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

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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. The existing evidence on the effects of Food Stamps on children's and families' outcomes is limited. 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 find loss of parental eligibility has large effects on program receipt, and an additional year of parental eligibility before age 5 improves health outcomes at ages 6-16.

JEL Codes: H5, I1, I3

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"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

I 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, and among families with children that participate in the program, Food Stamps play a crucial role in their total resources (Moffitt, 2013; The Center on Budget and Policy Priorities, 2013; Murray, 2011). Ignoring behavioral responses, if benefits were counted at their cash-equivalent value, they would reduce the poverty rate among participants by 16% in 2011 (Food Research and Action Center, 2012). 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, as well as the *benefits* of the program, especially the effects of the program on families' nutrition and children's outcomes (Hoynes and Schanzenbach, 2015). Concerns over increased spending resulted in several cuts to Food Stamp generosity in the past several years (Dean and Rosenbaum, 2013; Chokshi, 2014), with potentially larger cuts on the horizon (Grovum, 2014; Dewey and Jan, 2017; Parrott, Gonzales and Schott, 2018).

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 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-

[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.

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 demographics of the 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, Forthcoming; Ziliak, 2015). Therefore, 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.[2] 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. 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

[2]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).

the Food Stamp program.[3] 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 similar. 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 significantly reduces the benefit amount families are eligible to receive, because this amount is a function of the number of eligible household members. 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–a group with high rates of Food Stamp receipt. With the 1995-2007 Annual Social and Economic Supplement (ASEC) to the Current Population Survey (CPS), I find that the changes in parental eligibility led to large changes in program receipt–loss of parental eligibility reduced participation by 50% and average benefits received by 36%.

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

[3]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.

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 improves health in the medium-run. There are statistically significant decreases in the likelihood the child is reported in "Poor", "Fair", or "Good" health (relative to "Very Good" or "Excellent") and in an index of negative developmental health outcomes. Point estimates on indices of physical and mental health suggest potential improvements in these outcomes, although the confidence intervals on all health outcomes are wide, and for these outcomes I cannot rule out meaningful effects in either direction. 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, summarized by Almond, Currie and Duque (2017). In this paper, I focus on a key program in the modern safety net, and the findings illustrate that near-cash programs have large beneficial effects on modern children's medium-run health outcomes.[4] Moreover, understanding the medium-run effects is important because this impacts welfare analysis of early-life

[4]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.

interventions, and provides insight into the mechanisms behind long-run effects.

The rest of the paper proceeds as follows. Section II describes the Food Stamp program and the related literature. I describe the primary data in section III. Section IV outlines the empirical strategy. I discuss the results in section V. Section VI concludes.

II Background

Food Stamp benefits are available to families with total family income below 130% of the poverty line, regardless of their size or household structure, and are intended to allow families to maintain a minimum level of adequate nutrition. Eligible family's benefit amount is a function of their resources and a maximum benefit, the latter of which is a function of the number of eligible members in the family. Typically all members of the family are eligible, but as I describe in 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 Online 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: 1) the importance of periods after the in utero one for also determining long-run outcomes, and 2) 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). While the exact mechanisms are still unclear, one candidate mechanism is children's hypothalamic-pituitary-adrenal (HPA) system. The HPA system is responsible for, among other things, children's stress and emotional regulation, so dysregulation of the HPA system could affect childhood mental illness (e.g. ADHD). Notably, lack of nutrition during pregnancy and through the 18th postnatal month can lead to dysregulation of the HPA system (Kapoor et al., 2006; Lewis et al., 2014). Despite these theories, 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 important evidence by looking at outcomes in the medium-run.

In addition to effects on nutrition, access to Food Stamps represents a large increase in overall family resources, which may reduce stress in the family (Evans and Garthwaite, 2014). Stress is in turn linked to improved cognitive outcomes for children, through both biological and behavioral channels (Lewis et al., 2014). For example, elevated levels of cortisol that can arise as the result of stress are also linked to dysregulation of the HPA system (Kapoor et al., 2006). The boost in family resources may also result in increases in other forms of investment in children's health (e.g. health care). A final potential mechanism is the reduction in parental labor supply accompanying Food Stamp access (Hoynes and Schanzenbach, 2012; East, 2018). 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 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 low birth weight, and Hoynes, Schanzenbach and Almond (2016) build off of this by examining how Food Stamp access from in utero to age five impacts adult outcomes. They find more Food Stamp exposure in early-life causes statistically significant reductions in "metabolic syndrome" (obesity, high blood pressure, heart disease, heart attack, and diabetes) and, for women, improvements in labor market and educational outcomes.

Studies on more recent cohorts take several different approaches (summarized by Currie (2003) and Hoynes and Schanzenbach (2015)). Kreider et al. (2012) use bounding exercises to account for endogeneity in participation, as well as under-reporting of participation, and they cannot rule out positive or negative effects on children's health. Closer to my approach, Schmeiser (2012) uses changes in state-specific Food Stamp application procedures and vehicle ownership rules, as well as state EITC benefits, as instruments for Food Stamp participation and finds participation in the program reduces child BMI.

A Policy Changes Affecting Immigrants' Eligibility

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.[5] These nine "Fill-In" states were California, Connecticut, Maine, Massachusetts,

[5]E.g. 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).

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 in 2003 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.[6] I take advantage of all of these changes to estimate the effect of Food Stamps on children's health and show a timeline of how these policies affected children's eligibility in Figure (2).

