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ABSTRACT

The Supplemental Nutrition Assistance Program (SNAP, formerly food stamps) is one of the most important elements of the social safety net. Unlike most other safety net programs, SNAP varies little across states and over time, which creates challenges for quasi-experimental evaluation. Notably, SNAP benefits are fixed across 48 states; but local food prices vary, leading to geographic variation in the real value – or purchasing power – of SNAP benefits. In this study, we provide the first estimates that leverage variation in SNAP purchasing power across markets to examine effects of SNAP on child health. We link panel data on regional food prices to National Health Interview Survey data and use a fixed effects framework to estimate the relationship between local purchasing power of SNAP and children's health and health care utilization. We find that lower SNAP purchasing power leads to lower utilization of preventive health care and more days of school missed due to illness. We find no effect on reported health status.

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1 Introduction

The Supplemental Nutrition Assistance Program (SNAP, formerly the Food Stamp program) is the largest food assistance program and one of the largest safety net programs in the United States.[1] SNAP plays a crucial role in reducing poverty for children in the U.S., with only the EITC (combined with the Child Tax Credit) raising more children above poverty (Fox 2017). Eligibility for the program is universal in that it depends only on a family's income and assets; in 2015, 1 in 7 Americans received SNAP benefits (Ziliak 2015).

SNAP's primary goals are to improve food security among low-income households, reduce hunger, and increase access to a healthful diet.[2] The extant literature demonstrates that the program succeeds in reducing food insecurity among recipient households (see, e.g., Yen et al. 2008; Nord and Golla 2009; Mykerezi and Mills 2010; Ratcliffe, McKernan, and Zhang 2011; Shaefer and Gutierrez 2011; Schmidt, Shore-Sheppard, and Watson 2016 and the recent review by Hoynes and Schanzenbach 2016). Nonetheless, rates of food insecurity among SNAP households remain quite high, raising the question of whether SNAP benefits are adequate to meet the nutritional needs of recipients (Coleman-Jensen et al. 2012). Indeed, evidence regarding how SNAP benefits impact recipients' nutrition is more mixed (see, e.g., Yen 2010; Gregory et al. 2013; Bronchetti, Christensen, and Hansen 2017b).

Our study provides unique and highly policy-relevant evidence on the impact of variation in

[1] SNAP benefits paid in 2016 amounted to more than 66 billion dollars. The program has also grown dramatically in the years since 1996 welfare reform, with benefits paid out almost tripling in real terms over the years in this study (1999-2010).

[2] See, for example, the most recently amended authorizing legislation, the Food and Nutrition Act of 2008, available at https://fns-prod.azureedge.net/sites/default/files/snap/Food-And-Nutrition-Act-2008.pdf.

the generosity of SNAP benefit levels on child health. Estimating the causal relationship between SNAP and health is difficult because SNAP benefits and eligibility rules are legislated at the federal level and do not vary across states, leaving few opportunities for quasi-experimental analysis. One set of quasi-experimental studies analyzes the rollout of the food stamp program across counties in the 1960s and 1970s and finds that food stamps leads to significant improvements in birth outcomes (Currie and Moretti 2008; Almond, Hoynes, and Schanzenbach 2011) and access to food stamps in early childhood leads to significant improvements in adult health (Hoynes, Schanzenbach, and Almond 2016). A second set of studies uses recent state changes in application procedures (e.g. allowing online applications, whether there is a finger printing requirement) as instruments for SNAP participation (Schmeiser 2012),[3] though these state policies had relatively small effects on participation (Ziliak 2015). A third approach is taken by East (2016), who uses variation in eligibility for SNAP generated by welfare reform legislation in the 1990s, and finds that SNAP in early childhood leads to improvements in health status at ages 6-16. None of these studies, however, is able to shed light on how changes to legislated SNAP benefit levels might impact health outcomes.

Our approach leverages plausibly exogenous geographic variation in the *real value of SNAP benefits* to identify the effects of variation in SNAP generosity on health for a sample of children in SNAP households. Importantly, the SNAP benefit formula is fixed across 48 states (benefits are higher in Alaska and Hawaii) even though the price of food varies significantly across the

[3] Gregory and Deb (2015) use the Medical Expenditure Panel Survey and state policy variables and find that SNAP participants have fewer sick days and fewer doctor's visits, but more checkup visits.

country (Todd et al. 2010; Todd, Leibtag, and Penberthy 2011).[4] Across the continental U.S., maximum benefits vary only with family size; in 2018 a family of three is eligible for a maximum benefit of $504/month regardless of the local cost of living. Though SNAP benefits are implicitly adjusted for variation in the cost of living through allowed deductions (e.g., for housing, and child care) in the calculation of net income, the limited available evidence indicates these adjustments are not sufficient to equalize *real* benefits, particularly in high cost areas (Breen et al. 2011). Gundersen, Kreider, and Pepper (2011) and the Institute of Medicine (2013) propose this as an area for future research.

Higher SNAP purchasing power may impact children's health through three possible channels. A direct (nutrition) effect occurs if higher SNAP purchasing power leads to increases in the quality or quantity of food. But higher SNAP purchasing power may also impact health indirectly, facilitating households to increase consumption of other inputs into the health production function, like health care. Finally, if additional SNAP purchasing power leads to reductions in stress and "bandwidth poverty" (Bertrand et al 2004, Mullainathan and Shafir 2013), it may result in better compliance with activities such as getting children to school and to the doctor for annual exams.

Linking nationally representative data from the 1999-2010 National Health Interview Surveys (NHIS) to information on regional food prices from the Quarterly Food-at-home Price Database (QFAHPD), we study the effect of variation in SNAP purchasing power on children's health care utilization and health. Our measure of SNAP purchasing power compares the

[4] Studying data from the Quarterly Food at Home Price Database (QFAHPD), Todd et al. (2011) find that regional food prices vary from 70 to 90 percent of the national average at the low end to 120 to 140 percent at the high end.

maximum SNAP benefit to the regional cost of the Thrifty Food Plan (TFP), a nutrition plan constructed by the USDA to represent a nutritious diet at minimal cost and the basis for maximum legislated SNAP benefits (i.e., maximum benefits are set to the TFP national average cost). The QFAHPD includes information on food prices that allows us to construct an estimated TFP price for each of 30 designated "market group" geographic areas across the U.S. We relate child health care utilization and health outcomes to SNAP purchasing power (i.e., the ratio of the national SNAP maximum benefit to the market group-level TFP price faced by a household) in a fixed effects framework that controls for a number of individual-level and region characteristics (including non-food prices in the area) and state policy variables. Identification comes from differences across the 30 market groups in trends in the price of the TFP.

Our study contributes to the growing body of evidence on the SNAP program and its effects in a few key ways. First, we provide new evidence on the relationship between SNAP benefit generosity and the health and wellbeing of the SNAP population. Our findings consistently indicate that children in market groups with lower purchasing power of SNAP utilize less preventive/ambulatory health care. We find that a 10 percent increase in SNAP purchasing power raises the likelihood a child has an annual checkup by 6.3 percentage points (8.1 percent) and the likelihood of *any* doctor's visit by 3.1 percentage points (3.4 percent). While lower real SNAP benefits do not result in significant declines in reported health status, we document significant detrimental impacts on some health indicators, like the number of school days missed due to illness, as well as on children's food security. Summary indices corroborate the existence of effects on health care utilization, but not health outcomes generally. We confirm that these effects are not driven by relationships between geographic variation in food

prices and SNAP participation or health insurance coverage, nor are they present in placebo samples of somewhat higher-income children and noncitizen children (who are ineligible for SNAP).

A second contribution is methodological, in that our approach highlights a new identification strategy for estimating effects of proposed changes in SNAP generosity on other outcomes of interest. To our knowledge, ours is the first study to utilize variation in the real value of SNAP as a source of identification.[5] Future research could leverage geographic variation in SNAP purchasing to examine SNAP's impacts on nutrition, food consumption and other spending patterns, birth outcomes, and adult health.[6]

We interpret our estimates as reflecting the impacts of variation in SNAP purchasing power, rather than simply the effects of variation in local food prices.[7] Variation in real SNAP generosity may affect households differently than variation in prices to the extent that local earnings adjust to account for higher local prices (Roback 1982; Albouy 2008; Moretti 2013), while SNAP benefits do not. Indeed, we demonstrate that SNAP purchasing power does not significantly impact our key health outcomes or food insecurity for samples that are ineligible for SNAP or have very low SNAP utilization (e.g., non-citizen children, children in families with incomes between 300 and 450 percent of the poverty line). Additionally, while our main models include controls for regional prices of other goods (such as housing, energy, transportation,

[5] In related work, Gregory and Coleman-Jensen (2013) study the direct relationship between local food prices and food insecurity for a sample of SNAP households. The authors find that SNAP participants in high-priced areas are 15-20 percent more likely to be food insecure than those in low-priced areas.

[6] Bronchetti, Christensen, and Hansen (2017b) link National Household Food Acquisition and Purchase Survey (FoodAPS) data on SNAP recipients' diets to local data on the cost of the TFP to study the effects of variation in SNAP purchasing power on nutrition among the SNAP population.

[7] Throughout, our models include market area fixed effects and controls for local housing costs (HUD fair market rent) and other non-food prices.

etc.), our results are robust to the inclusion of these factors, suggesting that we are not simply capturing the broader effects of living in a more or less expensive market.

More broadly, our findings point to sizeable, beneficial impacts of SNAP (and of increasing the generosity of SNAP benefits) for children's health care utilization, food security, and some measures of their health, benefits which should be weighed carefully against the cost savings of any proposed cuts to the SNAP program. These results also shed light on the expected impact of adjusting benefit levels to account for geographic variation in food prices across market groups. Such adjustments would likely reduce disparities in preventive/ambulatory care, school absenteeism, and food security among low-income children, but may not lead to contemporaneous changes in other health outcomes.

The paper proceeds as follows. The next section describes our multiple sources of data on regional food prices, child health, food security, and SNAP participation, and Section 3 lays out our empirical approach. Section 4 presents our main results regarding the impact of SNAP purchasing power on children's health care utilization and health, Section 5 explores mechanisms and several robustness checks, and Section 6 concludes.

2 Data

In this study, we combine three sets of data to estimate the effect of SNAP on children's health. Below we describe the data on the price of the TFP, the National Health Interview Survey, and the state and county control variables. Additionally, we supplement our main analysis with administrative data on SNAP caseloads and household-level data on food insecurity from the December Current Population Survey (CPS).

2.1 Regional Cost of the Thrifty Food Plan (TFP)

The Thrifty Food Plan (TFP) is a food plan constructed by the USDA, specifying foods and amounts that represent a nutritious diet at a minimal cost. The TFP is used as the basis for legislated maximum SNAP benefit levels. In 2016, the U.S. average weekly TFP cost was $146.90 for a family of four with two adults and two children (ages 6-8 and 9-11).[8]

To assign food prices to our sample of households in the NHIS, we construct data on the regional price of the TFP using the Quarterly Food-at-Home Price Database (QFAHPD) (Todd et al. 2010) for the years from 1999 through 2010. The QFAHPD, created by the USDA's Economic Research Service, uses Nielsen scanner data to compute quarterly estimates of the price of 52 food categories (e.g. three categories of fruit: fresh or frozen fruit, canned fruit, fruit juices; nine categories of vegetables, etc.) for 35 regional market groups. The 35 market groups covered in the QFAHPD include 26 metropolitan areas and 9 nonmetropolitan areas, though for 1999-2001 only 4 nonmetropolitan areas are captured.[9] Each market group consists of a combination of counties. We map the 52 QFAHPD food categories to the 29 TFP food categories to create a single price estimate for the TFP for each market group and year during the full 1999-2010 period covered by the QFAHPD, following the methods in Gregory and Coleman-

[8] See https://www.cnpp.usda.gov/sites/default/files/CostofFoodNov2016.pdf. (Accessed 1/28/17)

[9] In 1999-2001, the QFAHPD identified one nonmetropolitan area for each of the 4 census regions (east, central, south and west). In 2002 and later, they expanded to include nonmetropolitan areas in each of the 9 census divisions: New England, Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain and Pacific. For comparability we use the four nonmetropolitan areas throughout. Appendix figure 1 shows these market groups.

