Fill-In States are the remaining 41 states and the District of Columbia.

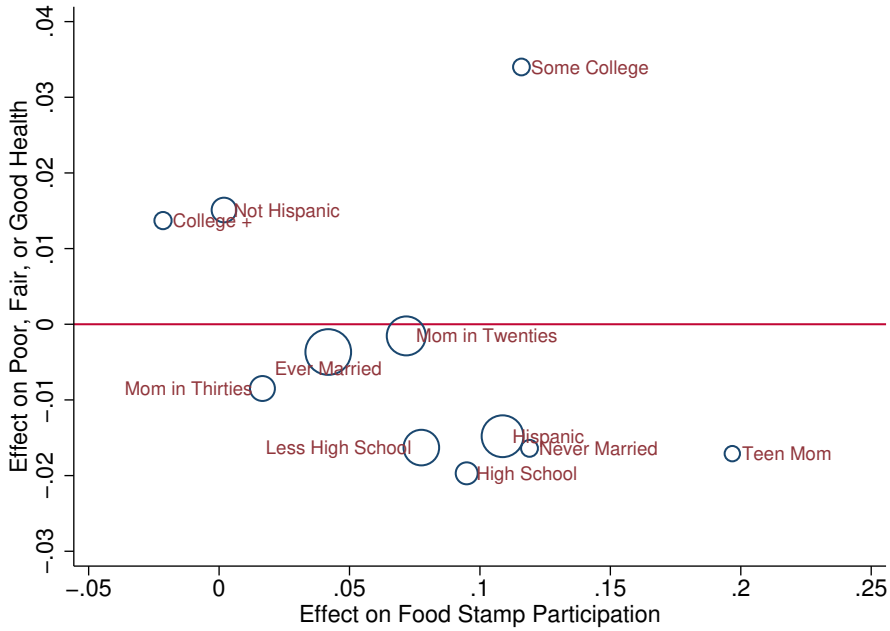
Figure 4: Average Health Outcomes among Children of Treated Immigrants and Natives



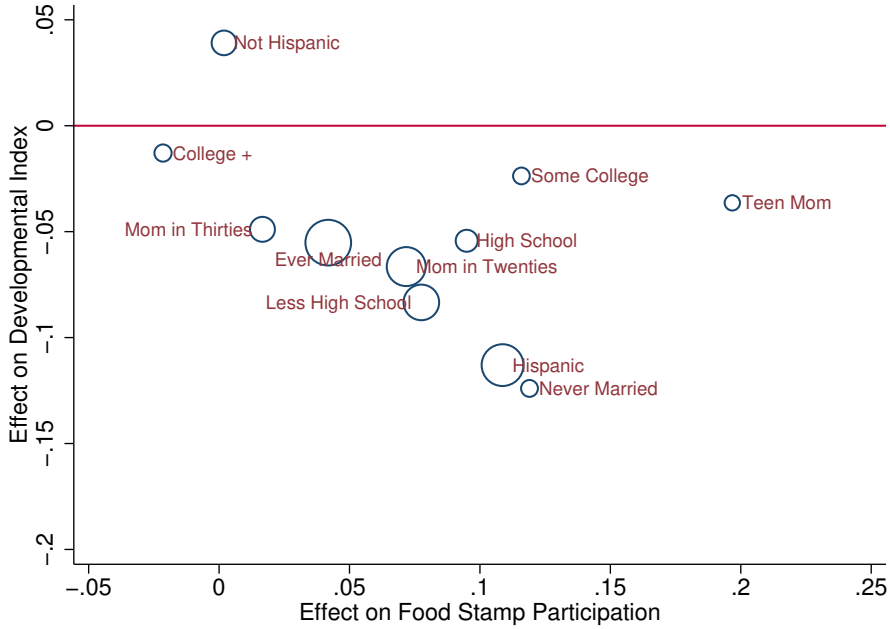
Notes: Data from the 1998-2015 National Health Interview Survey. The sample includes children born in the U.S. in 1989-2005 and between the ages of 6 and 16, whose mothers have a high school education or less. Children of treated immigrants defined as those whose parents were born outside of the U.S. and who immigrated between 1985 and 1996. Children of natives defined as those whose parents were born in the U.S.. The results are weighted using the NHIS-provided weights. The dotted line indicates the difference in the average number of years the child's treated immigrant parents were eligible for Food Stamps, between Fill-In and No-Fill-In states, from the time the child was in utero to their fifth birthday.

Figure 5: Subgroup Estimates

(a) "Poor", "Fair" or "Good" Health and Food Stamp Participation



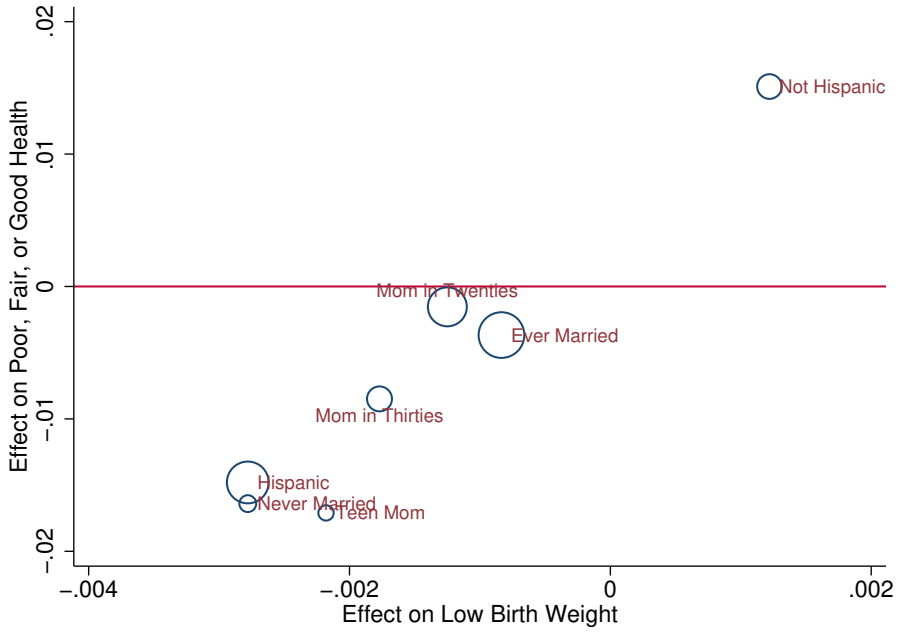
(b) Developmental Health Index and Food Stamp Participation