Focusing on U.S.-born children means their parents lose eligibility, but they themselves remain eligible.[7] When family members become ineligible, the maximum Food Stamp benefit the family can receive falls significantly; e.g., for a family of 3, with one citizen child and two non-citizen parents, benefits could fall by up to $2400 annually in 1998$s (almost 66%).[8]

The Fill-In states are not randomly selected, so I test if state observable characteristics before PRWORA–political party, demographics, and attitudes towards immigrants–predict the provision of a fill-in program and find no evidence that they do (Online Appendix Tables (B.1), (B.2), (B.3)). In the regression models discussed below, I include state fixed effects, so of greater concern is if *time-varying* state characteristics are correlated with state fill-in programs. I examine if 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 Online Appendix Table (B.4), there is only 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.

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

[7]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.

[8]States had the option to discount 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). So, when eligibility was restored, if parents' earnings were substantially large, the benefit amount could actually decrease. Anecdotal evidence suggests that this was very rare: in one Texas region 5% of mixed citizenship households had benefits decline and 6% had benefits stay the same (Swarns, 1997).

Kalil and Ziol-Guest (2009) study the effect of welfare reform and find that, nationally, non-citizen immigrant children were more likely to be in contemporaneous parent-reported poor health, and more likely to have postponed 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. I build 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.

III 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 is a nationally representative cross-sectional survey and I use two of its components: 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.[9]

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 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.[10] Because of additional policy complexities, I also limit the sample to children

[9]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.

[10]Prior to PRWORA, 38% of immigrant households where the mother had a high school education or less,

whose mother and father (if present) are "treated immigrants"–where "treated immigrants" are defined as individuals who were born outside of the U.S. and entered the U.S. between 1985 and 1996. As part of welfare reform, immigrants who worked in the U.S. for 40+ quarters and met minimum earnings requirements in each quarter, were exempt from eligibility changes. I do not observe work history in the data, but I do observe year of entry to the U.S., so I use 1985 to approximate this work requirement, because individuals who entered the U.S. before 1985 (and lived in the U.S. at least 10 years) were more likely to have 40 quarters of work history by welfare reform passage. Additionally, 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. So, to more cleanly identify the effects of Food Stamps, I drop the children of these individuals. However, there are a number of measurement issues with reported year of entry to the U.S., therefore, these year of entry restrictions should be interpreted as only a rough proxy for those likely to have experienced Food Stamp eligibility changes, due to potential measurement error in this variable.[11]

Several other groups were exempted from these policy changes–veterans, refugees, asylees, and naturalized citizens–but, due to data limitations, I cannot condition on these other characteristics in early-life and this may lead to some measurement error.[12] However,

participated in the Food Stamp program, whereas 8% of similar households where the mother had more than a high school degree did. I also drop children who have one parent born in the U.S. and the other born outside the U.S.–about 5% of all children–as well as 1% of children who do not have their biological mother present in the household.

[11]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).

[12]In the ASEC, only 10% of young children of treated immigrants in this time period had a naturalized citizen mother. Additionally, less than 0.5% of these children have a parent who reports being a veteran and

this provides additional motivation for restricting the sample of treated immigrants to be relatively recent migrants, as earlier immigrants had more time to apply for and receive citizenship. 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 use parent-reported child health, overnight hospitalizations, number of school days missed, and 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 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 in "Poor" health (Currie and Stabile, 2003; Milligan and Stabile, 2011).[13] There are many outcome variables that capture physical, developmental, and mental health available in the NHIS, which raises issues of multiple inference, so I create three indices following Anderson (2008). The physical health index includes 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.[14] The developmental health index includes whether the child has ever been diagnosed with autism, a learning disability,

less than 4% have mothers from countries which sent more than 100 refugees or asylees in 1998 (Department of Homeland Security, 1998). Further, immigrants on temporary visas or undocumented were never eligible. 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.

[13]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 Online Appendix Table (B.5) 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.

[14]The NHIS measure of children's BMI is too limited to be used in this study (National Center for Health Statistics, 2016).

mental retardation, a developmental delay, or ADD/ADHD. Finally, the mental health index includes 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. I construct weights using the inverse of each group of outcomes' variance-covariance matrix to make 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 also a nationally representative cross-sectional survey. 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 (Schmidley and Robinson, 1998). 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 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 in the person file (about 9000) than in the sample child file (about 3600). To these data sets, I merge in state by year demographic characteristics, safety net policies, economic conditions, and attitudes towards immigrants. These auxiliary data sets are described in the Online Appendix.

IV Empirical Strategy

The primary analysis uses a double difference model, which takes advantage of the variation in eligibility among children of treated immigrants, depending on the child's year of birth and state of birth, shown in Figure (3). Using this variation, 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 ("TI") parents would have been eligible while 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 the family was "income-eligible" for the program). I control for demographic characteristics in X_{isbt}, including child gender, fixed effects for child age at survey, mother's age at 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. I account for fixed characteristics of the child's state of birth with birth state 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 of survey, Z_{st}.[15] I cluster standard errors at the state of birth level and I estimate linear probability models when the dependent variable is binary.

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 esti-

[15]The survey state and birth state 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.

mate analogous regressions as those described above, using variation in the state of *residence* and year of *observation* among children of treated immigrants:

$$Y_{ist} = \alpha + \mu TIElig_{st} + \gamma_1 X_{ist} + \gamma_2 Z_{st} + \nu_s + \lambda_t + \epsilon_{ist} \tag{2}$$

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 μ 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).