Jensen (2013).[10, 11]

To map the QFAHPD food group prices to the TFP food group prices in the market basket, we use an expenditure-weighted average of the prices for the QFAHPD foods, where the weights are the expenditure shares for the QFAHPD foods within each TFP category (most TFP food categories consist of multiple QFAHPD food groups). We construct *national* expenditure shares by averaging the shares across all market groups. To avoid confounding regional variation in food prices with regional variation in consumption of different food categories, we apply these *national* expenditure shares to each market group's prices when constructing the market group-level cost of the TFP.[12, 13] We use the 2006 specification of the TFP, which features food categories that are relatively closely aligned with the food categories in the QFAHPD data (Carlson et al. 2007).

We assign each household in the NHIS to a market group-level TFP price based on the county of residence and the year of interview. When estimating the relationship between the

[10] We come very close to reproducing their estimates. As in this earlier work, we can cleanly link the QFAHPD categories to 23 of the 29 TFP categories without duplication or overlap of QFAHPD prices. The remaining six TFP categories contain foods that are accounted for in other parts of the QFAHPD TFP basket. For details on the construction of the TFP itself, see Carlson et al. (2007).

[11] There are two versions of the QFAHPD: QFAHPD-1, which provides price data on 52 food groups for 1999-2006, and QFAHPD-2, which includes prices for 54 food groups for 2004-2010. We bridge the two series by estimating the average ratio of QFAHPD-1 to QFAHPD-2 for years 2004 through 2006 for each market group. We then divide the price data for 1999-2003 (i.e. the years with information on only 52 food groups) by this ratio to put everything in consistent units.

[12] We have also constructed measures of TFP cost using total national expenditure shares (as opposed to averaging the weights across market groups) and obtain very similar estimates of the TFP and effect sizes.

[13] An example (borrowed from Gregory and Coleman-Jensen (2013)) is illustrative. The TFP food category "whole fruit" consists of two QFAHPD food groups: "fresh/frozen fruit" and "canned fruit." In Hartford (market group 1) in the first quarter of 2002, expenditures on fresh/frozen fruit were $35.7 million, and expenditures on canned fruit were $5.8 million. This yields expenditure weights for whole fruit (in Hartford in quarter 1 2002) of 0.86 and 0.13, respectively. We then average these expenditure shares across *all market groups* to generate the national expenditure shares (for each item and period). In 2002, these national expenditure weights are 0.84 and 0.16 for fresh fruit and canned fruit, respectively. We apply these shares to the first-quarter 2002 prices of fresh/frozen and canned fruit in the Hartford market group ($0.218 and $0.244 per 100 grams, respectively) to compute a price for whole fruit in Hartford for the first quarter of 2002 (0.84×$0.218+0.16×$0.244 = $0.222 per 100 grams).

real value of SNAP benefits and health, we measure the purchasing power of SNAP using the ratio of the maximum SNAP benefit to the TFP price faced by the household. Our main regression models use the natural log of this ratio as the key independent variable for ease of interpretation; however, results are qualitatively very similar when the level of the ratio is employed instead.[14]

Figure 1 illustrates the variation across regions and over time in the real value of SNAP, equal to the maximum SNAP benefit for a family of 4 divided by the regional cost of the TFP.[15] Panel A displays the value of this ratio in 1999, Panel B shows its value in 2008, and Panel C shows its value in 2010. In each case, a darker shading represents a higher SNAP/TFP ratio, or greater SNAP purchasing power. In lower-cost areas the SNAP benefit covers up to 80 percent of the cost of the TFP, while in higher cost areas (e.g., the west and northeast) this ratio falls to less than 65 percent. Note that since the statutory TFP is constructed using a national average, some areas are, by definition, likely to have SNAP benefits that exceed the cost of the TFP. However, our purchasing power measure (maximum SNAP benefit/price of TFP) is less than 1 for all market groups. One reason for this is that the regional TFP prices from the QFAHPD are based on average prices paid for each food category by all consumers, whereas the statutory TFP price is based on prices paid by low-income persons. If low-income households are shopping at different stores, or buying on sale or buying cheaper (e.g., store) brands, then the TFP price we estimate using the QFAHPD will consistently be too high.

Our identification strategy relies not on the exact level of the TFP price (or SNAP purchasing

[14] These results are available upon request.
[15] An interactive version of this figure is available online at http://garretchristensen.shinyapps.io/Food_Price_Maps.

power), but on the relative generosity across markets and differences across markets in trends in SNAP purchasing power. Figure 2 demonstrates a strong, positive correlation between the market area price paid by low-income households and the market area all-household price, for a variety of food categories. In Appendix Figure 2, we compare our estimated TFP price to a lowest-cost TFP price measure, by market area, which we construct using only the lowest-cost QFAHPD food category within each TFP category (similar to how the statutory TFP price is calculated). Reassuringly, we find a strong correlation (0.98) between our index and this lowest-cost alternate measure across market areas.

Figure 1 also demonstrates noticeable *changes* in SNAP purchasing power within regions over the 1999 – 2010 period. The changes in 2010 reflect, in part, the effect of the stimulus package (ARRA), which raised the maximum SNAP benefit in the second half of 2009 and throughout 2010. Appendix Figures 3a and 3b present trends in the TFP price and SNAP purchasing power, respectively, for each of the market group areas. Trends in food prices and SNAP purchasing power vary significantly across areas, with SNAP purchasing power rising sharply in *all* areas with the ARRA.

Given that food stamp recipients are not limited to purchasing the TFP basket, why do we use it? Ultimately, we are looking for a standardized index across places and over time that allows us to trace out variation in food prices that are relevant for the low-income population. Our investigations (Figure 2, Appendix Figure 2) indicate that the different price series are very highly correlated across place. In the end, we view the TFP as appealing because it is the index used by USDA in setting benefits. Furthermore, by using the price of a set basket we remove the influence of any (endogenous) changes in food choices that recipients make in the face of

higher prices.

2.2 National Health Interview Survey (NHIS) Data on SNAP Children

We use restricted-access micro data from the National Health Interview Survey (NHIS) for the years 1999-2010 to examine effects on child health and health care utilization.[16] The NHIS surveys approximately 35,000 households per year. By gaining restricted-use access to this data we can observe the county of residence for each household in the survey. This allows us to link respondents to regional area food prices and access detailed information on children's health and the characteristics of their parents and households for a large and representative national sample. From each household with children, the survey selects one child at random (the "sample child") and collects more extensive and detailed information on this child's health and health care utilization. Several of the outcomes we study are only available in these Sample Child files, while others (e.g., parent-reported health status) are available for all NHIS respondents in the Person-level file.

Our primary sample includes children ages 17 and under who are citizens of the United States. We impose the citizenship restriction because the post-welfare reform era witnessed dramatic changes to rules regarding non-citizens' eligibility for many social safety net programs, including SNAP. (We analyze noncitizen children as a placebo group below.) We conduct our main analyses on the sample of children in households who report having received SNAP benefits in at least one of the past 12 months. For the years from 1999 through 2010, there are

[16] State and county identifiers are masked in the public use NHIS data. Researchers interested in accessing the restricted geocode data should contact Peter Meyer at rdca@cdc.gov.

44,627 such children; 18,299 of them are also interviewed as Sample Children. While the advantage of limiting our analysis to the SNAP recipients is clear (this is the group most affected by SNAP), non-random selection into SNAP participation would call into question a causal interpretation of our estimates. In Section 4.1, we analyze the impact of SNAP purchasing power on SNAP participation at the county level and document no significant relationship between the real value of SNAP benefits and the per-capita SNAP caseload. As a robustness check in Section 5, we also test the sensitivity of our results using an alternative sample with a high likelihood of being on SNAP—children living with low-educated, unmarried parent(s).

Families with limited resources may respond to lower SNAP purchasing power by reducing consumption of other goods that impact health, like ambulatory or preventive health care. Additionally, lower SNAP purchasing power could lead to increases in stress and bandwidth poverty, resulting in lower compliance with preventive care. Our primary measures of health care utilization are indicators for whether the child has had a check-up in the past 12 months and whether the child has had *any* doctor's visit in the past 12 months. According to guidelines from the American Academy of Pediatrics (AAP), children should have 6-7 preventive visits before age 1, 3 visits per year as 1-year olds, 2 visits as 2-year olds, and at least one visit per year for ages 3 through 17. We also analyze the relationship between SNAP purchasing power and whether (the parent reports that) a child has delayed or forgone care due to cost in the past 12 months. Finally, we study whether the child has visited the ER in the past year; if lower SNAP purchasing power reduces the use of preventive/ambulatory care, we might also see increased utilization of ER care.

We also analyze the effects of SNAP purchasing power on several direct measures of child

health that might respond to reduced nutrition, or to reduced consumption of other inputs in the health production function (e.g., health care). Parental respondents report the child's health status on a 5-point scale (excellent, very good, good, fair, and poor); we use this measure to construct an indicator for whether the child is in excellent or very good health. As measures of contemporaneous health, we also study whether the child was hospitalized over the past 12 months, the number of school days missed due to illness in the past 12 months (for the sub-sample of school aged children), and an indicator for whether the child missed 5 or more days of school due to illness. School attendance might also respond due to the stress and bandwidth poverty channel. In addition, we estimate the relationship between SNAP purchasing power and two longer-term health outcomes that may be affected by reduced nutrition or to food insecurity: an indicator for obesity based on height and weight data (for the subsample of children ages 12-17), and whether the child has emotional problems (defined for the universe of children ages 4 and older).

In addition, we test both of these groups of outcomes (preventive health care utilization, health outcomes) using summary index methods as in Kling, Liebman, and Katz (2007).[17]

Table 1 displays summary statistics for SNAP recipient children and for the entire population of children. As expected, SNAP children are likely to be poor, live in single-parent households (only a third live with both parents), and are disproportionately likely to be black or Hispanic. Because such a high fraction (72 percent) of SNAP children receive Medicaid, the rate of

[17] We create summary indices by subtracting the mean and dividing by the standard deviation of each variable, then averaging across variables within items in the index. Typically, the mean and standard deviation of a control group are used, but lacking that, we use the full sample. Note that the sample in these regressions is limited to those with full data from all included measures. For the health outcomes index this implies school age children only. Anderson (2008) explains similar indices clearly, and Hoynes, Schanzenbach, and Almond (2016) use the technique when evaluating long-run impacts of SNAP.

uninsurance among this sample is low, at about 7 percent. Health care utilization and health outcomes are somewhat similar for SNAP citizen children compared to the general population of children in the U.S. Nearly one-quarter of SNAP children went without a check-up in the past year, but 90 percent had at least some sort of doctor's visit during that time, and more than 5 percent report having delayed or gone without care due to its cost. However, ER utilization is high, at over 30 percent, compared to 21 percent among the entire population. In terms of health itself, SNAP children have similar health status, but miss more school days (5, on average, but one-third of SNAP children missed 5 or more in the past year), and more commonly have emotional problems (46 percent of SNAP children 4 or older compared to 27 percent in the general population).

2.3 State and County Control Variables

We include several variables to control for regional policies and prices that might affect child health and be correlated with local food prices. First, we control for local labor market conditions with the county unemployment rate. Second, we include a summary index of state-level SNAP policies developed by (Ganong and Liebman, Forthcoming), which incorporates measures for simplified reporting, recertification lengths, interview format (e.g. in person or not), call centers, online applications, Supplemental Security Income Combined Application Project, vehicle exemptions for asset requirement, and broad-based categorical eligibility. Third, we control for other state policies including the minimum wage, state EITC, TANF maximum benefit guarantee amounts, and Medicaid/State Children's Health Insurance Program (CHIP) income eligibility limits. Finally, we control for prices of other goods by including HUD's

fair market rent (measured by county as the "40th percentile of gross rents for typical, non-substandard rental units occupied by recent movers in a local housing market"[18]) and regional Consumer Price Indices (CPIs) for non-food, non-housing categories (apparel, commodities, education, medical, recreation, services, transportation and other goods and services). These are available for 26 metro areas; for the remaining areas, the CPI is calculated within each of the four census regions and for four county population sizes (<50,000, 50,000-1.5 million, >1.5 million).

2.4 Supplemental Data on SNAP Caseloads and Food Insecurity

We investigate the relationship between SNAP purchasing power and SNAP participation in Section 4.1, using administrative data on county-level SNAP caseloads from the U.S. Department of Agriculture (USDA), for the years from 1999 through 2010. We match each county-year observation to that year's TFP price for the market group to which the county belongs.