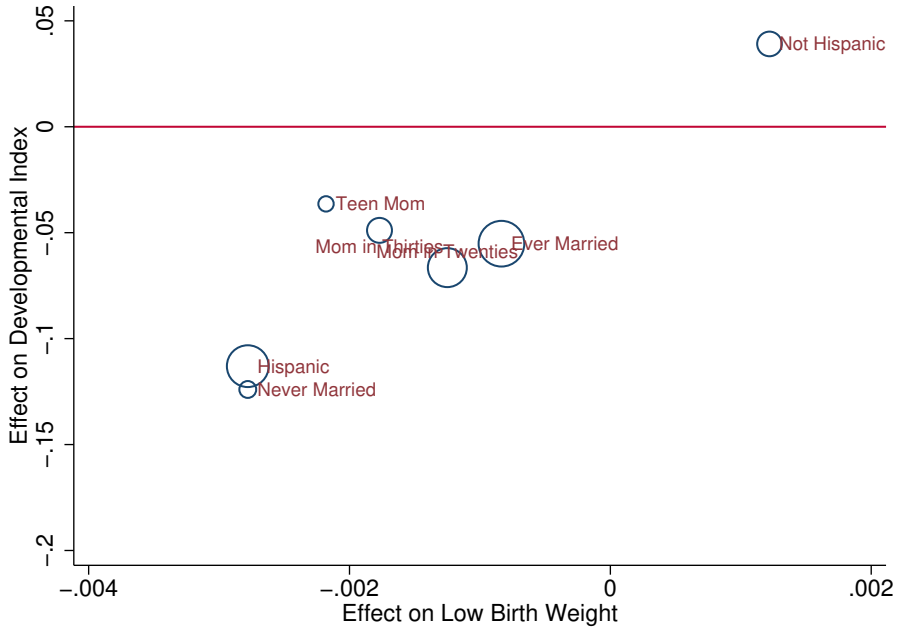
Notes: Estimates on the y-axis are from the 1998-2015 National Health Interview Survey and the sample includes children born in the U.S. in 1989-2005 and between the ages of 6 and 16. Estimates on the x-axis are from the 1995-2007 Annual Social and Economic Supplement to the CPS and the sample includes children born in the U.S. between the ages of 0 and 4. Estimates are weighted using the NHIS and CPS-provided weights. The size of each circle indicates the relative sample size of each subgroup in the NHIS person file.

Figure 6: Subgroup Estimates

(a) "Poor", "Fair" or "Good" Health and Low Birth Weight



(b) Developmental Health Index and Low Birth Weight



Notes: Estimates on the y-axis are from the 1998-2015 National Health Interview Survey and the sample includes children born in the U.S. in 1989-2005 and between the ages of 6 and 16. Estimates of the effect on low birth weight on the x-axis are from the 2000-2007 National Vital Statistics and the sample includes infants born in the U.S. to foreign-born mothers. Estimates are weighted using the NHIS-provided weights, and the number of births in each cell within the Vital Statistics data. The size of each circle indicates the relative sample size of each subgroup in the NHIS person file.

Table 1: Summary Statistics

	Children of Treated Immigrants	Children of Natives
Demographics of Child– NHIS Person File		
Male	0.51	0.51
Age	11	11
White	0.50	0.72
Black	0.06	0.22
Hispanic	0.80	0.11
Asian	0.03	0.00
Mom Less than High School	0.69	0.25
Mom Ever Married	0.87	0.83
Mom's Age at Birth	26	25
Mom's Years in U.S.	4.6	.
Dad's Age at Birth	29	29
Dad Less than High School	0.64	0.19
N	9072	45504
Health of Child– NHIS Person File		
Overall Health (1=excellent ... 5 =poor)	1.9	1.8
"Poor", "Fair", or "Good" Health	0.29	0.23
Any Overnight Hospitalizations in Past Year	0.01	0.02
N	9072	45504
Health of Child– NHIS Sample Child File		
Number of School Days Missed in Past Year	2.5	4.0
Chronic School Absense in Past Year (>15 days)	0.02	0.04
Any Doctor Visits in Past Year	0.80	0.86
2+ Doctor Visits in Past Year	0.51	0.61
Physical Health Index	-0.03	0.06
Developmental Health Index	0.04	0.51
Mental Health Index	-0.04	-0.22
N	3603	19821
Food Stamp Access– ASEC		
Food Stamp Participation	0.25	0.29
Food Stamp Benefit Amount Received	731.54	994.97
N	5949	39645

Notes: Data from the 1998-2015 NHIS and the 1995-2007 ASEC. The NHIS sample includes children born in the U.S. in 1989-2005 and between the ages of 6 and 16, whose mothers have a high school education or less. The ASEC sample includes children born in the U.S. in 1989-2005 and between the ages of 0 and 4, whose mothers have a high school education or less. Children of treated immigrants defined as those whose parents were born outside of the U.S. and who report arriving in the U.S. to stay between 1985 and 1996. Children of natives defined as those whose parents were born in the U.S.. The results are weighted using the NHIS and CPS-provided weights.

Table 2: Effect of Food Stamps on Benefit Receipt and Medium-Run Health

ASEC			
A: Food Stamp Participation			
T.I. Elig	0.080***		
	(0.018)		
Mean Y	0.25		
N	5949		
B: Food Stamp Benefit Amt			
T.I. Elig	184.781**		
	(82.300)		
Mean Y	731.54		
N	5949		
NHIS			
C: Overall Health (1=excell ... 5=poor)			
Num Yrs T.I. Elig Ages IU− >4	-0.036***	P=0.00	Adj-P=0.06
	(0.012)		
Mean Y	1.9		
Observations	9072		
D: "Poor" , "Fair", or "Good" Health			
Num Yrs T.I. Elig Ages IU− >4	-0.017***	P=0.00	Adj-P=0.05
	(0.005)		
Mean Y	0.29		
Observations	9072		
E: Physical Health Index			
Num Yrs T.I. Elig Ages IU− >4	-0.003	P=0.83	Adj-P=0.83
	(0.016)		
Mean Y	-0.03		
Observations	3271		
F: Developmental Health Index			
Num Yrs T.I. Elig Ages IU− >4	-0.076***	P=0.00	Adj-P=0.06
	(0.024)		
Mean Y	0.04		
Observations	3635		
G: Mental Health Index			
Num Yrs T.I. Elig Ages IU− >4	-0.013	P=0.52	Adj-P=0.72
	(0.019)		
Mean Y	-0.04		
Observations	2808		