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. As one test of this assumption, I plot the difference in the average rates of "Poor", "Fair", or "Good" health across Fill-In and No-Fill-In states in Figure (4). Given the small sample sizes, this is shown for three-year moving averages, which pool three birth cohorts together. The difference in "Poor", "Fair", or "Good" health for children of treated immigrants (panel (a)) is relatively flat for the early birth cohorts, providing evidence of parallel pre-trends. As the difference in eligibility, shown in the dashed gray line in the figure, becomes larger and then smaller, the difference in health across the state groups also becomes larger and then smaller. Reassuringly, there is no evidence of changes in the health of children of natives that are commensurate with the Food Stamp eligibility changes, shown in panel (b).[16] Similar patterns are apparent in Food Stamp participation and benefit amount, shown in Appendix Figure (A.2). The difference in these outcomes across state groups is largely correspondent over time to the difference in eligibility for children of treated immigrants (and there is no similar difference for children of natives).

[16]The analogous plots for the three health indices are shown in Appendix Figure (A.1). Due to smaller sample sizes for these outcomes, these averages are more variable and harder to draw conclusions from.

V Results

A 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.

Among children of treated immigrants, parental eligibility increases participation by 8.0 percentage points ($p<0.01$), shown in in Panel A of Table (2). 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, in Panel B, eligibility increases benefits by \$185 annually 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 ASEC (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 in the Online Appendix, in discussing how to interpret the effects on child health in light of these takeup estimates.

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.[17] Therefore, changes in participation may be an important margin through which the effects on health operate. However, I am unable to distinguish whether the changes in participation are due to the costs of participating versus "chilling effects" (e.g. confusion about eligibility rules, complicated application procedures, and fear of participation affecting immigration status (Capps et al., 2004; Watson, 2014)).[18]

B 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), indicate improvements in health due to Food Stamp access.[19] 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 ($p<0.01$) and results in a decrease in the developmental health index of 0.08 standard deviations ($p<0.01$). The point estimates on the indices of physical health outcomes and mental health outcomes are also negative, but the confidence intervals on these estimates (shown in the table) are large enough that I cannot rule out meaningful effect sizes in either direction. To put the point estimates into context, I compare the estimated marginal effect of one additional year

[17]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 Online Appendix Table (B.6). 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.

[18]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. In addition, 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 Online Appendix Table (B.6). I detail in the Online Appendix the differences between my empirical strategy and those used in the "chilling effect" literature that explain the discrepancy between the findings.

[19]It is also possible to use the estimates from the ASEC to calculate the Treatment on the Treated effect, which I do in the Online Appendix.

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" health by about 5%. 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.[20] Although, again wide confidence intervals suggest caution in drawing strong conclusions as to the exact magnitude of the effect. Moreover, since family income and child health are strongly correlated (Case, Lubotsky and Paxson, 2002), the effect is likely smaller relative to baseline mean for individuals who received Food Stamps, who are more disadvantaged than the full sample. Since there are many outcome variables, I show the unadjusted p-values in the second column, and the p-values adjusted for multiple hypothesis testing (Romano and Wolf, 2005) in the third column ("Adj-P"). The overall conclusions are unchanged by this adjustment.

I next explore the effects on other health outcomes including the likelihood the child 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 not so once the adjustment for multiple hypothesis testing is conducted (shown in the table). Interestingly, there appears to be little effect on the likelihood of going to the doctor at all within a year in the medium-run, although the confidence intervals are again wide, and

[20] As shown in Appendix Table (A.1), 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.

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 point estimates are large, they are in line with others in the literature. Almond and Mazumder (2011) find that exposure to Ramadan 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 childhood outcomes. One such study is Persson and Rossin-Slater (2018) who examine the effects of maternal stress on children, and find that a maternal bereavement in utero increases the likelihood children will use ADHD medication in later childhood by 25%.

A final important point of comparison is Hoynes, Schanzenbach and Almond (2016), who look at the long-run effects of the Food Stamp roll-out in the 1960-70s. Their point estimates suggest one additional year of early life access reduces self-reported poor health in adulthood by 3%, compared to the point estimate here on parent-reported poor health of 5%. Although similar to my study, the confidence intervals in Hoynes, Schanzenbach and Almond are wide, and overlap with the ones here.

1 Sensitivity Analysis

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, this would bias the double difference estimates. But, if 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 brevity this is only shown 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. This regression 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 ($NumYrsTIElig(IU->4)_{sb}* KidsofTI_n$). I also include the appropriate two-way fixed effects: parents' treated immigrant status by birth state, and parents' treated immigrant status by birth year (and I make all the analogous changes in the ASEC analysis). The uninteracted term ($NumYrsTIElig(IU->4)_{sb}$) captures the effect of 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 ($NumYrsTIElig(IU->4)_{sb} * KidsofTI_n$), remain very similar to the baseline results. In column (3), in addition to the two-way fixed effects already described, I include state of birth by year of birth fixed effects. This is a fully interacted model, so I drop the uninteracted term ($NumYrsTIElig(IU->4)_{sb}$), 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 add state-year 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 (application recertification frequency, in-person applications or re-certification requirements, outreach spending, broad based categorical eligibility, vehicle asset rules, and whether benefits are issued on debit cards). 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.[21]

[21]The results are also similar in the NHIS if controls for these state characteristics in the *survey* year and

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 here comes only from across-cohort differences in eligibility across children of treated immigrants relative to children of natives. 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. Next, I test the robustness 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. Columns (4)-(5) of Table (5) show these are very similar to the baseline estimates. I also test the robustness of the results to the choice of year of entry cutoff that is a proxy for immigrants

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.

who do not meet the 40 quarters of work requirements (1985 in the main analysis). These checks shown in Online Appendix Figure (B.1) indicate the results are similar for other choices of cutoff year. Finally, I find no evidence of changes in the composition of children due to migration, fertility, or changes in their parents' citizenship status (Online Appendix Table (B.7)).

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 (overlapping) 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. I expect that the more disadvantaged groups–less educated, 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, μ 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 larger for the more disadvantaged 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".