To further probe mechanisms whereby variation in regional food prices may impact child health, we supplement our main analysis by studying the relationship between SNAP purchasing power and food insecurity.[19] For this analysis we use data from the December Current Population Survey Food Security Supplement (CPS-FSS) for the years from 2001-2010.[20]

[18] More specifically, HUD estimates FMRs for 530 metropolitan areas and 2,045 nonmetropolitan county FMR areas.

[19] Food insecurity is a household-level measure of well-being, defined as being unable to obtain, or uncertain of obtaining, an adequate quantity and quality of food due to money or resources. Very-low food insecurity is defined as food insecurity that includes disrupted or restricted dietary patterns. Prior to 2006, very-low food insecurity was labeled "food insecurity with hunger".

[20] The December food security supplement was not collected in 1999 and 2000.

We identify a sample of 37,277 citizen children, ages 0 to 17, who live in households that report receiving SNAP, and link them to market group TFP prices according to location of residence.[21]

3 Empirical Methods

We estimate the causal impact of variation in the real value of SNAP benefits on measures of child health and health care utilization for children in households who report receiving SNAP benefits during the past 12 months. Throughout, our regressions take the following form:

$$y_{irt} = \alpha + \beta \ln\left(\frac{SNAPMAX_t}{TFP_{rt}}\right) + X_{irt}\theta + Z_{rt}\gamma + \delta_t + \lambda_r + \varepsilon_{irt} \quad (1)$$

where y_{irt} is the health outcome of individual *i* who resides in region *r* (market group) in time *t*. The key independent variable is the natural log of the ratio of maximum SNAP benefits for a family of four (which vary by year, but is constant across regions) to the TFP price in region *r* in year *t*. The vector X_{irt} contains a set of controls for the child's characteristics, including his/her age (and its square), race, Hispanic ethnicity, family size, indicators for the presence of the mother (and/or father) in the household, and interactions between indicators for the mother's (father's) presence and the mother's (father's) education, marital status, age, and citizenship. The state policy variables described in Section 2.3 are included in Z_{rt}, as are a set of regional CPIs in non-food, non-housing consumption categories. All models also include a full set of fixed

[21] The public-use food security supplement files reports geographic information on all states, 217 counties, 69 primary metropolitan statistical areas, 173 metropolitan statistical areas (MSA), 40 combined statistical areas (CSA), and 278 core-based statistical areas (CBSA) during our period of analysis. In order to assign CPS observations to a market group, we first identify states that include a single market group and assign all observations in that state to the corresponding market group. Continuing with the next most general geography (CSA), we repeat this process at increasingly more detailed geographies levels to the county identifiers. After this step, we then assign observations living in a non-metropolitan area to the rural market group based on their state of residence (for states with rural areas in a single market group). We match 83.7 percent of CPS observations to a market group using this iterative process.

effects for the year (δ_t) and market group (λ_r).[22] In all models, the standard errors are corrected for clustering at the market group level.

One important question is how much variation in the cost of food remains after controlling for the prices of other goods. Appendix Table 3 shows an R^2 of 0.82 when regressing our main food price measure on other prices indexes, and R^2 of 0.97 after adding fixed effects. Appendix Figure 4 plots the residuals, which exhibit a fair amount of idiosyncratic variation. What causes these residuals (and leads to our plausibly exogenous variation) is by definition difficult to explain but could be related to local wages and demand conditions, which grocery/outlet chains are in a market, or local supply shocks.[23]

Identification in this model comes from variation in trends in the price of the Thrifty Food Plan across market groups. As we discussed in Section 2.1 (see Figure 1), there is substantial variation across geographic areas in the purchasing power of SNAP benefits. More importantly for our identification strategy, these regional differences change over time, with some areas experiencing larger increases in SNAP purchasing power from 1999 to 2010, and others experiencing smaller increases (e.g., purchasing power in some southern metropolitan areas increased nearly 17 percent, but only about 4.5 percent in urban New York).[24]

[22] We have also tested models with additional controls including income, parent-reported health status, and an indicator for insurance coverage, but due to endogeneity concerns, we do not include these in our main specification. The results are generally similar, however; see Appendix Tables 1 and 2.

[23] It is similarly difficult to fully explain regional prices for other commodities such as gasoline in California. See for example Borenstein, Bushnell, and Lewis (2004) and Borenstein (2015).

[24] SNAP benefits in 2010 and 6 months of 2009 include increased benefits provided through the American Recovery and Reinvestment Act (ARRA). ARRA benefits amounted to $62, or about a 13.6 percent increase above the base 2009 levels. Changes in SNAP purchasing power ranged from a decrease of 5.8 percent in San Francisco to 4.3 percent increase in metropolitan areas in Arkansas and Oklahoma over the 1999-2008 period.

4 Results

4.1 SNAP Participation

We begin by analyzing the effects of SNAP purchasing power on the SNAP caseload. If variation in the real value of SNAP leads to changes in SNAP participation, then selection may bias our estimates of the effect of SNAP purchasing power on child health.

Using data from USDA, we construct a county panel for annual SNAP caseloads covering 1999-2010. We estimate equation (1) where the dependent variable is SNAP caseloads divided by county population. Table 2 displays the results of six different specifications of the model. Each includes year and market group fixed effects, as well as the natural log of the ratio of maximum SNAP benefits to the market group TFP price. In the second column we add a control for the county unemployment rate, which is a significant determinant of SNAP caseloads (Bitler and Hoynes 2016) and possibly correlated with regional prices. In column 3 we add controls for state policy variables, including for SNAP, EITC, minimum wages, TANF generosity, and Medicaid. In column 4 we add controls for regional prices, including the county HUD fair market rent and regional CPIs for goods other than food.

When only year and market group fixed effects are included, the estimated coefficient on SNAP purchasing power is positive and significant, consistent with the SNAP caseload per capita rising when the purchasing power of SNAP increases. However, once we add county unemployment rate, in column (2), the coefficient drops substantially in magnitude and is no longer statistically different from zero. The addition of the state policy controls (column 3) and the regional prices (column 4) does not change the coefficient significantly. In column 5, we extend the specification by including a market group linear time trend, which leads to little

change in the estimated coefficient on SNAP purchasing power. From this we conclude that there is no significant relationship between the real value of SNAP and SNAP caseloads, and thus we interpret our main results free of concerns about selection.

4.2 SNAP Purchasing Power and Health Care Utilization

The primary goal of our study is to analyze the impacts of variation in the purchasing power of SNAP benefits on outcomes related to child health. We begin by examining evidence for measures of health care utilization, recognizing that families facing higher food prices may respond to the lower real value of their SNAP benefits by reducing out-of-pocket spending on other goods, including health care.

We present the results of this analysis in Table 3. Our primary measure of health care utilization is an indicator for whether the child has had a check-up in the past 12 months (column 1), which is observed only for children in the Sample Child file. We also examine indicators for whether the child has had any doctor's visit in the past 12 months (column 2), and whether a child has visited an ER in the past 12 months (column 3). Whether a child has delayed or forgone care is reported in the Person file of the NHIS so is observed for all NHIS children under age 18; we report this estimate in column 4. The model includes fixed effects for market group, year, individual controls, and regional controls for unemployment rate, non-food prices, and state safety net policies (similar to column 4 of Table 2).[25] The key independent variable, representing SNAP purchasing power, is ln(SNAPMAX/TFP).

Among SNAP-recipient children, we find that increased purchasing power of SNAP

[25] Individual-level controls include the child's age (and its square), whether the child is black or Hispanic, the child's family size, indicators for the presence of the mother (and/or father) in the household, and interactions between indicators for the mother's (father's) presence and the mother's (father's) education, marital status, age, and citizenship.

significantly raises the likelihood a child has had a checkup in the past 12 months. A ten percent increase in the ratio (SNAPMAX/TFP) leads to a 6.3 percentage point (or 8.1 percent) increase in the likelihood of a checkup. We also document a smaller, but significant impact of increased SNAP purchasing power on the probability a child has had *any* doctor's visit over the past 12 months. A ten percent increase in the purchasing power of SNAP raises the likelihood of any doctor's visit by 3.1 percentage points, or 3.4 percent.

The results in columns 3 and 4 indicate that SNAP purchasing power has no statistically significant effect on whether children have visited the ER in the past 12 months, or are reported to have delayed or forgone care due to cost. However, the coefficients are negative, suggesting a protective effect of SNAP.

4.3 SNAP Purchasing Power and Health Outcomes

Table 4 presents evidence on the extent to which variation in SNAP purchasing power affects child health outcomes. The regression specifications include the same set of controls as in Table 3. Note that several of the outcomes are defined only for sub-samples of children, leading to different numbers of observations across the columns of Table 4. Specifically, obesity is measured only for children ages 12 through 17,[26] emotional problems are identified for children ages 4 and older, and the number of school days missed is recorded only for children age 5 and older who are in school. Parent-reported health status and hospitalization in the past 12 months are reported for all children, but the other health outcomes are only

[26] The indicator for obesity is based on BMI calculations, which are affected by some outlying height and weight measurements. We trim the top and bottom of the BMI distribution to exclude the top and bottom percentile. In addition, height and weight information was only collected for children ages 12 and older in years 2008 through 2010. We therefore limit the sample to children ages 12-17.

provided for children in the Sample Child file.

We find no statistically significant relationship between SNAP purchasing power on the indicator for the child's (parent-reported) health status being excellent or very good, nor the likelihood of having been hospitalized in the past year. However, we document a strong negative and robust relationship between the real value of SNAP and the number of school days children missed due to illness. For SNAP recipient children, a ten percent increase in SNAP purchasing power is associated with a decrease in missed school days of just over 1 day (or a 22 percent decrease relative to the mean of approximately 5 days missed).

The evidence in Table 4 indicates that SNAP purchasing power does not significantly impact obesity or the propensity to have emotional problems, although we note that these are longer term health problems that often develop over time and may be less likely to respond contemporaneously to higher area food prices. It is possible that these outcomes would be likely to respond only after a longer, cumulative period of food insecurity, poor nutrition, or reduced health care.

4.4 Summary Index Tests

To address concerns of multiple hypothesis testing, we conduct a collective test of these health care utilization and health outcomes by constructing summary index estimates as in Kling, Liebman, and Katz (2007). We normalize and combine the outcomes into a health care utilization index and a health index, changing signs when necessary so that all positive outcomes mean more health care utilization or better health outcomes. The index for health care utilization includes the variables for checkups, any doctor visits, delay seeking health care, and ER visit. The summary index for health outcomes includes health status, hospitalization,

emotional problems, and school days missed.

Results are shown in Table 5. We find that a 10% increase in SNAP purchasing power leads to a statistically significant 0.09 standard deviation increase in health care utilization. We find positive but not significant effects on SNAP children's health; a 10% increase in SNAP purchasing power leads to a statistically insignificant 0.03 standard deviation increase of the health measure.

Broadly, we interpret our results (in Tables 3 and 5) as suggesting that children in households facing lower SNAP purchasing power receive less preventive and ambulatory care. Our findings for health outcomes (Tables 4 and 5) suggest that variation in the real value of SNAP may lead to changes in school attendance but has no overall impact on children's contemporaneous health. A weakness of measuring health using the number of school days missed due to illness is that it may depend on the parent's evaluation of the child's health; however, parent-reported child health status, which is also a subjective measure, does not appear to respond to variation in the real value of SNAP. On the other hand, the number of missed school days is perhaps the only health outcome we analyze that might be expected to respond contemporaneously to reduced nutrition or limited use of preventive/ambulatory health care.

5 Mechanisms and Robustness Checks

5.1 Mechanisms

We outlined three possible mechanisms for effects of SNAP purchasing power on child health care utilization and health including: direct (nutrition) effects, indirect (other goods)

effects, and stress/bandwidth effects.

One test for the direct channel is to examine impacts of SNAP purchasing power on food insecurity. Children in families facing higher SNAP purchasing power may be able to consume more (or higher quality) food which may then lead to a reduction in food insecurity. Because the NHIS did not provide information on food security or nutritional intake in the years of data we analyze, we turn to data from the December food security supplement to the CPS to estimate the impact of SNAP purchasing power on food insecurity among SNAP-recipient children.