Notes: Data from the 1998-2015 NHIS and the 1995-2007 ASEC. The NHIS sample includes children born in the U.S. between 1989-2005 and observed between the ages of 6 and 16, whose parents are treated immigrants and whose mothers have a high school education or less. The ASEC sample includes children born in the U.S. between 1989-2005 and observed between the ages of 0 and 4, whose parents are treated immigrants and whose mothers have a high school education or less. Treated immigrants defined as those born outside of the U.S. and who report arriving in the U.S. to stay between 1985 and 1996. Regressions using the NHIS include state of birth and year of birth fixed effects, and regressions using the ASEC include state of residence and year of observation fixed effects. The models include controls for demographic characteristics (child's age, gender, race/ethnicity, and number of siblings, as well as mother's education, years lived in the U.S., and age at childbirth) and controls for the state unemployment rate and Medicaid/SCHIP generosity at the time of birth and the time of the survey (or only time of survey for the ASEC). The results are weighted using the NHIS and CPS-provided weights. Standard errors are clustered by state of birth in the NHIS, and state of residence in the ASEC and shown in parentheses. P-values for each NHIS estimate are shown in the second column, and the third column displays the p-values after adjustment for multiple hypothesis testing, described in more detail in the text. * p<0.10, ** p<0.05, *** p<0.01

Table 3: Effect of Food Stamps on Other Health Outcomes

NHIS			
A: Any Overnight Hospitalizations			
Num Yrs T.I. Elig Ages IU− >4	-0.002	P=0.39	Adj-P=0.62
	(0.002)		
Mean Y	0.01		
Observations	9069		
B: School Days Missed			
Num Yrs T.I. Elig Ages IU− >4	-0.032	P=0.71	Adj-P=0.90
	(0.088)		
Mean Y	2.5		
Observations	3603		
C: Chronic School Absence (>15 days)			
Num Yrs T.I. Elig Ages IU− >4	-0.005**	P=0.03	Adj-P=0.15
	(0.002)		
Mean Y	0.02		
Observations	3603		
D: Any Doctor Visits in Past 12 Months			
Num Yrs T.I. Elig Ages IU− >4	0.003	P=0.95	Adj-P=0.94
	(0.012)		
Mean Y	0.80		
Observations	3615		
E: 2+ Doctor Visits in Past 12 Months			
Num Yrs T.I. Elig Ages IU− >4	-0.010	P=0.18	Adj-P=0.41
	(0.008)		
Mean Y	0.51		
Observations	3615		

Notes: Data from the 1998-2015 National Health Interview Survey. The sample includes children born in the U.S. in 1989-2005 and between the ages of 6 and 16, whose parents are treated immigrants and whose mothers have a high school education or less. All regressions using the NHIS include state of birth and year of birth fixed effects. Treated immigrants defined as those born outside of the U.S. and who report arriving in the U.S. to stay between 1985 and 1996. The model includes controls for demographic characteristics (child's age, gender, race/ethnicity, and number of siblings, as well as mother's education, years lived in the U.S., and age at childbirth) and controls for the state unemployment rate and Medicaid/SCHIP generosity at the time of birth and the time of the survey. The results are weighted using the NHIS-provided weights. Standard errors are clustered by state of birth and shown in parentheses. P-values for each estimate are shown in the second column and the third column displays the p-values after adjustment for multiple hypothesis testing, described in more detail in the text. * p<0.10, ** p<0.05, *** p<0.01

Table 4: Robustness Checks

	Baseline	Triple Difference		Double Difference, Additional Controls					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ASEC									
A: Food Stamp Participation									
T.I. Elig	0.080***	-0.026		0.056**	0.074***	0.080***	0.057**	0.072***	0.075***
	(0.018)	(0.022)		(0.022)	(0.022)	(0.019)	(0.026)	(0.020)	(0.020)
T.I. Elig * Kids of T.I.		0.103***	0.086***						
		(0.025)	(0.023)						
Mean Y	0.25	0.29	0.29	0.25	0.25	0.25	0.25	0.25	0.25
N	5949	45594	45594	5949	5949	5949	5949	5949	5949
B: Food Stamp Benefit Amt									
T.I. Elig	184.781**	5.331		151.121*	140.522	167.108**	76.321	168.703*	170.528**
	(82.300)	(95.743)		(83.360)	(102.503)	(82.731)	(96.107)	(87.125)	(82.323)
T.I. Elig * Kids of T.I.		163.350	147.131						
		(122.935)	(117.944)						
Mean Y	731.54	962.08	962.08	731.54	731.54	731.54	731.54	731.54	731.54
Observations	5949	45594	45594	5949	5949	5949	5949	5949	5949
NHIS									
C: Overall Health (1-5)									
Num Yrs T.I. Elig IU− >4	-0.036***	0.001		-0.030**	-0.029*	-0.035***	-0.027	-0.031**	-0.020
	(0.012)	(0.006)		(0.012)	(0.015)	(0.013)	(0.017)	(0.012)	(0.014)
Num Yrs T.I. Elig IU− >4 * Kids of T.I.		-0.037***	-0.036***						
		(0.013)	(0.013)						
Mean Y	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9
Observations	9072	54576	54576	9072	9072	9072	9072	9072	9072
D: "Poor"/"Fair"/"Good"									
Num Yrs T.I. Elig IU− >4	-0.017***	-0.001		-0.010**	-0.014*	-0.015***	-0.010	-0.013**	-0.007
	(0.005)	(0.003)		(0.005)	(0.007)	(0.005)	(0.007)	(0.005)	(0.006)
Num Yrs T.I. Elig IU− >4 * Kids of T.I.		-0.015***	-0.017***						
		(0.005)	(0.006)						
Mean Y	0.29	0.24	0.24	0.29	0.29	0.29	0.29	0.29	0.29
Observations	9072	54576	54576	9072	9072	9072	9072	9072	9072
E: Developmental Health Index									
Num Yrs T.I. Elig IU− >4	-0.076***	0.001		-0.075**	-0.093***	-0.074***	-0.077**	-0.073**	-0.053
	(0.024)	(0.021)		(0.039)	(0.033)	(0.025)	(0.036)	(0.031)	(0.035)
Num Yrs T.I. Elig IU− >4 * Kids of T.I.		-0.079**	-0.091**						
		(0.037)	(0.040)						
Mean Y	0.04	0.46	0.46	0.04	0.04	0.04	0.04	0.04	0.04
Observations	3635	23804	23804	3635	3635	3635	3635	3635	3635
State by Year Fixed Effects			X						
Other Safety Net Generosity				X					
Other State Fill In					X				
Attitude Towards Immigrants						X			
Other FS Changes							X		
State 1990 Char * Trends								X	
State Linear Trends									X