3 Mechanisms

To shed light on the potential mechanisms, I explore whether access to Food Stamps in utero improves health outcomes at birth, which would suggest the medium-run health effects could be driven in individuals' initial health "stock" (Currie, 2009). To do this I use the national Vital Statistics data, described in detail in the Online 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. I estimate the effect of mother's eligibility in the third trimester–the most important for nutrient intake (Rush, Stein and Susser, 1979)–on 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). I show the results 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 ($p<0.01$). In percentage terms this is a change of 1% and .2%, respectively, which is quite similar to the intent to treat estimates in Almond, Hoynes and Schanzenbach (2011).

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 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. Interestingly, low birth weight is associated with dysregulation of the HPA system (Ward et al., 2004), which is one potential mechanism that could explain the medium-run effects. 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 utero and the medium-run are related and suggestive of potential biological mechanisms, I am cautious about concluding 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)).

Another 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 Online 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. 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.

C 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 (calculations described in detail in the Online Appendix). 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.[22] The benefits captured through parent-reported health may accrue to different sources: first, a reduction in medical costs 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. However, there may be more benefits (e.g. increases in lifetime earnings due to the reduction in poor health) as well as additional costs (e.g. labor supply disincentives) not studied here.

VI Conclusion

This paper studies the short and medium-run effects of immigrants' access to Food Stamps. The loss of parental Food Stamp eligibility has a large effect on contemporaneous Food Stamp receipt, and loss of parental eligibility before age 5 negatively affects children's health in the medium-run at ages 6-16. These results are robust to a number of tests including adding natives as a control group, and accounting for a variety of other state by year characteristics. These findings support the theories that changes in nutrition and resources in the first

[22] In 2009, the administrative costs of Food Stamps were $45 per participating household (United States Department of Agriculture, 2011) and I estimate the average cost per family of making parents eligible is $308 per year (this adjusts for under-reporting described in the Online Appendix). Note that this calculation relies on the point estimates, which are not always precisely estimated.

few years of life can have lasting effects on children's health. The results on infant health suggest biological channels may be a factor driving the results in school-age, although lack of data prevents me from drawing strong conclusions about which are the most important mechanisms.

This analysis also contributes to the understanding of the modern Food Stamp program. Food Stamps grew 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. The efficacy of the Food Stamp program is still contentious, and changes to the program are currently being proposed. Moreover, many of the proposed changes specifically target immigrants, so understanding the effects of previous restrictions in immigrants' access is crucially important. The program likely has other benefits, but through the outcomes studied here, the results suggest important reductions in medical expenditures as the result of early-life Food Stamp access.

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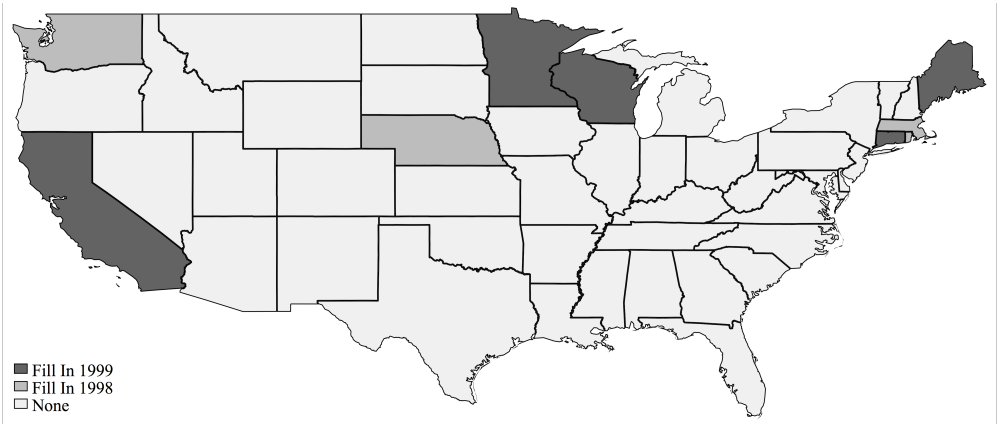
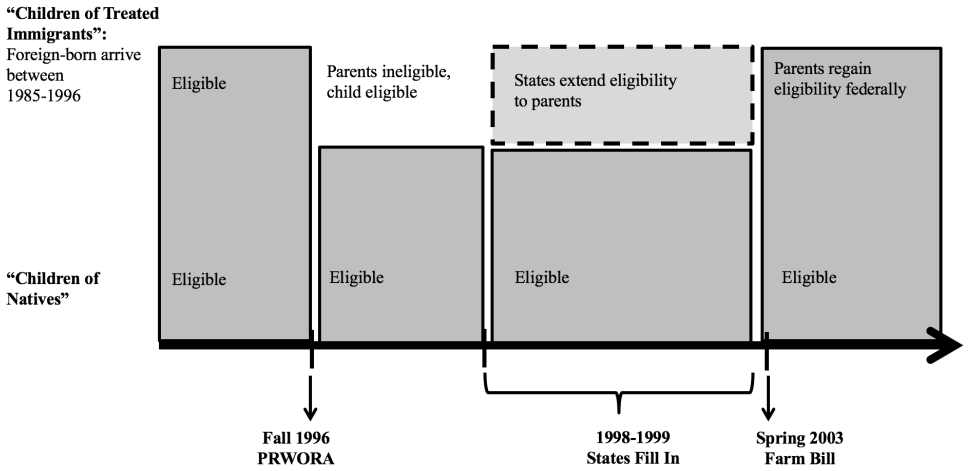
Figure 1: States that Chose to Fill In Food Stamps for Immigrants