We display these results in Table 6.[27] We find that a higher real value of SNAP benefits is associated with an improvement in children's food security: A 10 percent increase in SNAP purchasing power reduces the likelihood a child is food insecure by 6.4 percentage points (a 21.8 percent decrease relative to the mean). These results are qualitatively quite similar to those in Gregory and Coleman-Jensen (2013), which used fewer years of the same data and a different estimation strategy. The result for very low food security (column 2) is not statistically significant; however, we note that very low food security is a rare outcome even for SNAP children (only 4 percent of the children in our sample are very food insecure while almost 30 percent are food insecure). In particular, very low food security requires not only that households are uncertain of obtaining an adequate quantity and quality of food due to money or resources, but that they also restrict or disrupt food intake because of lack of resources. It is perhaps not surprising, then, that this more extreme outcome is not significantly responsive to

[27] The regression specifications include the same set of controls as in Tables 3 and 4 except because we cannot identify counties in the CPS, we do not control for local CPI for nonfood nor the HUD fair market rent data which are measured at the county level.

marginal variation in area food prices.

Overall, these results are suggestive that the direct effect may be part of the mechanism for our findings. In addition, they confirm a well-studied and robust finding that higher SNAP generosity leads to a reduction in food insecurity (Hoynes and Schanzenbach 2016). This is important as it provides validation for our research design.

In Table 7 we investigate whether the impacts of SNAP on health care utilization and health could be explained by a relationship between SNAP purchasing power and health insurance coverage. Such a relationship would be unexpected for this sample, given that SNAP recipient children are all likely to be income-eligible for Medicaid or CHIP. Returning to our sample of NHIS children, we estimate equation (1), where the dependent variable is now an indicator for whether the child is uninsured. Reassuringly, for both children in the Sample Child file and all NHIS children, we find no statistically significant effect of SNAP purchasing power on the likelihood a child has no health insurance. Additionally, Appendix Table 4 shows no relationship between SNAP purchasing power and child participation in other food and nutrition programs.

Two of our most robust findings – that higher SNAP purchasing power leads to reductions in school absences and increases in compliance with well child checkups – are consistent with the stress and bandwidth channel. We are limited in our ability to test more directly for this channel, though the NHIS does include mental health variables for the sample adult. These include questions related to how often the respondent felt sad, worthless, nervous, hopeless, etc. We analyzed these variables for sample adults who were mothers of the children in our sample and found small and statistically insignificant effects.

5.2 SNAP Purchasing Power versus Local Prices

A natural check of our main results is to estimate our models for health care utilization and health outcomes on a placebo sample of children that should not be affected by SNAP. We present results for two groups: noncitizen children (who are not eligible for SNAP) and children living in households with incomes that would make them ineligible for SNAP. [28] Appendix Figure 5 shows SNAP participation by bins of family income to poverty; we assign the placebo income sample for incomes between 300-450% of poverty. If our main results reflect impacts of SNAP on children's health, rather than simply impacts of local food prices, we would expect SNAP purchasing power to have no significant impact on these placebo samples.

These results are presented in Table 8. Panel A presents estimates for the higher income sample, and Panel B presents estimates for noncitizen children. Estimated coefficients for our key outcomes (i.e., had check-up, had any doctor's visit, and number of school days missed) are small and statistically insignificant, as are estimated effects on most other outcomes. Two exceptions are that for the higher income sample, we find a statistically significant effect of SNAP purchasing power on whether a child visited the ER in the past year and on whether a child is obese. For the sample of noncitizen children, we find only a marginally significant, negative coefficient for whether the child has an emotional problem. Recall, however, that none of these outcomes was found to respond significantly to SNAP purchasing power among SNAP recipient children. These findings are also reflected in estimates on the summary indexes (see Appendix Table 5). There are small and statistically insignificant coefficients for noncitizen children. The estimated effect on the health care utilization index for the higher income

[28] As before, this sample is limited to children ages 0 through 17 who are citizens of the United States.

placebo group is half the size of our main effect, and statistically significant at the 10% level. Appendix Table 6 shows there is no impact of SNAP purchasing power on child food insecurity in these placebo samples. The bottom row of Appendix Table 5 shows SNAP participation in these samples, which is low (4 percent or less) for high income children and 13 to 18 percent for non-citizens.

Finally, we also explore the sensitivity of our findings to whether we control for non-food regional CPI price controls (such as housing, energy, transportation, et cetera). As shown in Appendix Table 7, our results are robust to the inclusion of these factors, suggesting that we are not simply capturing the broader effects of living in a more or less expensive market.[29]

5.3 Robustness Checks

Table 9 displays the results of a series of robustness checks to our main findings regarding the impacts of SNAP purchasing power on health care utilization and health. In panel A, we re-estimate the models including a lead term that uses the *t+1* market group TFP price. This lead specification provides a test for the validity of our fixed effects design. If we find significant effects of future SNAP purchasing power (while controlling for current purchasing power) we might be concerned that we are capturing the effects of some other trend in the regions. That is, we estimate:

$$(2) \qquad y_{irt} = \alpha + \beta_1 \ln\left(\frac{SNAPMAX_t}{TFP_{rt}}\right) + \beta_2 \ln\left(\frac{SNAPMAX_{t+1}}{TFP_{r,t+1}}\right) X_{irt}\theta + Z_{rt}\gamma + \delta_t + \lambda_r + \varepsilon_{irt}$$

Only in one of the ten specifications, is the lead of SNAP purchasing power significant. Importantly, our results for the contemporaneous effect of SNAP purchasing power are largely

[29] In results not shown here, we estimated models where we dropped the non-food regional CPI price controls and the state SNAP and other policy controls, and find very similar results.

unchanged: The magnitudes of the estimated coefficients for "had checkup" and "school days missed" are quite similar to those in Tables 3 and 4. One exception is that the estimated impact of current-period SNAP purchasing power on whether a child had any doctor's visit in the past 12 months is a third as large and is no longer statistically significant.

The second panel of Table 9 contains results from a model that includes a set of market group linear time trends. This approach places serious demands on the data in that identification now must come from departures in market groups' TFP prices from their trends (assumed to be linear). While the main estimates for health care utilization (had checkup, had any doctor's visit) are qualitatively similar to those in Table 3, they are smaller in magnitude and no longer statistically significant. The estimated impact of SNAP purchasing power on missed school days, however, remains nearly identical in magnitude and significance to that in Table 4.

Finally, to address concerns that inclusion in our SNAP recipient sample may be endogenous to SNAP purchasing power, we estimate the impacts of variation in SNAP purchasing power on health care utilization and health for a high intent-to-treat population. In particular, we identify a sample of children living with unmarried parent(s) with less than a college education.[30] The results (in panel C of Table 9 along with the index models in column 3 of Appendix Table 5) show qualitatively similar findings. Again, the estimated impacts on the likelihood of a checkup and on the number of missed school days are quite similar in magnitude to those for our main sample (although the p-value on the coefficient for missed school days rises to 0.141). The

[30] Even though this is a high-ITT group, observable characteristics show that it is more advantaged, on average, than the SNAP population.

estimated relationship between SNAP purchasing power and having had *any* doctor's visit is smaller and no longer statistically significant. Interestingly, we document a negative effect of increased SNAP purchasing power on ER utilization for this somewhat higher-income sample: a 10 percent increase in the ratio (SNAPMAX/TFP) reduces the likelihood of an ER visit by 4.8 percentage points.

6 Discussion and Conclusion

In this paper we provide some of the first direct evidence on how variation in the purchasing power of SNAP benefits affects children's health care utilization and health outcomes. We find evidence consistent with families adjusting to lower SNAP purchasing power by reducing utilization of preventive/ambulatory medical care. In particular, we document that a 10 percent increase in SNAP purchasing power increases the likelihood a child had a check-up in the past year by 8.1 percent and increases the likelihood that children had *any* doctor's visit in the past 12 months by 3.4 percent.

We do not find much evidence that lower SNAP purchasing power causes detrimental impacts on health status, the likelihood of a hospitalization, or other measures of physical (e.g., obesity) and mental health (e.g., child has emotional problems). One exception is that children with reduced SNAP purchasing power miss significantly more days of school due to illness (22 percent more, relative to a baseline mean of 5 missed days, when SNAP purchasing power is reduced by 10 percent). We also find that lower purchasing power of SNAP benefits results in a greater likelihood of food insecurity.

One possible explanation for our finding stronger effects on utilization than on health itself

is that most of the health measures we consider are more chronic and cumulative in nature (e.g., obesity). However, we also find no evidence of a relationship between SNAP purchasing power and caregiver-reported health status, an outcome which could be less likely to suffer from the same problem. A second possible interpretation of our findings is that while lower SNAP purchasing power causes reduced health care utilization among children and negatively affects food security, neither translates into substantial detrimental impacts on children's health status.

We also note that our measure of variation in the price of food is constructed using 30 market groups that perhaps mask variation in urban and rural customers who are in fact paying different prices, thus masking why certain SNAP recipients are able to buy relatively inexpensive food and stay relatively healthy. In related work, Bronchetti and Christensen (2017) use food prices measured at a much finer geographic level from the National Household Food Acquisition and Purchase Survey (FoodAPS) and demonstrate that whether SNAP benefits are sufficient to buy the TFP depends largely on whether recipients are able to identify and travel to the lowest-cost store in their area. Relating health and other outcomes to SNAP purchasing power using finer geographic variation may be a fruitful research area in the future.

Finally, our results speak to whether adjusting benefit levels to account for geographic variation in food prices across market groups would help improve child health and wellbeing. We conclude that such adjustment would reduce disparities in child healthcare utilization and school absenteeism in low-income households, but may not lead to significant changes in contemporaneous health status.

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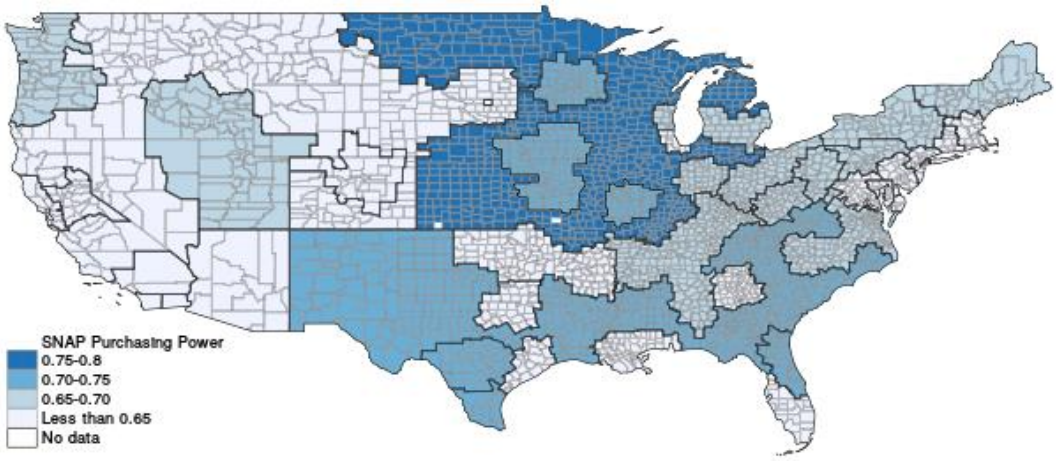
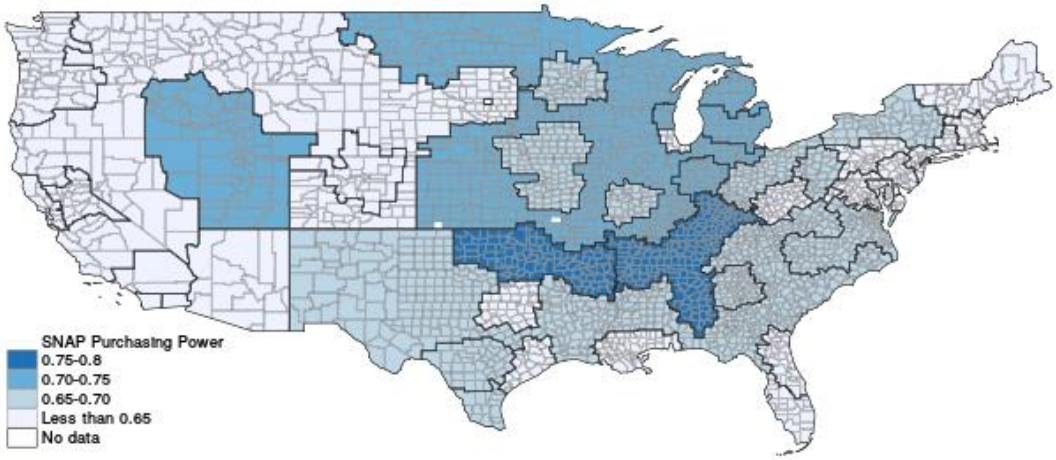
Figure 1: Purchasing Power of SNAP by Market Group