Notes: Data from the 1998-2015 NHIS and the 1995-2007 ASEC. The NHIS sample includes children born in the U.S. between 1989-2005 and observed between the ages of 6 and 16, whose parents are treated immigrants and whose mothers have a high school education or less. The ASEC sample includes children born in the U.S. between 1989-2005 and observed between the ages of 0 and 4, whose parents are treated immigrants and whose mothers have a high school education or less. Treated immigrants defined as those born outside of the U.S. and who report arriving in the U.S. to stay between 1985 and 1996. Regressions using the NHIS include state of birth and year of birth fixed effects, and regressions using the ASEC include state of residence and year of observation fixed effects. The models include controls for demographic characteristics (child's age, gender, race/ethnicity, and number of siblings, as well as mother's education, years lived in the U.S., and age at childbirth) and controls for the state unemployment rate and Medicaid/SCHIP generosity at the time of birth and the time of the survey (or only time of survey for the ASEC). The results are weighted using the NHIS and CPS-provided weights. Standard errors are clustered by state of birth in the NHIS, and state of residence in the ASEC and shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table 5: Specification Checks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ASEC						
A: Food Stamp Participation							
T.I. Elig	0.080***	0.030	0.042*	0.067***	0.080***		
	(0.018)	(0.041)	(0.022)	(0.023)	(0.018)		
Mean Y	0.25						
Observations	5949	4148	36966	5949	5949		
B: Food Stamp Benefit Amt							
T.I. Elig	184.781**	62.801	144.197	149.218	185.107**		
	(82.300)	(187.190)	(98.355)	(90.352)	(82.357)		
Mean Y	731.54						
Observations	5949	4148	36966	5949	5949		
	NHIS						
C: Overall Health (1=excell ... 5=poor)							
Num Yrs T.I. Elig Ages IU− >4	-0.036***	-0.041**	-0.018	-0.029**	-0.040***		-0.029*
	(0.012)	(0.019)	(0.011)	(0.013)	(0.012)		(0.016)
Num Yrs T.I. Elig Ages 5− >Survey							0.012
							(0.015)
Num Yrs T.I. Elig Ages IU− >1						-0.047**	
						(0.021)	
Num Yrs T.I. Elig Ages 2− >4						-0.028	
						(0.019)	
Mean Y	1.9						
Observations	9072	5121	41894	9072	9072	9072	9072
D: "Poor" , "Fair", or "Good" Health							
Num Yrs T.I. Elig Ages IU− >4	-0.017***	-0.008	-0.007	-0.011*	-0.017***		-0.010
	(0.005)	(0.009)	(0.005)	(0.006)	(0.005)		(0.008)
Num Yrs T.I. Elig Ages 5− >Survey							0.011
							(0.007)
Num Yrs T.I. Elig Ages IU− >1						-0.026***	
						(0.008)	
Num Yrs T.I. Elig Ages 2− >4						-0.010	
						(0.008)	
Mean Y	0.29						
Observations	9072	5121	41894	9072	9072	9072	9072
E: Developmental Health Index							
Num Yrs T.I. Elig Ages IU− >4	-0.076***	-0.005	-0.017	-0.056**	-0.078***		-0.070**
	(0.024)	(0.064)	(0.028)	(0.028)	(0.023)		(0.028)
Num Yrs T.I. Elig Ages 5− >Survey							0.008
							(0.016)
Num Yrs T.I. Elig Ages IU− >1						-0.091**	
						(0.045)	
Num Yrs T.I. Elig Ages 2− >4						-0.065	
						(0.040)	
Mean Y	0.04						
Observations	3635	2128	18511	3635	3635	3635	3635
Omit California		X					
Omit All Fill-In			X				
Model Illinois & New Jersey as Fill-In				X			
Model Teen Moms as Children for Eligibility					X		
Split Eligibility by Ages						X	
Eligibility at Ages 5 +							X

Notes: Data from the 1998-2015 NHIS and the 1995-2007 ASEC. The NHIS sample includes children born in the U.S. between 1989-2005 and observed between the ages of 6 and 16, whose parents are treated immigrants and whose mothers have a high school education or less. The ASEC sample includes children born in the U.S. between 1989-2005 and observed between the ages of 0 and 4, whose parents are treated immigrants and whose mothers have a high school education or less. Treated immigrants defined as those born outside of the U.S. and who report arriving in the U.S. to stay between 1985 and 1996. Regressions using the NHIS include state of birth and year of birth fixed effects, and regressions using the ASEC include state of residence and year of observation fixed effects. The models include controls for demographic characteristics (child's age, gender, race/ethnicity, and number of siblings, as well as mother's education, years lived in the U.S., and age at childbirth) and controls for the state unemployment rate and Medicaid/SCHIP generosity at the time of birth and the time of the survey (or only time of survey for the ASEC). The results are weighted using the NHIS and CPS-provided weights. Standard errors are clustered by state of birth in the NHIS, and state of residence in the ASEC and shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table 6: Mechanisms

National Vital Statistics	
A: Average Birth Weight	
T.I. Elig 3rd Trimester	6.52***
	(2.96)
Mean Y	3295
Observations	4896
B: Low Birth Weight	
T.I. Elig 3rd Trimester	-0.001***
	(0.001)
Mean Y	0.07
Observations	4896
CPS Food Security Supplment	
C: Food Stamp Participation	
T.I. Elig	0.093*
	(0.051)
Mean Y	0.15
Observations	685
D: Log of Weekly Food Consumption	
T.I. Elig	0.091
	(0.085)
Mean Y	5.06
Observations	685

Notes: Data in Panels A-B are from the 2000-2007 Vital Statistics Natality Data. The sample includes all infants born in the U.S. to foreign-born mothers and is collapsed to the infants' state of birth, year and month of birth cell. Results are weighted by number of births in each cell. Data in Panels C-D are from the Current Population Survey Food Security Supplement 2001-2007. Weekly Food Consumption includes purchases made with Food Stamps. Sample is treated immigrant mothers with a high school education or less, aged 18 to 55 who have U.S.-born children under age 17. Treated immigrants defined as those born outside of the U.S. and who report arriving in the U.S. to stay between 1985 and 1996. The results are weighted using the CPS-provided household weights. Regressions include controls for state of birth (or survey in the CPS) and year by month of birth (or year of survey in the CPS) fixed effects, as well as controls for the state unemployment rate and Medicaid/SCHIP generosity. Demographic controls in the Vital Statistics are child's gender, race/ethnicity, parity of birth, and mother's age at childbirth. Demographic controls in the CPS are mother's age, race/ethnicity, education, years lived in the U.S., and fixed effects for the number of children and number of adults living in the household. Standard errors are clustered by state and shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01