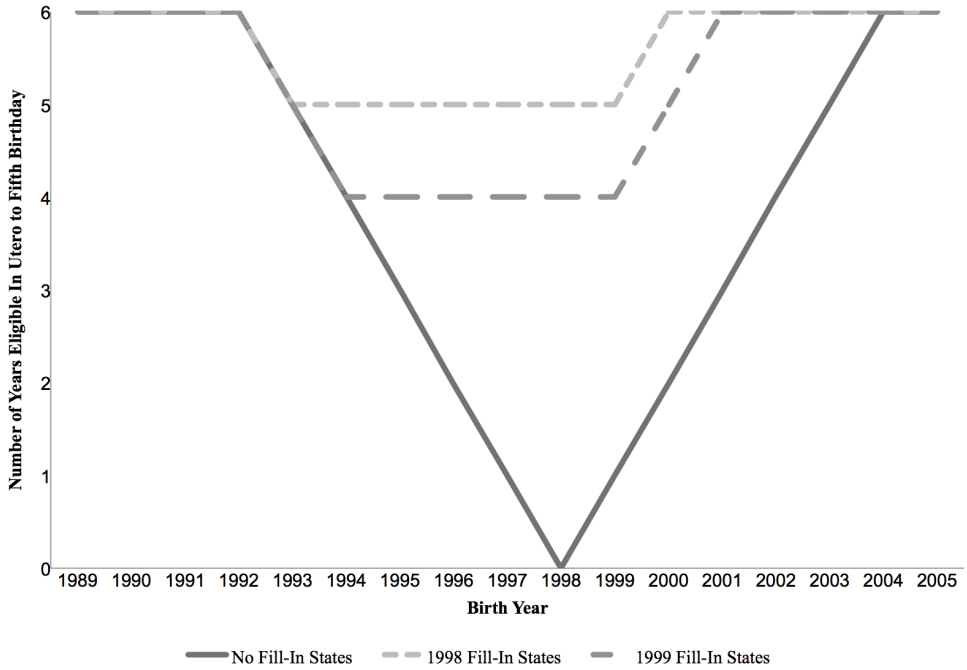
Notes: States are classified based on their availability of a Food Stamp fill-in program in January, February or March of a given year. Only fill-in programs that provided benefits to children and their parents are included here and fill-in programs for the elderly are not included. In addition, states 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..

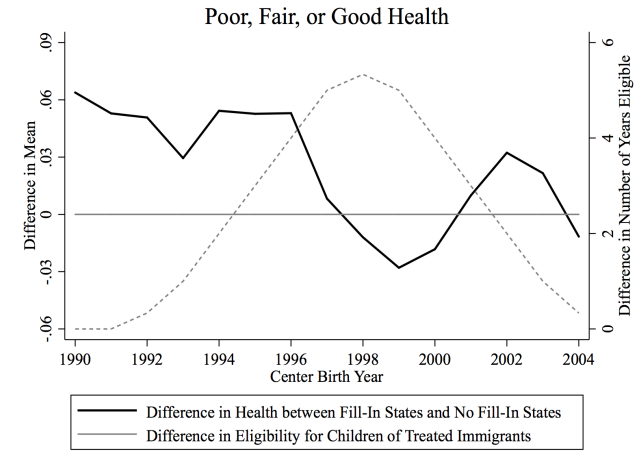
Figure 3: Eligibility for Food Stamps Among Children of Treated Immigrants by Birth Year



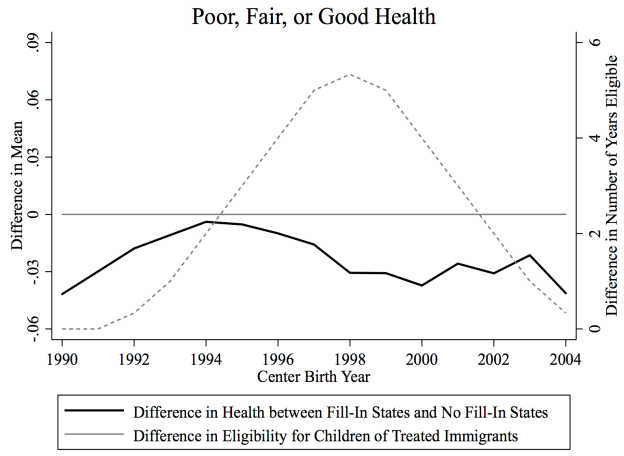
Notes: States are classified based on their availability of a Food Stamp fill-in program in January, February or March of a given year. 1998 Fill-In States are Massachusetts, Nebraska, Rhode Island, and Washington. 1999 Fill-In States are California, Connecticut, Maine, Minnesota, and Wisconsin. The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

Figure 4: Difference in "Poor", "Fair" or "Good" Health between Fill-In and No-Fill-In States