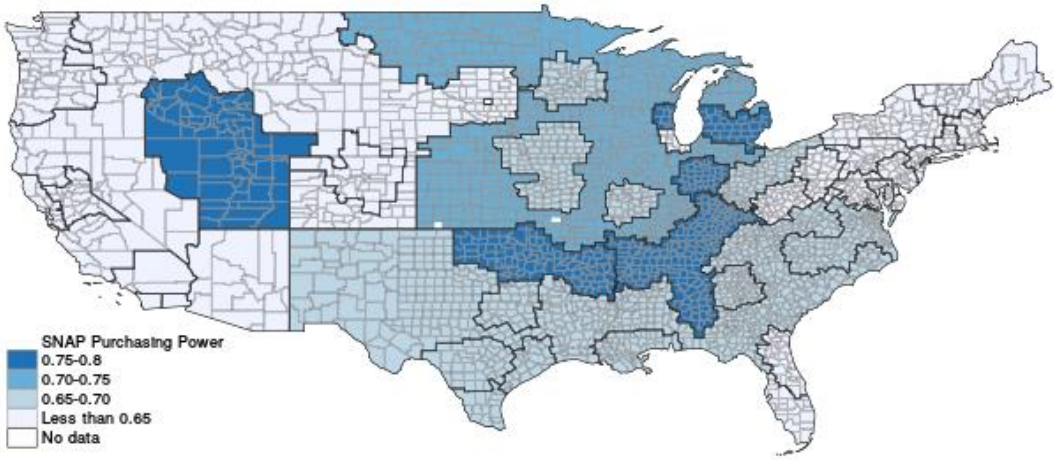
Panel A: 1999



Panel B: 2008



Panel C: 2010

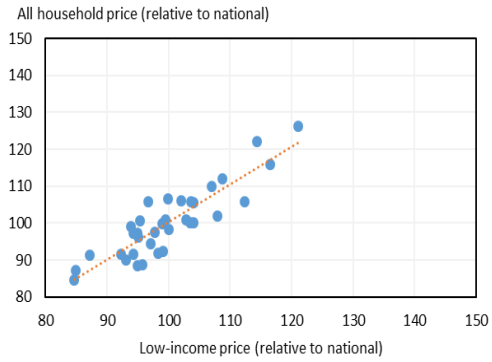


Notes: Maps plot SNAPMAX/TFP for each of the 30 market groups identified consistently in the Quarterly Food at Home Price Database (QFAHPD).

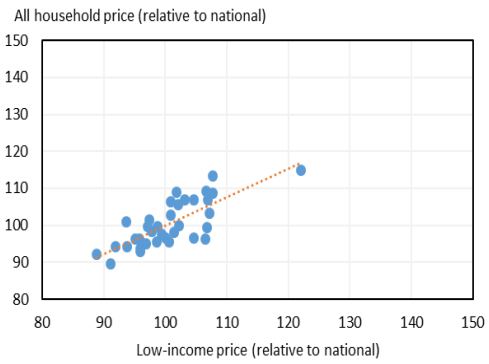
Figure 2: Comparison of Prices Across Market Groups

Full Sample vs. Low-income Sample

Canned Fruit

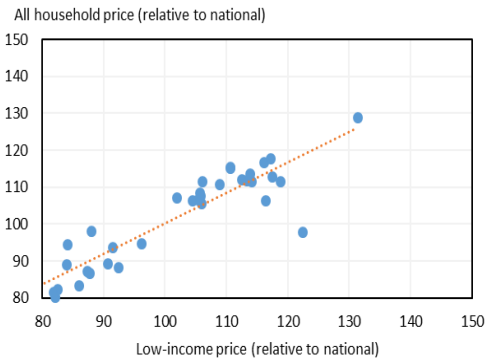


Packaged Whole Grains



Eggs

Low-Fat Milk



Carbonated Beverages

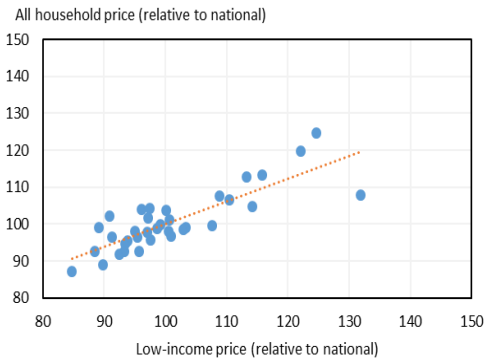


Table 1
Summary Statistics for Children in NHIS

Child/Household Characteristics	SNAP Citizen Children	All Children
TFP price	203	205
	(14.36)	(14.18)
Max SNAP benefit	143	141
	(11.57)	(10.17)
Income to poverty ratio	0.90	3.06
	(0.74)	(2.24)
Child's age	7.50	8.5
	(5.09)	(5.19)
Child is male	0.51	0.51
	(0.50)	(0.50)
Child is black	0.34	0.16
	(0.47)	(0.36)
Child is Hispanic	0.26	0.19
	(0.44)	(0.40)
Mother is present	0.94	0.95
	(0.24)	(0.23)
Father is present	0.39	0.75
	(0.49)	(0.43)
Both parents	0.36	0.71
	(0.48)	(0.45)
Child receives Medicaid	0.72	0.21
	(0.45)	(0.41)
Child has no health insurance	0.07	0.10
	(0.25)	(0.30)
Number of observations	44,627	296,779

Health Care Utilization	SNAP Sample Children	All Sample Children
Any check-up (12m)	0.77	0.74
	(0.42)	(0.44)
Any doctor's visit (12m)	0.90	0.88
	(0.30)	(0.32)
Any ER visit (12m)	0.32	0.21
	(0.47)	(0.41)
Delay/forgo care (12m)	0.06	0.05
	(0.23)	(0.22)
Health Outcomes		
Health status exc. or v. good	0.71	0.70
	(0.45)	(0.46)
Hospitalized overnight (12m)	0.09	0.08
	(0.28)	(0.26)
School days missed, illness (12m)	4.96	3.53
	(9.36)	(6.43)
5+ school days missed (12m)	0.33	0.25
	(0.47)	(0.43)
Obese	0.20	0.13
	(0.40)	(0.34)
Emotional problem	0.46	0.27
	(0.76)	(0.59)
Number of observations	18,299	139,268

Notes: Tables contains estimates of means of US citizen children in household receiving SNAP, weighted to account for complex survey design. Standard errors in parentheses. Left panel are children from the person-file dataset (i.e. all children in household, separately for SNAP and all households) while right panel shows only children from sample child file (i.e. one child per household.)

Table 2
Effect of SNAP Purchasing Power on Per-Capita SNAP Caseload

Outcome = SNAP CASELOAD / POPULATION	(1)	(2)	(3)	(4)	(5)
$\log(\text{SNAPMax}/\text{TFP}_t)$	0.091**	0.024	0.003	-0.004	0.010
	(0.036)	(0.089)	(0.088)	(0.079)	(0.085)
$\log(\text{SNAPMax}/\text{TFP}_{t+1})$					
Observations	37,277	37,277	37,277	37,177	37,177
R^2	0.299	0.497	0.514	0.539	0.544
Mean	0.111	0.111	0.111	0.111	0.111
Effect of a 10% increase in SNAP purchasing power	**0.88%**	**0.23%**	**0.03%**	**-0.04%**	**0.10%**
Fixed effect for year, market group	Yes	Yes	Yes	Yes	Yes
County UR	No	Yes	Yes	Yes	Yes
State SNAP and other policy controls	No	No	Yes	Yes	Yes
Regional price controls	No	No	No	Yes	Yes
Linear time trend	No	No	No	No	Yes

Notes: Data consists of county by year panel for 1999-2010. Results are weighted using county population. Standard errors in parentheses are corrected for clustering at the market group level; *** p<0.01, ** p<0.05, * p<0.1. All regressions include fixed effects for market group and year. Columns (2)-(6) add controls for local economic and policy variables: the county unemployment rate, an index of state SNAP policies (Ganong and Liebman, 2015), the state minimum wage, EITC, and Medicaid/SCHIP income eligibility limits, TANF generosity, as well as controls for HUD's fair market rent, and regional CPIs for non-food, non-housing categories (apparel, commodities, education, medical, recreation, services, transportation and other goods and services).

Table 3
Effects of Variation in SNAP Purchasing Power on Children's Health Care Utilization
Sample: SNAP Recipient U.S. Citizen Children in the NHIS, 1999-2010

	Children in Sample Child File			All Children
	(1) Had a checkup past 12m	(2) Doctor's visit past 12m	(3) Any ER visit past 12m	(4) Delay or forgo care past 12m
log(SNAPMAX/TFP)	0.656***	0.323**	-0.178	-0.089
	(0.225)	(0.147)	(0.215)	(0.092)
Mean of dep. var.	0.77	0.901	0.315	0.051
Effect of 10% increase in SNAP purchasing power	0.063	0.031	-0.017	-0.009
As a % of mean of dep. var.	**8.1%**	**3.4%**	-5.4%	-16.6%
N	18,169	18,108	18,217	44,626
R^2	0.077	0.038	0.046	0.022

Notes: Results from weighted OLS regressions. Standard errors in parentheses are corrected for clustering at the market group level; *** p<0.01, ** p<0.05, * p<0.1. All regressions include controls for the child's age (and its square), whether the child is black or Hispanic, the child's family size, indicators for the presence of the mother (and/or father) in the household, and interactions between indicators for the mother's (father's) presence and the mother's (father's) education, marital status, age, and citizenship. All regressions also include controls for local economic and policy variables: the county unemployment rate, an index of state SNAP policies (Ganong and Liebman, 2015), the state minimum wage, EITC, and Medicaid/CHIP income eligibility limits, TANF generosity, as well as controls for HUD's fair market rent, and regional CPIs for non-food, non-housing categories (apparel, commodities, education, medical, recreation, services, transportation and other goods and services). Finally, all models include year and market group fixed effects. Outcomes in columns 1-3 are observed only for children in the Sample Child files.

Table 4
Effects of Variation in SNAP Purchasing Power on Children's Health Outcomes
Sample: SNAP Recipient U.S. Citizen Children in the NHIS, 1999-2010

	Children in Sample Child File				All NHIS Children 0-17	
	(1) School days missed due to illness	(2) 5 or more school days missed	(3) Obese	(4) Emotional problem	(5) Health status excellent or very good	(6) Hospitalized overnight past 12m
log(SNAPMAX/TFP)	-11.43**	-0.148	-0.24	0.055	-0.121	0.020
	(5.374)	(0.272)	(0.374)	(0.468)	(0.199)	(0.065)
Mean of dep. var.	4.955	0.332	0.199	0.464	0.700	0.075
Effect of 10% increase in SNAP purch power	-1.090	-0.014	-0.023	0.005	-0.012	0.002
As a % of mean of dep. var.	**-22.0%**	-4.2%	-11.5%	1.1%	-1.6%	2.6%
N	11420	11420	4471	10779	44,627	44,620
R^2	0.033	0.041	0.035	0.055	0.032	0.150

Notes: Results from weighted OLS regressions. Standard errors in parentheses are corrected for clustering at the market group level; *** p<0.01, ** p<0.05, * p<0.1. All regressions include the same controls as in Table 3. Outcomes in columns 1-4 are observed only for children in the Sample Child files. Missed school days is defined only for children ages 5 and older who attend school; information on obesity is consistently available for children ages 12-17, trimmed to exclude the top and bottom percentile of the BMI distribution; and emotional problem defined for the universe of children ages 4 and older.