A Appendix: Food Stamp Program Details

In order to be eligible for Food Stamps, families with children must meet several income and asset tests. First, families' "gross income" must be below 130% of the poverty line. Not all income is counted as gross income. The major components of gross income are earnings, cash income from other safety net programs (e.g. TANF, Unemployment Insurance, Social Security) and child support. The second income test is on "net income", which is gross income minus deductions, and net income must be below 100% of the poverty line to be eligible. There is a standard deduction, as well as a deduction for earnings, child care expenses, medical expenses, child support payments, and excess shelter costs (high rent and utility payments). During the late 1990s and early 2000s most states also had an asset test as part of their eligibility requirements.[35] Alternatively, families are eligible if they received AFDC/TANF benefits, SSI payments, or General Assistance benefits, although these programs often had income eligibility thresholds below the Food Stamp thresholds. Able-bodied adults without dependents (essentially non-disabled working-age adults without children) were subject to new, stricter limits on their eligibility as the result of welfare reform in 1996, however these changes are not likely to play a large role in my context, as I focus on families with children.

For families that are eligible, family-level benefit amounts are calculated as follows: families receive the maximum benefit amount minus 30% of the families' "net income". The maximum benefit amount is determined by the Department of Agriculture's Thrifty Food Plan, which is designed to provide adequate nutrition at minimal cost, is indexed to inflation, and varies with family size. Appendix Table (A.9) shows the maximum monthly benefit amount for families based on their size in fiscal year 1998. These amounts are the same in the continental U.S. and are slightly different in Alaska and Hawaii.

B Appendix: Other Data Information

B.1 State-Year Control Variables

Changes in economic conditions and other safety net programs are important to control for in the analysis as they may affect children's outcomes (Currie and Gruber, 1996; Dehejia and Lleras-Muney, 2004; Bitler, Gelbach and Hoynes, 2006; Hoynes, Miller and Simon, 2015). Therefore, I merge on to the NHIS and ASEC information about states' unemployment rates, whether the

[35] This information is from Wilde (2001) and The Center on Budget and Policy Priorities (2013*b*).

state "filled-in" other programs for immigrants who entered the U.S. after 1996, whether the state had an EITC or SCHIP program, the timing of welfare reform or waivers in each state, maximum welfare benefits, other state Food Stamp policies, and income eligibility cutoffs for Medicaid and SCHIP for children by state. The unemployment rates are from the Bureau of Labor Statistics. The EITC information is from the NBER TAXSIM. Dates of welfare reform and waivers are from Bitler, Gelbach and Hoynes (2006) and maximum welfare benefits are from Robert Moffitt. Information on other Food Stamp program changes–the frequency with which applications must be re-certified, whether in-person applications or re-certifications are required, state spending on outreach, broad based categorical eligibility, vehicle asset rules, and whether benefits are issued on debit cards–are from the USDA's SNAP Policy Database. This database only contains information beginning in 1996, so I assume the policies were the same prior to 1996 as they were in 1996. The SCHIP program start dates are from Rosenbach et al. (2001) and the Medicaid/SCHIP generosity measures come from Hoynes and Luttmer (2011), which I supplemented with information from the National Governor's Association.

Local attitudes regarding immigration may affect immigrants' program participation (Watson, 2014), so I follow Bronchetti (2014) and include two measures of state attitudes: 1) the fraction of individuals reporting they would like immigration decreased from the American National Election Studies (ANES), and 2) the number of deportation court cases per foreign-born individual from Transactional Records Access Clearinghouse (TRAC) Immigration Reports. The ANES only includes census region identifiers, so I assign the same values to all states within the same region. Additionally, the ANES information is only available in "even" years, so I linearly interpolate in the missing years.

The additional data used in Appendix Table (A.5) are expenditure data. The educational expenditure data are from Kids Count and the safety net program expenditure data is from the BEA Regional Economic Accounts.

B.2 Vital Statistics Data

For the analysis on infant health outcomes, I use the 2000-2007 Vital Statistics Natality Data from the National Center for Health Statistics. Public-use data from 2000-2004 contain state identifiers and I obtained a restricted-use version of the 2005-2007 data files that include state identifiers through an application to the National Association of Public Health Statistics and Information Systems (NAPHSIS).[36] This data contains information about the birth weight of each infant as well

[36]Specifically, the data are the Natality–Limited Geography files for 2005-2007 originally from the National Center for Health Statistics and compiled from data provided by the 57 vital statistics jurisdictions through the

as their mothers' demographic information, including mothers' country of birth for the universe of births in the United States. However, there are several important limitations of this data. First, the data does not contain any information about the year of entry of foreign-born mothers, making analysis of the policy changes harder because I cannot construct a sample of "treated immigrants". This will result in more mothers in the "treatment group" actually remaining eligible for Food Stamps, compared to the analysis with the ASEC and NHIS. Moreover, I cannot drop from the sample immigrants who were subject to restrictions on eligibility for other safety net programs. To circumvent this latter issue, I focus only on births between 2000 and 2007, to capture the effects of the restoration of eligibility resulting from the 2002 Farm Bill, but to avoid picking up effects of welfare reform more generally. The second disadvantage is that I do not observe fathers' place of birth, or year of entry for foreign-born fathers. Finally, over my sample period, mother's education is not uniformly reported in the data, so I do not condition my sample on mother's educational attainment. I collapse the data to the month-year of birth, state of birth, and mothers' country of birth level for ease of computation, and weight by the number of births in each cell. I use equation (2) to estimate the effects in which, instead of indexing by year of observation, I index by the year and month of birth.

B.3 CPS Food Security Supplement

To examine the effect of Food Stamps eligibility on food consumption I utilize the Food Security Supplement to the CPS from 2001 to 2007, which contains the same demographic information as the ASEC. This supplement was conducted in earlier years as well, but I restrict the sample to begin in 2001, in order to have a consistent measure of total food consumption in each year. In these years, the survey collects information about the household's expenditures on food consumed at home, food consumed away from the home, and purchases made with Food Stamps in the prior week. I sum these components to get a measure of the log of weekly total food consumption in the past week including purchases made with Food Stamps. I focus on all families with U.S.-born children under age 17, to maximize sample size. The unit of observation in this analysis is the mother. I use equation (2) to estimate the effects and I control for fixed effects indicating the number of children and number of other family members to flexibly control for food needs as suggested by Currie (2003).

Vital Statistics Cooperative Program.

C Appendix: Further Results

C.1 Comparison of Food Stamp Program Participation Results with the Previous Literature

As described above, I find no effect of Food Stamp eligibility on participation in programs besides Food Stamps. This appears contradictory to some of the findings from the previous literature, which documented that immigrant participation for many programs declined following welfare reform. However, there are several differences between my study and this literature that explain the discrepancy, described below.