(a) Treated Immigrants



(b) Natives

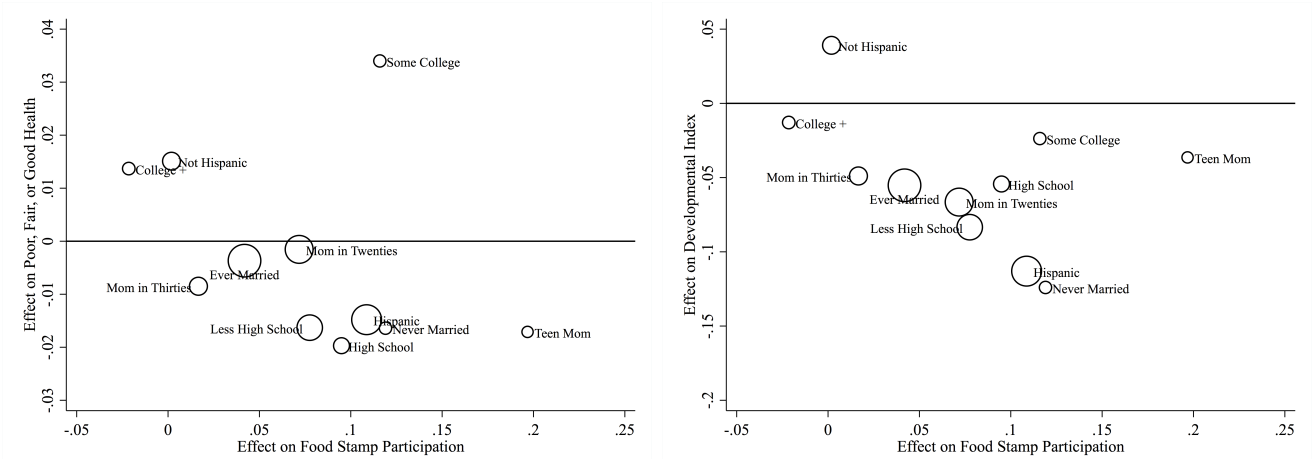


Notes: Data from the 1998-2015 National Health Interview Survey. The sample includes children born in the U.S. in 1989-2005 and ages 6-16, whose mothers have a high school education or less. Children of treated immigrants defined as those whose parents were born outside of the U.S. and who immigrated 1985-1996. Children of natives defined as those whose parents were born in the U.S.. The solid black line indicates the difference in health outcomes between Fill-In and No-Fill-In states for centered three-year moving averages. The center birth year for each three-year average is denoted on the x-axis. The dotted gray line indicates the average difference in the number of years 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, for the three-year moving averages. The solid gray line is plotted at the zero point on the left-hand side axis. Columns (a) and (b) display this difference for children of treated immigrants and children of natives, respectively. The results are weighted using the NHIS-provided weights.

Figure 5: Subgroup Estimates: Food Stamp Participation and Health

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

(b) Developmental Health Index and Food Stamp Participation

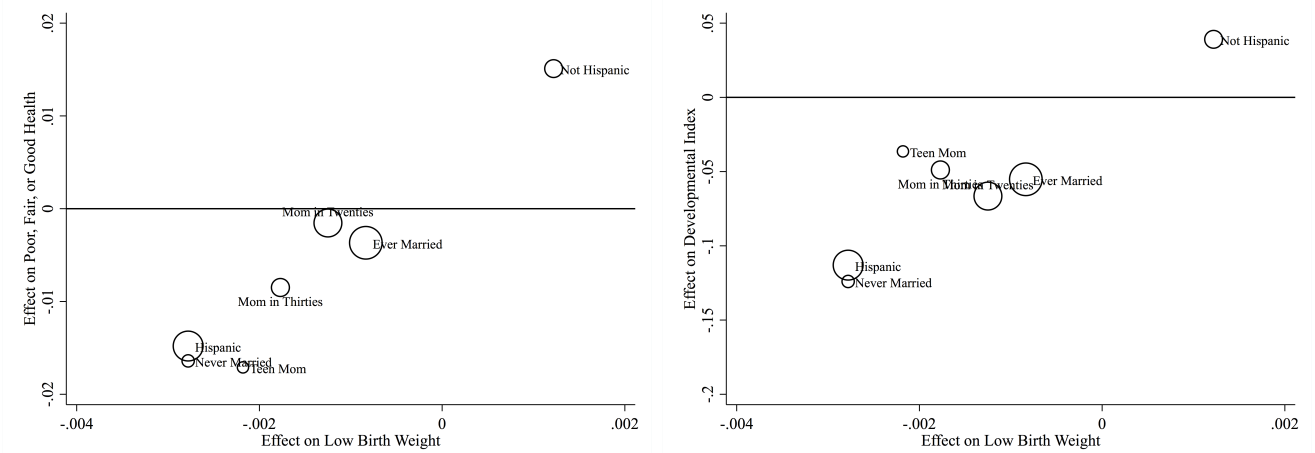


Notes: Estimates on the y-axis are from the 1998-2015 National Health Interview Survey and the sample includes children born in the U.S. in 1989-2005 and between the ages of 6 and 16. Estimates on the x-axis are from the 1995-2007 Annual Social and Economic Supplement to the CPS and the sample includes 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: Infant and Medium-Run Health

(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***	Confidence Interval = [0.044, 0.115]
	(0.018)	
Mean Y	0.25	
N	5949	
B: Food Stamp Benefit Amt		
T.I. Elig	184.781**	Confidence Interval = [23.473, 348.089]
	(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***	Confidence Interval = [-0.060, -0.013]
	(0.012)	P=0.00 Adj-P=0.06
Mean Y	1.9	
Observations	9072	
D: "Poor" , "Fair", or "Good" Health		
Num Yrs T.I. Elig Ages IU− >4	-0.017***	Confidence Interval = [-0.027, -0.007]
	(0.005)	P=0.00 Adj-P=0.05
Mean Y	0.29	
Observations	9072	
E: Physical Health Index		
Num Yrs T.I. Elig Ages IU− >4	-0.003	Confidence Interval = [-0.034, 0.029]
	(0.016)	P=0.83 Adj-P=0.83
Mean Y	-0.03	
Observations	3271	
F: Developmental Health Index		
Num Yrs T.I. Elig Ages IU− >4	-0.076***	Confidence Interval = [-0.123, -0.029]
	(0.024)	P=0.00 Adj-P=0.06
Mean Y	0.04	
Observations	3635	
G: Mental Health Index		
Num Yrs T.I. Elig Ages IU− >4	-0.013	Confidence Interval = [-0.050, 0.024]
	(0.019)	P=0.52 Adj-P=0.72
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	Confidence Interval = [-0.006, 0.002]	
	(0.002)	P=0.39	Adj-P=0.62
Mean Y	0.01		
Observations	9069		
B: School Days Missed			
Num Yrs T.I. Elig Ages IU− >4	-0.032	Confidence Interval = [-0.204, 0.140]	
	(0.088)	P=0.71	Adj-P=0.90
Mean Y	2.5		
Observations	3603		
C: Chronic School Absence (>15 days)			
Num Yrs T.I. Elig Ages IU− >4	-0.005**	Confidence Interval = [-0.009, -0.001]	
	(0.002)	P=0.03	Adj-P=0.15
Mean Y	0.02		
Observations	3603		
D: Any Doctor Visits in Past 12 Months			
Num Yrs T.I. Elig Ages IU− >4	0.003	Confidence Interval = [-0.020, 0.027]	
	(0.012)	P=0.95	Adj-P=0.94
Mean Y	0.80		
Observations	3615		
E: 2+ Doctor Visits in Past 12 Months			
Num Yrs T.I. Elig Ages IU− >4	-0.010	Confidence Interval = [-0.026, 0.006]	
	(0.008)	P=0.18	Adj-P=0.41
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 to Including Natives as Controls and Other State by Year Variables