Table 5
Summary Index Estimates

Sample: SNAP Recipient U.S. Citizen Children in the NHIS, 1999-2010		
	(1)	(2)
	Index for health care utilzation	Index for health outcomes
log(SNAPMax/TFP)	0.919***	0.311
	(0.298)	(0.354)
Mean of dep. var.	-0.003	0.032
Effect of 10% increase in SNAP purchasing power	0.088	0.030
N	18,023	9,514
R^2	0.043	0.036

Notes: Table features coefficients from mean effects estimates for health care utilization variable (checkups, any doctor visits, delay seeking health care, and any ER visit) or for health outcome variables (school days missed, emotional problem, health status, and any hospitalization). Variables are standard normalized and averaged so coefficient represents standard deviation units. All observations are from the Sample Child file.

Table 6
Effects of SNAP Purchasing Power on Food Insecurity
Sample: SNAP Recipient U.S. Citizen Children in the December CPS, 2001-2010

	(1) Child is food insecure	(2) Child is very food insecure
$\log(\text{SNAPMax}/\text{TFP}_t)$	-0.670*	0.0856
	(0.330)	(0.107)
Mean of dep. var.	0.293	0.041
Effect of 10% increase in SNAP purchasing power	-0.064	-0.008
As a % of mean of dep. var.	**-21.8%**	-19.5%
N	29,324	29,324
R^2	0.033	0.021

Notes: Results from weighted OLS regressions. Standard errors in parentheses are corrected for clustering at the market group level; *** p<0.01, ** p<0.05, * p<0.1. All regressions include controls for the child's age (and its square), whether the child is black or Hispanic, the child's family size, indicators for the presence of the mother (and/or father) in the household, and interactions between indicators for the mother's (father's) presence and the mother's (father's) education, marital status, age, and citizenship. All regressions also include controls for local economic and policy variables: the state unemployment rate, an index of state SNAP policies (Ganong and Liebman, 2015), the state minimum wage, EITC, and Medicaid/CHIP income eligibility limits, and TANF generosity. Finally, all models include year and market group fixed effects.

Table 7
Effects of SNAP Purchasing Power on Health Insurance Coverage
Sample: SNAP Recipient U.S. Citizen Children in the NHIS, 1999-2010

	Children in Sample Child File	All NHIS Children 0-17
	(1)	(2)
	No Insurance	No Insurance
$\log(\text{SNAPMax}/\text{TFP}_t)$	-0.136	-0.071
	(0.146)	(0.136)
Mean of dep. var.	0.068	0.067
Effect of 10% increase in SNAP purchasing power	-0.013	-0.007
As a % of mean of dep. var.	-19.0%	-10.1%
N	18,259	44,540
R^2	0.036	0.033

Notes: Results from weighted OLS regressions. Standard errors in parentheses are corrected for clustering at the market group level; *** p<0.01, ** p<0.05, * p<0.1. All regressions include controls for the child's age (and its square), whether the child is black or Hispanic, the child's family size, indicators for the presence of the mother (and/or father) in the household, and interactions between indicators for the mother's (father's) presence and the mother's (father's) education, marital status, age, and citizenship. All regressions also include controls for local economic and policy variables: the county unemployment rate, an index of state SNAP policies (Ganong and Liebman, 2015), the state minimum wage, EITC, and Medicaid/CHIP income eligibility limits, TANF generosity, as well as controls for HUD's fair market rent, and regional CPIs for non-food, non-housing categories (apparel, commodities, education, medical, recreation, services, transportation and other) goods and services. Finally, all models include year and market group fixed effects.

Table 8
Effects of SNAP Purchasing Power on Health Care Utilization and Health: Robustness Checks
Placebo Samples

	Health Care Utilization				***Health***					
	Children in Sample Child File			All Children	Children in Sample Child File				All Children	
PANEL A: HIGHER INCOME CHILDREN (300-450% POVERTY)										
	(1) Had checkup	(2) Doctor's visit	(3) Any ER visit	(4) Delay or forgo care	(1) School days missed	(2) 5+ school days missed	(3) Obese	(4) Emotional problem	(5) Health status exc or v good	(6) Hosp. overnight
log(SNAPMax/TFP$_t$)	0.239	0.196	-0.292**	-0.045	2.13	-0.083	0.425**	0.297	0.008	-0.014
	(0.208)	(0.124)	(0.115)	-(0.045)	(3.135)	(0.151)	(0.158)	(0.272)	(0.104)	(0.045)
Mean of dep. var.	0.756	0.911	0.175	0.030	3.359	0.241	0.114	0.239	0.886	0.054
Effect of 10% increase in SNAP PP	0.022	0.018	-0.029	-0.006	0.203	-0.008	0.041	0.028	0.001	-0.001
As a % of mean of dep. var.	2.3%	2.0%	-16%	-18.6%	6.0%	-3.3%	36.0%	11.7%	0.1%	-2.3%
N	24,833	24,822	24,960	48,500	18,146	18,146	8,856	15,608	48,521	48,491
R^2	0.092	0.035	0.020	0.010	0.023	0.02	0.042	0.029	0.023	0.176
PANEL B: NONCITIZEN CHILDREN										
	(1) Had checkup	(2) Doctor's visit	(3) Any ER visit	(4) Delay or forgo care	(1) School days missed	(2) 5+ school days missed	(3) Obese	(4) Emotional problem	(5) Health status exc or v good	(6) Hosp. overnight
log(SNAPMax/TFP$_t$)	0.143	0.204	0.403	0.112	-0.700	-0.245	0.185	-0.630*	-0.310	0.0284
	(0.429)	(0.363)	(0.281)	(0.193)	(3.567)	(0.192)	(0.236)	(0.314)	(0.251)	(0.064)
Mean of dep. var.	0.516	0.673	0.129	0.088	2.137	0.131	0.116	0.126	0.755	0.020
Effect of 10% increase in SNAP PP	0.014	0.020	0.038	0.011	-0.067	-0.023	0.018	-0.060	-0.030	0.003
As a % of mean of dep. var.	2.7%	3.0%	29.5%	12.5%	-3.1%	-17.6%	15.5%	-47.6%	-4.0%	15.0%
N	5,440	5,421	5,458	12,358	4,809	4,809	2,490	4,163	12,372	12,368
R^2	0.161	0.124	0.034	0.035	0.022	0.028	0.089	0.029	0.077	0.025

Notes: Results from weighted OLS regressions. Standard errors in parentheses are corrected for clustering at the market group level; *** p<0.01, ** p<0.05, * p<0.1. All regressions include controls for the child's age (and its square), whether the child is black or Hispanic, the child's family size, indicators for the presence of the mother (and/or father) in the household, and interactions between indicators for the mother's (father's) presence and the mother's (father's) education, marital status, age, and citizenship. Insurance coverage not included as control in columns 1 and 5. All regressions also include controls for local economic and policy variables: the county unemployment rate, an index of state SNAP policies (Ganong and Liebman, 2015), the state minimum wage, EITC, TANF generosity and Medicaid/CHIP income eligibility limits, as well as controls for HUD's fair market rent, and regional CPIs for non-food, non-housing categories (apparel, commodities, education, medical, recreation, services, transportation and other goods and services). Finally, all models include year and market group fixed effects. Health care utilization outcomes, columns 1-3, and health outcomes, columns 1-4 are observed only for children in the Sample Child files. Panel A contains results for children ages 0 through 17 in families with incomes between 300 and 450 percent of the federal poverty line. Panel B displays results for children ages 0 through 17 who are not US citizens.

Table 9
Effects of SNAP Purchasing Power on Health Care Utilization and Health: Robustness Checks
Sample: SNAP-Recipient U.S. Citizen Children, 1999-2010

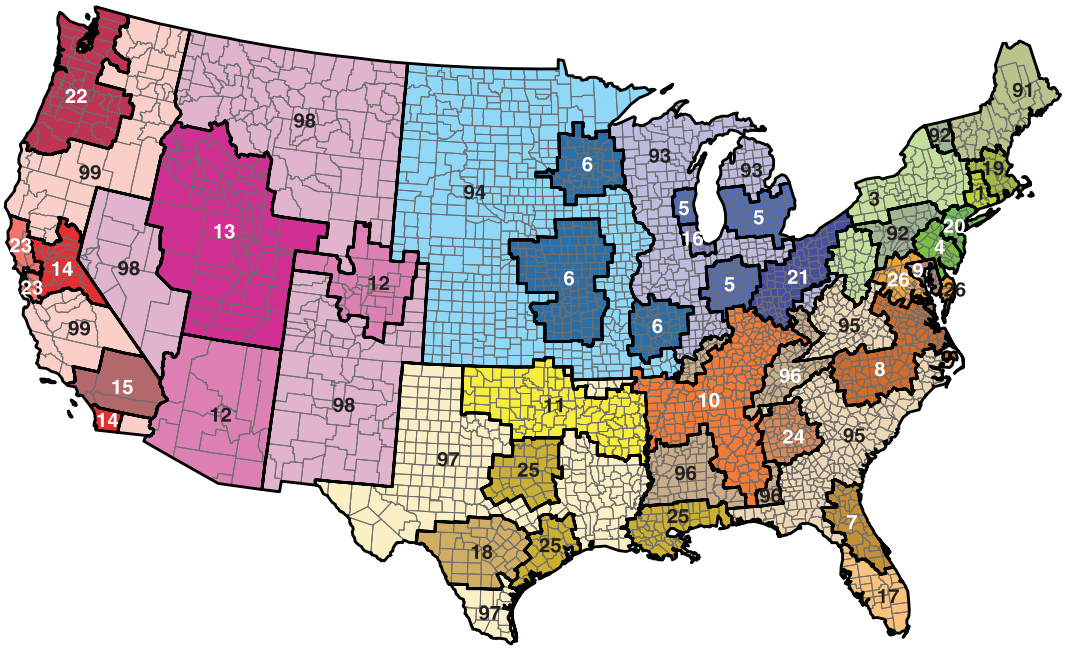
	A. Health Care Utilization				***B. Health Outcomes***					
Robustness Check	Chldren in Sample Child File			All Children	Chldren in Sample Child File				All Children	
A. Include lead term using future TFP price	(1) Had checkup	(2) Doctor's visit	(3) Any ER visit	(4) Delay or forgo care	(1) School days missed	(2) 5+ school days missed	(3) Obese	(4) Emotional problem	(5) Health status exc or v good	(6) Hosp. overnight
log(SNAPMax/TFP$_t$)	0.517*	0.111	0.011	0.040	-13.48**	-0.161	-0.273	0.003	-0.065	0.043
	(0.278)	(0.161)	(0.308)	(0.089)	(5.90)	(0.327)	(0.535)	(0.774)	(0.305)	(0.060)
log(SNAPMax/TFP$_{t+1}$)	0.194	0.260	-0.386	-0.185*	-4.756	-0.303	0.0717	0.266	-0.155	-0.076
	(0.247)	(0.192)	(0.238)	(0.097)	(4.02)	(0.295)	(0.473)	(0.792)	(0.316)	(0.089)
Mean of dep. var.	0.764	0.900	0.312	0.054	4.981	0.333	0.201	0.459	0.697	0.075
Effect of 10% increase in SNAP PP	0.049	0.011	0.001	0.004	-1.284	-0.015	-0.026	0.000	-0.006	0.004
As a % of mean of dep. var.	6.5%	1.2%	0.3%	7.1%	-25.8%	-4.6%	-13.0%	0.1%	-0.9%	5.5%
B. Include market group-level linear time trends	(1) Had checkup	(2) Doctor's visit	(3) Any ER visit	(4) Delay or forgo care	(1) School days missed	(2) 5+ school days missed	(3) Obese	(4) Emotional problem	(5) Health status exc or v good	(6) Hosp. overnight
log(SNAPMax/TFP$_t$)	0.268	0.148	0.0724	-0.0316	-12.53*	-0.018	-0.351	-0.098	-0.228	0.0775
	(0.272)	(0.196)	(0.315)	(0.116)	(6.82)	(0.289)	(0.433)	(0.671)	(0.248)	(0.064)
Mean of dep. var.	0.770	0.901	0.315	0.051	4.955	0.332	0.199	0.464	0.70	0.07
Effect of 10% increase in SNAP PP	0.026	0.014	0.007	-0.003	-1.194	-0.002	-0.034	-0.009	-0.02	0.01
As a % of mean of dep. var.	3.3%	1.6%	2.2%	-5.9%	-24.1%	-0.5%	-16.8%	-2.0%	-3.1%	9.9%
C. Alternate Sample: Children of Low-Educated, Unmarried Parents	(1) Had checkup	(2) Doctor's visit	(3) Any ER visit	(4) Delay or forgo care	(1) School days missed	(2) 5+ school days missed	(3) Obese	(4) Emotional problem	(5) Health status exc or v good	(6) Hosp. overnight
log(SNAPMax/TFP$_t$)	0.640**	0.100	-0.505**	0.013	-11.68	-0.011	0.210	-0.305	0.058	-0.047
	(0.255)	(0.161)	(0.184)	(0.086)	(7.93)	(0.194)	(0.344)	(0.427)	(0.195)	(0.053)
Mean of dep. var.	0.726	0.867	0.279	0.057	4.323	0.305	0.181	0.396	0.705	0.062
Effect of 10% increase in SNAP PP	0.061	0.010	-0.048	0.001	-1.113	-0.001	0.020	-0.029	0.006	-0.005
As a % of mean of dep. var.	8.4%	1.1%	-17.3%	2.1%	-25.7%	-0.3%	11.0%	-7.3%	0.8%	-7.2%