Overall, the previous literature argues that a harsh policy climate after welfare reform led to declines in participation, above and beyond changes in participation due to changes in eligibility rules. One of the pioneering papers documenting this "chilling effect" compares mean participation rates of all immigrants to all natives, and of citizens to non-citizens, over time (Fix and Passel, 1999). However, there are several reasons these unadjusted participation rates may not be the best way to compare immigrants and natives. First, natives and immigrants live in different states: immigrants are more concentrated than natives in very few states (along the southern border of the U.S., as well as New York and several other East Coast states). Therefore, it may be important to control for state fixed effects to take account of differential patterns in participation occurring across different states. Second, the demographics of these two sets of families are different, as shown in Table (A.10). Mothers in immigrant families have less education, more children, are younger, and are more likely to be poor than native mothers, so it is important to control for observable characteristics of these families as well. Indeed, Haider et al. (2004) find state fixed effects, demographic controls, and controls for state economic conditions explain much of the differential decline in program participation among immigrants relative to natives after welfare reform.

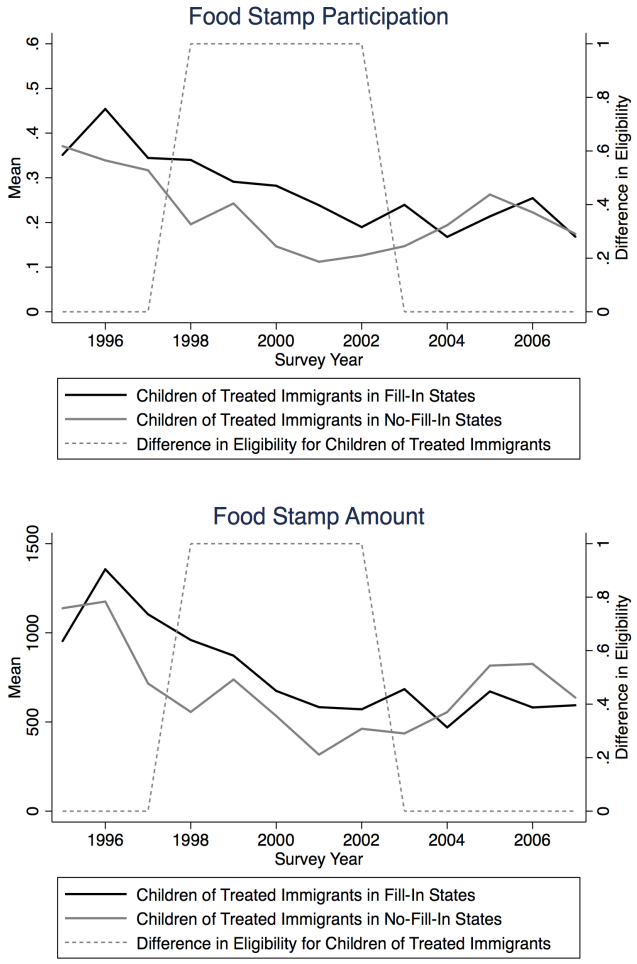
The other major difference between my analysis and the previous literature is the policy variation utilized; I use the variation in Food Stamp eligibility across states and over time for treated immigrants only, whereas most of the chilling effect literature looks at changes in participation for *all* immigrants *nationally* before and after welfare reform.[37] Therefore, the findings in these other papers may not be directly applicable to my setting. However, if there was a fall in participation nationally in programs besides Food Stamps for treated immigrants following welfare reform, I will not pick this up with the state by year identification strategy.

[37] Other differences include: 1) not restricting the sample to low-income or low-education households (Borjas, 2003), and 2) separating naturalized citizen families from legal permanent resident families (Kandula et al., 2004).

I therefore conduct my own analysis of the chilling effect that accounts for all of the issues described above. I restrict the sample to families in which the parents are treated immigrants or natives, and where the mother has a high school education or less, with children born in the U.S., to reflect the sample choices made in the main analysis. I find in Table (A.11) that accounting for differences in demographics between immigrants and natives explains most of the differential decline in program participation among treated immigrants, relative to natives, following welfare reform. After accounting for differential demographics and state of residence, there is no difference in the change in participation in Medicaid/SCHIP between immigrants and natives.[38] There is a marginally significant differential decrease in AFDC/TANF participation, and a significant differential decrease in participation in SSI, however the fraction of families that participate in SSI is small, so this is unlikely to drive the estimated effects in my main analysis. Additionally, there is a differential *increase* in participation in Free and Reduced Price Lunch, but this would cause my estimated effects to be smaller in the main analysis, if participation in these programs improves children's health. Importantly, even after controlling for all of these factors, the effect on Food Stamp participation remains.

[38]This is similar to the findings in Borjas (1999), which suggest observable characteristics between immigrants and native explain much of the difference in their safety net program participation.

Figure A.1: Participation in Food Stamps and Benefit Amount Received among Children of Treated Immigrants



Notes: Data are from the 1995-2007 Annual Social and Economic Supplement to the CPS. The sample includes children born in the U.S. in 1989-2005 and between the ages of 0 and 4, whose mothers have a high school education or less. Children of treated immigrants defined as those whose parents were born outside of the U.S. and who immigrated between 1985 and 1996. The results are weighted using the CPS-provided weights. The dotted line indicates the difference in eligibility between Fill-In and No-Fill-In states for children of treated immigrants.

Table A.1: Health Outcomes and Parent-Reported Poor/Fair/Good Health

	Children of Treated Immigrants		Children of Natives	
	Mean X	"Poor", "Fair", "Good"	Mean X	"Poor", "Fair", "Good"
Overall Health				
Overnight Hospitalizations	0.01	0.267***	0.02	0.251***
		(0.0518)		(0.0192)
Number of School Days Missed	2.5	0.008***	4.0	0.008***
		(0.002)		(0.001)
Chronic School Absence	0.02	0.120*	0.04	0.252***
		(0.069)		(0.020)
Two or More Doctor Visits	0.51	0.091***	0.61	0.083***
		(0.019)		(0.007)
Health Conditions				
Diabetes	0.00	-0.068	0.00	0.434***
		(0.250)		(0.076)
Frequent Diarrhea	0.01	0.120	0.01	0.229***
		(0.103)		(0.036)
Mental Retardation	0.01	0.585***	0.01	0.367***
		(0.067)		(0.038)
Developmental Delay	0.02	0.387***	0.05	0.239***
		(0.074)		(0.021)
ADD/ADHD	0.03	0.236***	0.11	0.158***
		(0.058)		(0.013)
Autism	0.01	0.473***	0.01	0.309***
		(0.153)		(0.044)
Learning Disability	0.06	0.291***	0.12	0.210***
		(0.044)		(0.013)
Health Indexes				
Physical Health Index	-0.03	0.012	0.05	0.017***
		(0.015)		(0.002)
Developmental Index	0.04	0.065***	0.51	0.042***
		(0.009)		(0.002)
Mental Health Index	-0.04	0.043***	-0.22	0.032***
		(0.012)		(0.005)