	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 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 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: Robustness to Alternative Parental Eligibility Rules and Eligibility at Different Child Ages

	(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

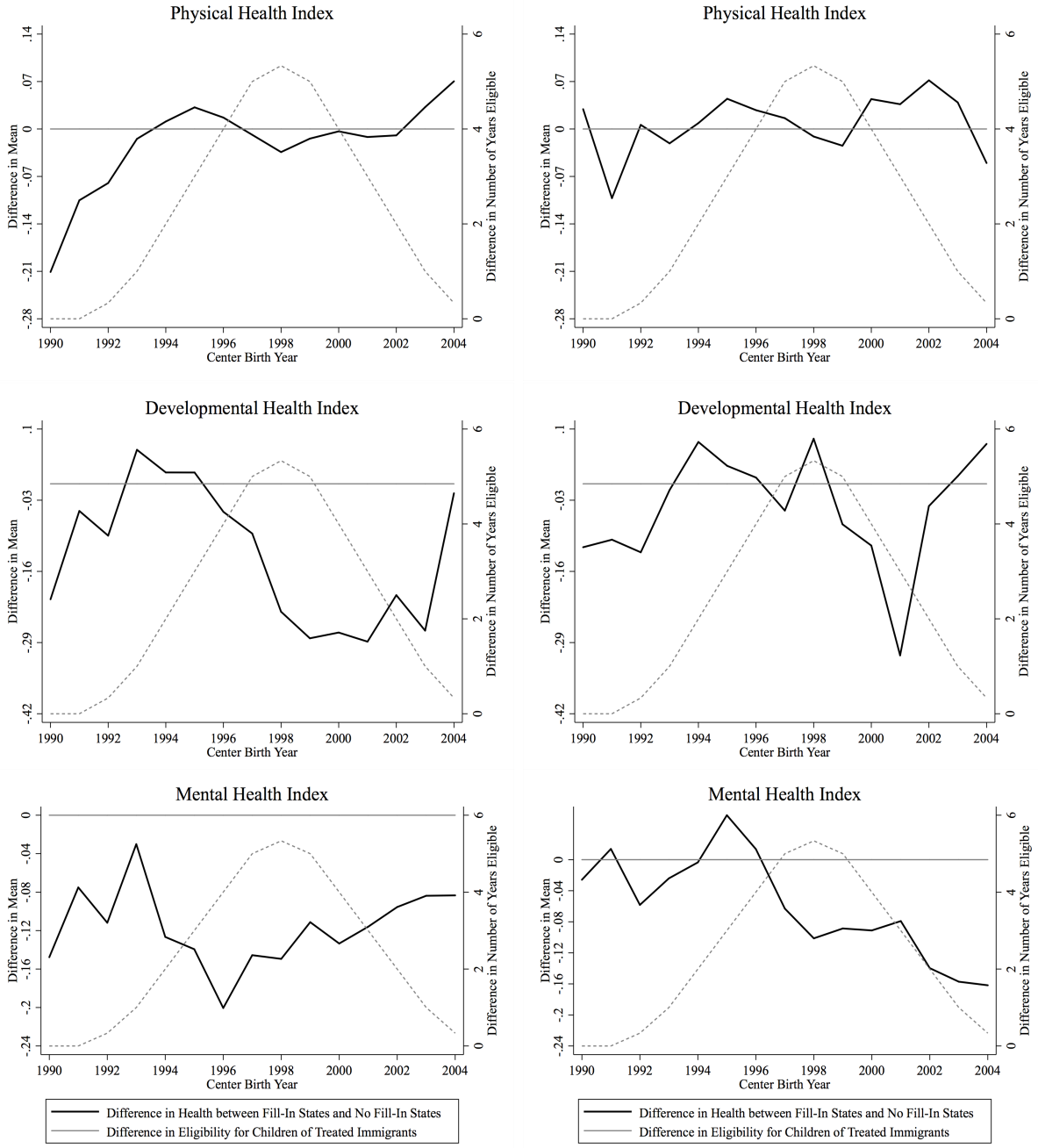
National Vital Statistics	
A: Average Birth Weight	
T.I. Elig 3rd Trimester	6.52***
	(2.96)
Mean Y	3295
Observations	4896
B: Low Birth Weight	
T.I. Elig 3rd Trimester	-0.001***
	(0.001)
Mean Y	0.07
Observations	4896
CPS Food Security Supplment	
C: Food Stamp Participation	
T.I. Elig	0.0927*
	(0.0509)
Mean Y	0.15
Observations	685
D: Log of Weekly Food Consumption	
T.I. Elig	0.0906
	(0.0854)
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