Notes: Results from weighted OLS regressions. Standard errors in parentheses are corrected for clustering at the market group level; *** p<0.01, ** p<0.05, * p<0.1. All regressions include controls for the child's age (and its square), whether the child is black or Hispanic, the child's family size, indicators for the presence of the mother (and/or father) in the household, and interactions between indicators for the mother's (father's) presence and the mother's (father's) education, marital status, age, and citizenship. Insurance coverage not included as control in columns 1 and 5. All regressions also include controls for local economic and policy variables: the county unemployment rate, an index of state SNAP policies (Ganong and Liebman, 2015), the state minimum wage, EITC, TANF generosity, and Medicaid/CHIP income eligibility limits, as well as controls for HUD's fair market rent, and regional CPIs for non-food, non-housing categories (apparel, commodities, education, medical, recreation, services, transportation and other). Finally, all models include year and market group fixed effects. Outcomes in Panel A, columns 1-3, and outcomes on Panel B, columns 1-4 are observed only for children in the Sample Child files.

Appendix

Appendix Figure 1. Reprinted from Todd et al. (2010). (Government document not subject to copyright.)

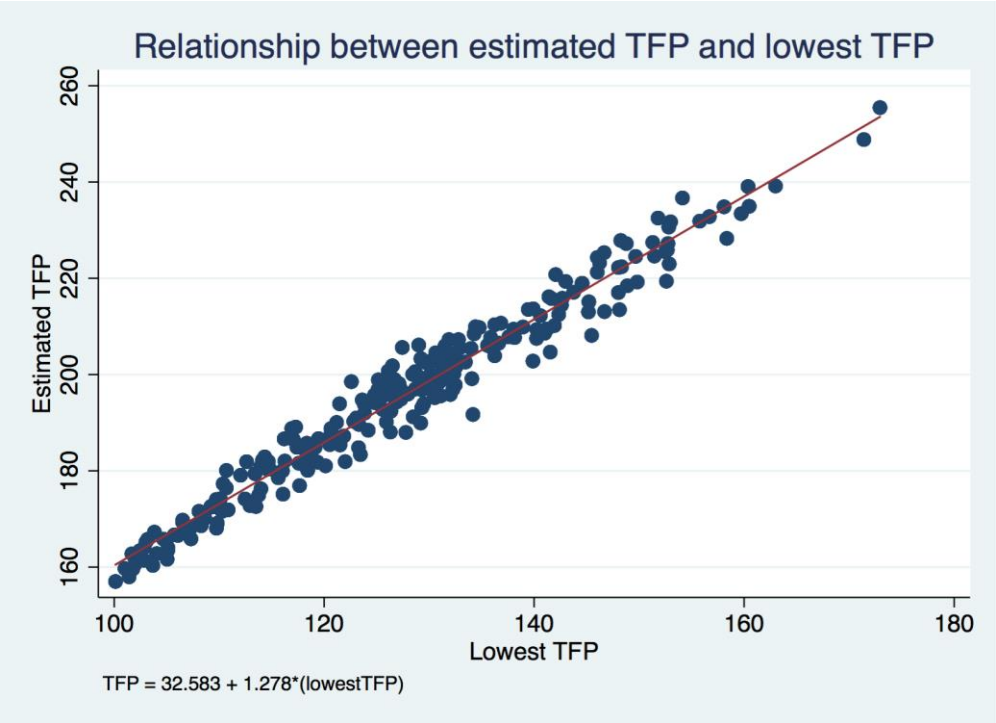
Figure 1
Quarterly Food-at-Home Price Database Market Groups, 2002-06



Notes: For 1999-2001, markets 91 and 92 are combined as market 81; markets 93 and 94 are combined as market 82; markets 95, 96, and 97 are combined as market 83; and markets 98 and 99 are combined as market 84.

1	Hartford	19	Boston
2	Urban NY	20	Other NY
3	Western NY/PA	21	Metro Ohio
4	Philadelphia	22	North Pacific
5	Metro Midwest 1	23	San Francisco
6	Metro Midwest 2	24	Atlanta
7	North Florida	25	Metro South 4
8	Metro South 1	26	Washington, DC
9	Baltimore	91	Nonmetro New England
10	Metro South 2	92	Nonmetro Middle Atlantic
11	Metro South 3	93	Nonmetro East North Central
12	Metro Mountain	94	Nonmetro West North Central
13	Salt Lake City	95	Nonmetro South Atlantic
14	Metro California	96	Nonmetro East South Central
15	Los Angeles	97	Nonmetro West South Central
16	Chicago	98	Nonmetro Mountain
17	South Florida	99	Nonmetro Pacific
18	San Antonio		

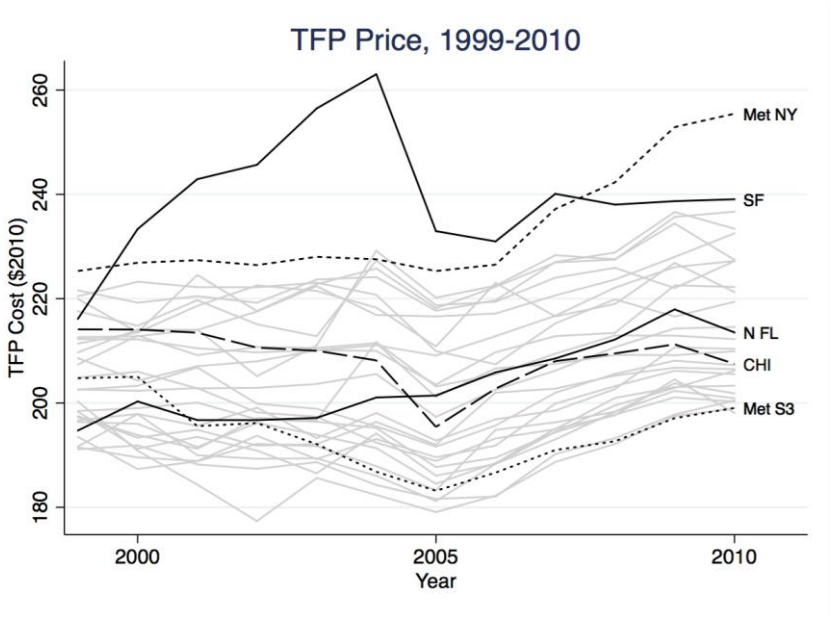
Appendix Figure 2: Comparison of Main TFP Measure Lowest Cost Category Measure



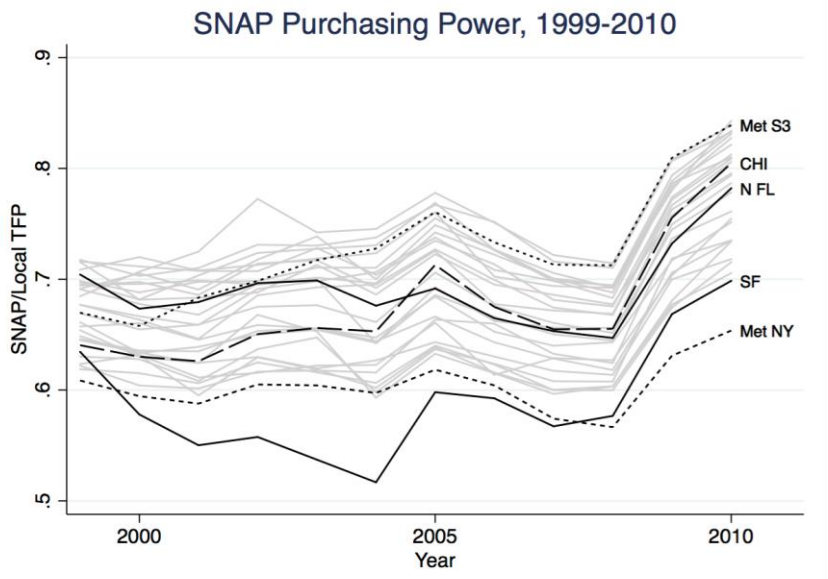
Appendix Figure 3

Variation across Market Group Areas, 1999-2010

(a) Real TFP Cost 1999-2010

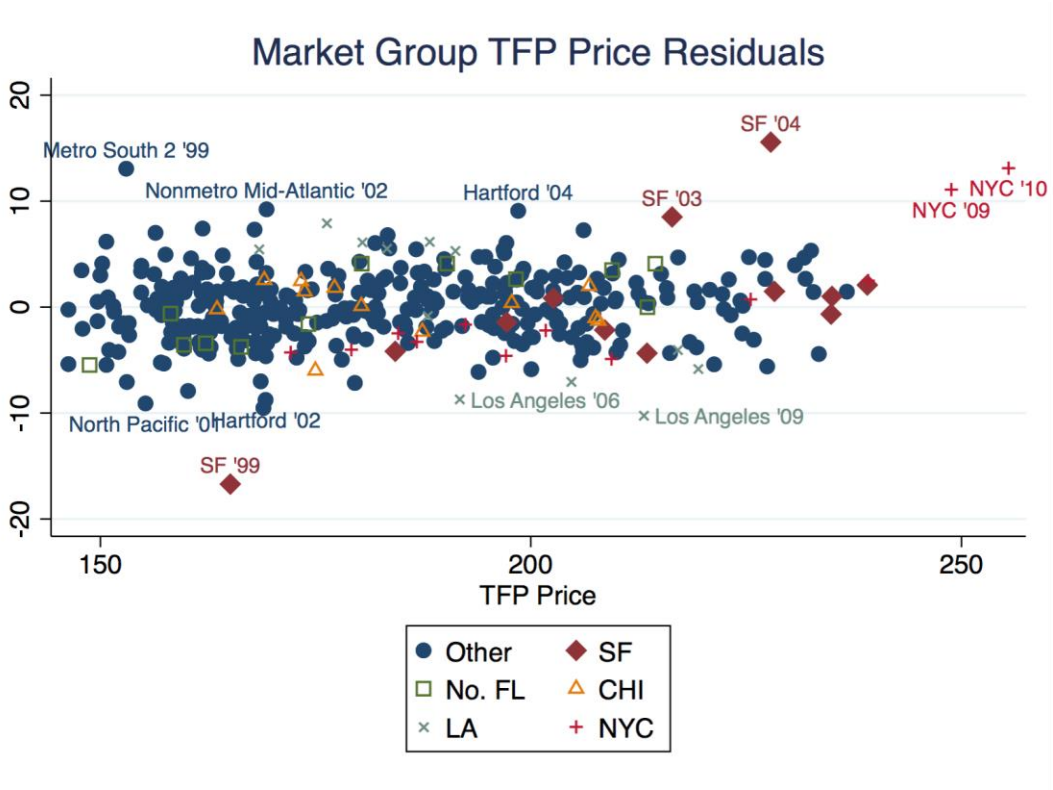


(b) SNAP Purchasing Power



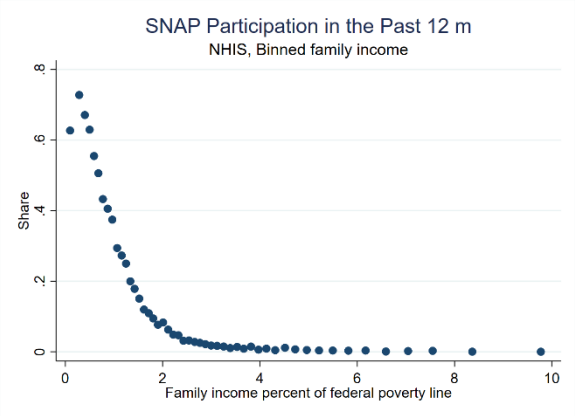
Notes: Figure shows (a) the TFP in constant 2010 dollars and (b) the ratio of maximum SNAP benefits to market group TFP. Highlighted regions are those with the largest increase over the period (North Florida, New York, San Francisco) and the largest decrease (Chicago, Metro South: Little Rock, Metro Oklahoma).