Notes: Data from the 1998-2015 NHIS. The sample includes children of treated immigrants and children of natives born in the U.S. in 1989-2005 and between the ages of 6 and 16, whose mothers have a high school education or less. Children of treated immigrants defined as those whose parents were born outside of the U.S. and who report arriving in the U.S. to stay between 1985 and 1996. Children of natives defined as those whose parents were born in the U.S.. The equation estimated is $Y_i = \alpha + \gamma_1 X_i + \gamma_2 Z_i + \epsilon_i$ where X_i is the health outcome listed in each row and Y_i is an indicator variable of whether the child is reported to be in "Poor", "Fair", or "Good" health. The first column for each sample shows the mean incidence of each health outcome in that sample and the second column shows the coefficient γ_1 and associated standard error. The model includes controls for demographic characteristics in Z_i: child's age, gender, race/ethnicity, and number of siblings, as well as mother's education, years lived in the U.S., and age at childbirth. The results are weighted using the NHIS-provided weights. Standard errors are shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table A.2: Correlation of State Political Party in 1996 with Whether the State is Fill-In State

	(1)	(2)	(3)	(4)
Governor Republican	0.076	0.076	0.169	0.169
	(0.104)	(0.103)	(0.162)	(0.160)
Governor Independent	0.889***		0.900***	
	(0.076)		(0.081)	
Mean Y	0.18	0.16	0.23	0.22
Population Weights			X	X
Omit Maine		X		X
N	51	50	51	50

Notes: Data are from Wikipedia and Dave Leip's Atlas of U.S. Presidential Elections for the results of elections from 1992-1996. See appendix for more detailed description of the data. The dependent variable is a dummy variable equal to one if the state enacted a Food Stamp fill-in program. Having an independent governor appears to be correlated with the likelihood of being a Fill-In state however only Maine had an independent governor in 1996 and was also a Fill-In state. The weighted results use the state population in 1996. Standard errors are clustered by state and shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table A.3: Correlation of State Demographic Characteristics in 1990 with Whether the State is Fill-In State

	(1)	(2)
Frac of Adults with More HS	0.007	0.004
	(0.011)	(0.013)
Frac of Pop Black	-0.007	-0.017**
	(0.005)	(0.007)
Frac of Adults Foreign-Born	-0.068	-0.069*
	(0.040)	(0.037)
Frac Foreign-Born Adults with More HS	-0.003	0.008
	(0.008)	(0.008)
Frac of Pop Age<= 16	-0.064	-0.060
	(0.054)	(0.081)
Frac of Pop Age> 65	0.025	-0.007
	(0.046)	(0.041)
Frac of Kids Foreign-Born	0.180	0.225**
	(0.107)	(0.089)
Frac of Pop Age<= 5	0.104	0.145
	(0.186)	(0.278)
Population Weight		X
N	51	51

Notes: Data are from the 1990 1% Census. The dependent variable is a dummy variable equal to one if the state enacted a Food Stamp fill-in program. The adult population is defined as those aged 25 to 62 and the child population is defined as those aged 0 to 16. The weighted results use the state population in 1990. Standard errors are clustered by state and shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table A.4: Correlation of State Attitude Towards Immigrants in 1996 with Whether the State is Fill-In State

	(1)	(2)
Fraction Foreign-Born Deported	0.024	0.025
	(0.072)	(0.101)
Fraction Population Want Immigration Decreased	-0.038	0.064
	(0.038)	(0.060)
Mean Y	0.18	0.23
Population Weights		X
N	51	51

Notes: Data are from the 1996 American National Election Study and the TRAC database for 1996. See appendix for more detailed description. The dependent variable is a dummy variable equal to one if the state enacted a Food Stamp fill-in program. The weighted results use the state population in 1996. Standard errors are clustered by state and shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table A.5: Correlation of State Fill-In Programs with Time-Varying Characteristics

	Spend Sch	Spend Med	Spend Welf	Spend SSI	Max Welf	Urate	Wheth EITC	Med Expand	Med Gen 0	Med Gen 6
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
T.I. Elig	184.78	0.01	-0.00	-0.00	8.82	-0.29*	-0.02	-0.05	23.28*	10.76
	(165.71)	(0.02)	(0.00)	(0.00)	(10.52)	(0.15)	(0.05)	(0.05)	(13.86)	(7.83)
Mean Y	8974.29	0.95	0.08	0.14	411.60	5.09	0.24	0.73	195.73	198.14
N	557	714	714	714	714	714	714	714	714	714

Notes: Data sources are described in the appendix. All spending is per person except for school which is per pupil and all dollar amounts are in 2009 $s. "Med Expand" indicates the timing of the state's Medicaid/SCHIP expansion after SCHIP was created in 1997, and the other measures of Medicaid and SCHIP generosity are expressed as a percentage of the poverty line. The regressions include state and year fixed effects. The results weighted with the state population. Standard errors are clustered by state and shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table A.6: Effect of Food Stamp Eligibility on Fertility, Migration, and Citizenship

	Fertility	Migration		Citizenship	
	Number of Children	# Treat Immig	% Treat Immig	Mother	Father
T.I. Elig	-0.017	-0.553	-0.010	-0.013	0.018
	(0.041)	(1.115)	(0.008)	(0.021)	(0.021)
Mean Y	1.81	15.56	0.09	0.17	0.21
N	10542	535	535	8222	6090

Notes: Data are from the 1995-2007 Annual Social and Economic Supplement to the CPS. In the first column the sample is treated immigrant women aged 16 to 45 with a high school education or less and the dependent variable is the number of children in the household. In the second and third columns, the sample is treated immigrant mothers aged 16 to 55 who have children under age 16 that were born in the U.S., collapsed to the state and year level and the dependent variables are the number of treated immigrant families in each state and year, and the number of these families, divided by the number of native families in each state and year, respectively. In the fourth and fifth columns, the sample is treated immigrant parents aged 16 to 55 who have children under age 16 that were born in the U.S. and the dependent variables are whether the mother or father is a naturalized citizen, respectively. Treated immigrants defined as those born outside of the U.S. and who report arriving in the U.S. to stay between 1985 and 1996. The regressions include state and year fixed effects. The first column controls for women's age, race/ethnicity, year of immigration and education. The fourth and fifth columns control for women's age, race/ethnicity, year of immigration, number of kids, and education. The results are weighted using the CPS-provided weights. Standard errors are clustered by state and shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table A.7: Effect of Parents' Eligibility on Amount of Food Stamps Received Among Participants and on Participation in Other Programs