1 Appendix: Additional Results

Figure A.1: Difference in Health Indices between Fill-In and No-Fill-In States

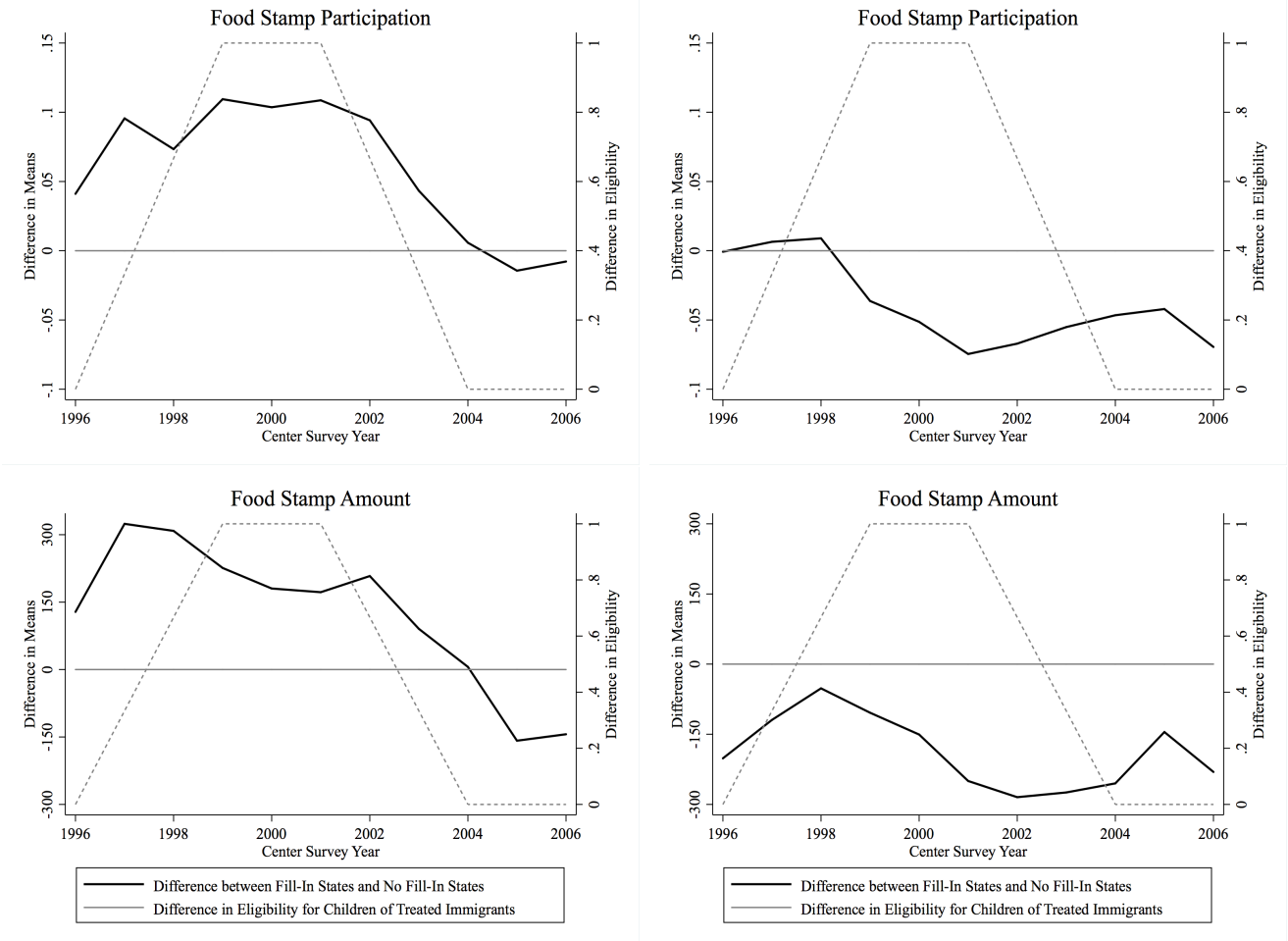
(a) Treated Immigrants **(b)** Natives



Notes: Data from the 1998-2015 National Health Interview Survey. The sample includes children born in the U.S. in 1989-2005 and ages 6-16, 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 1985-1996. Children of natives defined as those whose parents were born in the U.S.. The solid black line indicates the difference in health outcomes between Fill-In and No-Fill-In states for centered three-year moving averages. The center birth year for each three-year average is denoted on the x-axis. The dotted gray line indicates the average difference in the number of years 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, for the three-year moving averages. The solid gray line is plotted at the zero point on the left-hand side axis. Columns (a) and (b) display this difference for children of treated immigrants and children of natives, respectively. The results are weighted using the NHIS-provided weights.

Figure A.2: Difference in Food Stamp Participation and Benefit Amount Received between Fill-In and No-Fill-In States

(a) Treated Immigrants **(b)** Natives



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. Children of natives defined as those whose parents were born in the U.S.. The solid black line indicates the difference in outcomes between Fill-In and No-Fill-In states for centered three-year moving averages. The center survey year for each three-year average is denoted on the x-axis. The dotted gray line indicates the average difference in eligibility between Fill-In and No-Fill-In states for children of treated immigrants for the three-year averages. The solid gray line is plotted at the zero point on the left-hand side axis. Columns (a) and (b) display this difference for children of treated immigrants and children of natives, respectively. The results are weighted using the CPS-provided weights.

Table A.1: 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