	FS Participation	FS Benefit Amt Among Participants	SSI Participation	TANF/AFDC Participation	Medicaid/SCHIP Participation	School Lunch Participation
T.I. Elig	0.080***	-332.535	-0.000	0.007	0.010	-0.003
	(0.018)	(264.328)	(0.009)	(0.020)	(0.047)	(0.022)
Mean Y	0.25	2973.16	0.02	0.14	0.52	0.44
N	5949	1403	5949	5949	5949	5949

Notes: Data are from the 1995-2007 Annual Social and Economic Supplement to the CPS. The sample includes children born in the U.S. in 1989-2005 and between the ages of 0 and 4, whose parents are treated immigrants and whose mothers have a high school education or less. Treated immigrants defined as those born outside of the U.S. and who report arriving in the U.S. to stay between 1985 and 1996. All regressions include state and year fixed effects, and controls for demographic characteristics (child's age, gender, race/ethnicity, and number of siblings, as well as mother's education, years lived in the U.S., and age at childbirth). The models include controls for the state unemployment rate and Medicaid/SCHIP generosity at the time of the survey. The results are weighted using the CPS-provided weights. Standard errors are clustered by state and shown in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table A.8: Effect of Food Stamps on Developmental Health Outcomes

NHIS			
A: Developmental Health Index			
Num Yrs T.I. Elig Ages IU− >4	-0.076***	P=0.00	Adj-P=0.00
	(0.024)		
Mean Y	0.04		
Observations	3635		
B: Autism			
Num Yrs T.I. Elig Ages IU− >4	-0.005**	P=0.01	Adj-P=0.05
	(0.002)		
Mean Y	0.01		
Observations	3640		
C: Developmental Delay			
Num Yrs T.I. Elig Ages IU− >4	-0.005	P=0.17	Adj-P=0.25
	(0.004)		
Mean Y	0.02		
Observations	3639		
D: Learning Disability			
Num Yrs T.I. Elig Ages IU− >4	-0.022***	P=0.00	Adj-P=0.00
	(0.004)		
Mean Y	0.06		
Observations	3638		
E: Mental Retardation			
Num Yrs T.I. Elig Ages IU− >4	-0.008***	P=0.00	Adj-P=0.01
	(0.002)		
Mean Y	0.01		
Observations	3640		
F: ADD/ADHD			
Num Yrs T.I. Elig Ages IU− >4	-0.004	P=0.11	Adj-P=0.25
	(0.003)		
Mean Y	0.03		
Observations	3637		

Notes: Data from the 1998-2015 National Health Interview Survey. The sample includes children born in the U.S. in 1989-2005 and between the ages of 6 and 16, whose parents are treated immigrants and whose mothers have a high school education or less. All regressions include state of birth and year of birth fixed effects. Treated immigrants defined as those born outside of the U.S. and who report arriving in the U.S. to stay between 1985 and 1996. The model includes controls for demographic characteristics (child's age, gender, race/ethnicity, and number of siblings, as well as mother's education, years lived in the U.S., and age at childbirth) and controls for the state unemployment rate and Medicaid/SCHIP generosity at the time of birth and the time of the survey. The results are weighted using the NHIS-provided weights. Standard errors are clustered by state of birth and shown in parentheses. P-values for each estimate are shown in the second column and the third column displays the p-values after adjustment for multiple hypothesis testing, described in more detail in the text. * p<0.10, ** p<0.05, *** p<0.01

Table A.9: Maximum Food Stamp Benefit in Continental United States in Fiscal Year 1998

Household Size	Benefit Amount
1	$122
2	$224
3	$321
4	$408
5	$485
6	$582
7	$643
8	$735
Each Add'l Member	$92

Notes: Maximum benefit amounts from USDA "CHARACTERISTICS OF FOOD STAMP HOUSEHOLDS FISCAL YEAR 1998". Values are slightly different for Alaska and Hawaii.

Table A.10: Pre-existing Differences in Demographics

	Immigrants	Natives
Food Stamp Participation	0.36	0.22
Married	0.73	0.72
Number of Kids	2.2	1.9
Number of US-Born Kids	1.6	1.9
Number of Elders (65+)	0.03	0.01
Less High School	0.71	0.21
Below Poverty Line	0.53	0.23
Age	30	35

Notes: Data are from the 1995-1996 Annual Social and Economic Supplement to the CPS. Sample is treated immigrant and native mothers who have children under age 16 that were born in the US. Treated immigrants defined as those born outside of the U.S. and who report arriving in the U.S. to stay between 1985 and 1996. The results are weighted using the CPS-provided weights.

Table A.11: Effect of Welfare Reform on Program Participation

	1995-2007				
	Food Stamps	SSI	AFDC/TANF	Med/SCHIP	Free Lunch
A: No Controls					
Post*Immig	-0.151***	-0.024***	-0.088***	-0.098***	0.082***
	(0.023)	(0.006)	(0.022)	(0.026)	(0.018)
Mean Y	0.20	0.05	0.10	0.31	0.30
N	99337	99337	99337	99337	99337
B: Demographic Controls					
Post*Immig	-0.074***	-0.019***	-0.037**	-0.010	0.085***
	(0.021)	(0.006)	(0.017)	(0.020)	(0.018)
Mean Y	0.20	0.05	0.10	0.31	0.30
N	98790	98790	98790	98790	98790
C: Demographics, State FE					
Post*Immig	-0.073***	-0.018***	-0.032*	-0.007	0.083***
	(0.021)	(0.006)	(0.016)	(0.021)	(0.017)
Mean Y	0.20	0.05	0.10	0.31	0.30
N	98790	98790	98790	98790	98790

Notes: Data are from the 1995-2007 Annual Social and Economic Supplement to the CPS. Sample is mothers who have a high school education or less and who have children that were born in the US and are under age 17. Post is equal to one in 1997 and after. All regressions include survey year fixed effects. Demographic controls include: age and marital status of mother, number of children, number of elderly, number of family members, and race/ethnicity. Standard errors are clustered by state and shown in parentheses. The results are weighted using the CPS-provided weights. * p<0.10, ** p<0.05, *** p<0.01