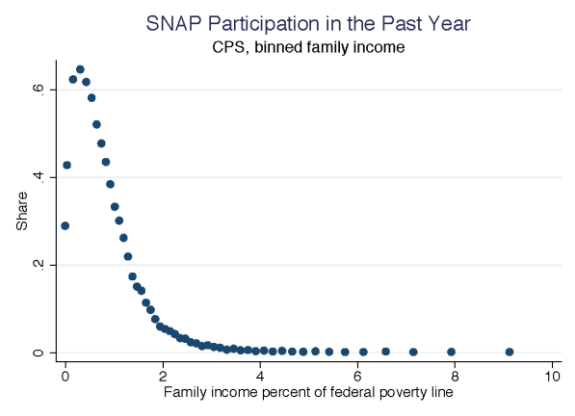
Appendix Figure 4



Notes: Figure shows residuals from regression of market group TFP price on other price measures and including market group and year fixed effects.

Appendix Figure 5: SNAP Participation Rates by Family Income-to-Poverty Ratio





Appendix Table 1
Effects of Variation in SNAP Purchasing Power on Children's Health Care Utilization
Adding controls for income, parental insurance and heath status
Sample: SNAP Recipient U.S. Citizen Children in the NHIS, 1999-2010

	Children in Sample Child File			All Children
	(1) Had a checkup past 12m	(2) Doctor's visit past 12m	(3) Any ER visit past 12m	(4) Delay or forgo care past 12m
log(SNAPMAX/TFP)	0.648***	0.301**	-0.230	-0.084
	(0.223)	(0.146)	(0.207)	(0.085)
Mean of dep. var.	0.770	0.901	0.315	0.051
Effect of 10% increase in SNAP purchasing power	0.062	0.029	-0.022	-0.008
As a % of mean of dep. var.	**8.1%**	**3.2%**	-7.0%	-15.7%
N	18,126	18,065	18,171	44,504
R^2	0.087	0.052	0.063	0.097

Notes: Results from weighted OLS regressions. Standard errors in parentheses are corrected for clustering at the market group level; *** p<0.01, ** p<0.05, * p<0.1. All regressions include the same controls as in Table 3 of paper but also add controls for family income, whether child has health insurance coverage, and child's health status (1-5). Finally, all models include year and market group fixed effects. Outcomes in columns 1, 2, and 4 are observed only for children in the Sample Child files.

Appendix Table 2
Effects of Variation in SNAP Purchasing Power on Children's Health Outcomes
Adding controls for income, parental insurance and heath status
Sample: SNAP Recipient U.S. Citizen Children in the NHIS, 1999-2010

					All NHIS Children 0-17	
	(1) School days missed due to illness	(2) 5 or more school days missed	(3) Obese	(4) Emotional problem	(5) Health status excellent or very good	(6) Hospitalized overnight past 12m
log(SNAPMAX/TFP)	-12.16**	-0.179	-0.338	-0.008	-0.140	0.021
	(5.57)	(0.257)	(0.380)	(0.436)	(0.196)	(0.065)
Mean of dep. var.	4.96	0.332	0.199	0.463	0.700	0.075
Effect of 10% increase in SNAP purch power	-1.16	-0.017	-0.032	-0.001	-0.013	0.002
As a % of mean of dep. var.	**-23.4%**	-5.1%	-16.1%	-0.2%	-1.9%	2.7%
N	11420	11420	4471	10779	44,627	44,620
R2	0.033	0.041	0.035	0.055	0.034	0.150

Notes: Results from weighted OLS regressions. Standard errors in parentheses are corrected for clustering at the market group level; *** p<0.01, ** p<0.05, * p<0.1. All regressions include the same controls as in Table 4 of paper but also add controls for family income, whether child has health insurance coverage, and child's health status (1-5) when health status is not the outcome of interest. Outcomes in columns (3)-(6) are observed only for children in the Sample Child files.. Outcomes in columns (3)-(6) are observed only for children in the Sample Child files. Missed school days is defined only for children ages 5 and older who attend school; information on obesity is consistently available for children ages 12-17, trimmed to exclude the top and bottom percentile of the BMI distribution; and emotional problem defined for the universe of children ages 4 and older.

Appendix Table 3
Relationship between Food (TFP) Price and Other Prices

VARIABLES	(1) TFP Price	(2) TFP Price	(3) TFP Price
CPI Apparel	0.235***	0.079	0.107
	(0.08)	(0.08)	(0.08)
CPI Commodities	0.026	0.968***	0.904***
	(0.20)	(0.31)	(0.31)
CPI Education	1.963***	-0.055	-0.075
	(0.11)	(0.14)	(0.14)
CPI Housing	2.032***	0.687**	0.562*
	(0.15)	(0.28)	(0.30)
CPI Medical	-0.046	-0.031	-0.026
	(0.06	(0.05)	(0.05)
CPI Other G\&S	0.286***	0.053	0.061
	(0.04)	(0.05)	(0.05)
CPI Recreation	0.418***	0.059	0.090
	(0.13)	(0.11)	(0.11)
CPI Services	-2.205***	-0.526	-0.496
	(0.22)	(0.35)	(0.36)
CPI Transportation	0.406***	-0.641***	-0.603***
	(0.11)	(0.20)	(0.20)
State Unemployment			-0.490
			(0.36)
Fair Market Rent			0.012**
			(0.00)
Observations	393	393	393
R^2	0.822	0.974	0.974
Marketgroup FE	No	Yes	Yes
Year FE	No	Yes	Yes

Notes: Table shows regression of main price level measure (TFP by marketgroup and year) on other price controls and fixed effects. Standard errors in brackets; *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table 4
Effects of SNAP Purchasing Power on Other Program Participation
Sample: SNAP Recipient U.S. Citizen Children in the December CPS, 2001-2010

	(1) [Ages 0-5] WIC	(2) [Ages 5-17] School Breakfast	(3) [Ages 5-17] School Lunch
log(SNAPMax/TFP$_t$)	0.199	0.295	0.360
	(0.493)	(0.566)	(0.332)
Mean of dep. var.	0.597	0.719	0.878
Effect of 10% increase in SNAP purchasing power	0.019	0.028	0.034
As a % of mean of dep. var.	3.2%	3.9%	3.9%
N	9,713	19,171	19,244
R^2	0.096	0.082	0.058

*Notes: Results from weighted OLS regressions. Standard errors in parentheses are corrected for clustering at the market group level; *** p<0.01, ** p<0.05, * p<0.1. All regressions include controls for the child's age (and its square), whether the child is black or Hispanic, the child's family size, indicators for the presence of the mother (and/or father) in the household, and interactions between indicators for the mother's (father's) presence and the mother's (father's) education, marital status, age, and citizenship. All regressions also include controls for local economic and policy variables: the state unemployment rate, an index of state SNAP policies (Ganong and Liebman, 2015), the state minimum wage, EITC, and Medicaid/CHIP income eligibility limits, and TANF generosity. Finally, all models include year and market group fixed effects.*

Appendix Table 5
Summary Index Estimates, Placebo and Alternative Treatment Group

A. Health Care Utilization

	(1)	(2)	(3)
	Placebo Samples		
SAMPLE	Citizen Children 300-450% FPL	Noncitizen Children	Citizen Low-Education Unmarried
log(SNAPMax/TFPYRM)	0.555*	-0.189	0.793***
	[0.272]	[0.442]	[0.264]
Mean of dep. var.	0.011	0.013	-0.002
Effect of 10% increase in SNAP purchasing power	0.053	-0.018	0.076
N	24,662	5,402	17,651
R^2	0.046	0.132	0.049

B. Health Outcomes

	(1)	(2)	(3)
	Placebo Samples		
SAMPLE	Citizen Children 300-450% FPL	Noncitizen Children	Citizen Low-Education Unmarried
log(SNAPMax/TFPYRM)	-0.189	-0.0268	0.650
	(0.205)	(0.436)	(0.457)
Mean of dep. var.	0.046	0.020	0.033
Effect of 10% increase in SNAP purchasing power	-0.018	-0.003	0.062
N	14,366	3,941	9,869
R^2	0.024	0.05	0.03
Mean SNAP participation rate	0.04	0.14	0.41

Notes: Table features coefficients from mean effects estimates for health care utilization variable (checkups, any doctor visits, delay seeking health care, and any ER visit) or for health outcome variables (school days missed, emotional problem, health status, and any hospitalization). Variables are standard normalized and averaged, so coefficient represents standard deviation units. All observations are from the Sample Child file. The sample varies by column.

Appendix Table 6
Effects of SNAP Purchasing Power on Food Insecurity
Placebo Samples

	Placebo Samples	
	Citizen Children 300-450% FPL	Non-citizen Children
log(SNAPMax/TFP$_t$)	-0.168	0.131
	(0.317)	(0.112)
Mean of dep. var.	0.177	0.040
Effect of 10% increase in SNAP PP	-0.016	0.0124
As a % of mean of dep. var.	-9.0%	31.2%
N	8,415	23,939
R^2	0.093	0.038

*Notes: Results from weighted OLS regressions. Standard errors in parentheses are corrected for clustering at the market group level; *** p<0.01, ** p<0.05, * p<0.1. All regressions include controls for the child's age (and its square), whether the child is black or Hispanic, the child's family size, indicators for the presence of the mother (and/or father) in the household, and interactions between indicators for the mother's (father's) presence and the mother's (father's) education, marital status, age, and citizenship. All regressions also include controls for local economic and policy variables: the state unemployment rate, an index of state SNAP policies (Ganong and Liebman, 2015), the state minimum wage, EITC, and Medicaid/CHIP income eligibility limits, and TANF generosity. Panel A displays results for the sample of citizen children with family income between 300 and 450 percent of the federal poverty line, and Panel B shows results for the sample of non-citizen children. Finally, all models include year and market group fixed effects.*

Appendix Table 7
Effects of Variation in SNAP Purchasing Power on Children's Health Care Utilization and Health, without CPI Controls
Sample: SNAP Recipient U.S. Citizen Children in the NHIS, 1999-2010

	Health Care Utilization				***Health***				
	Children in Sample Child File			All Children	Children in Sample Child File			All Children	
	(1) Had checkup	(2) Doctor's visit	(3) Any ER visit	(4) Delay or forgo care	(1) School days missed	(2) Obese	(3) Emotional problem	(5) Health status exc or v good	(6) Hosp. overnight
log(SNAPMax/TFP$_t$)	0.616**	0.284*	-0.221	-0.071	-12.91**	-0.329	-0.007	-0.127	0.024
	(0.224)	(0.148)	(0.209)	(0.087)	(5.362)	(0.346)	(0.449)	(0.197)	(0.062)
Mean of dep. var.	0.770	0.901	0.315	0.051	4.956	0.199	0.463	0.700	0.075
Effect of 10% increase in SNAP PP	0.059	0.027	-0.021	-0.007	-1.230	-0.031	-0.001	-0.012	0.002
As a % of mean of dep. var.	**7.6%**	**3.0%**	-6.7%	-13.2%	**-24.8%**	-15.7%	-0.1%	-1.7%	3.1%
N	18,211	18,150	18,259	44,724	11,438	4,478	10,785	44,725	44,718
R^2	0.076	0.036	0.045	0.021	0.032	0.033	0.054	0.031	0.149

Notes: Results from weighted OLS regressions. Standard errors in parentheses are corrected for clustering at the market group level; *** p<0.01, ** p<0.05, * p<0.1. All regressions include controls for the child's age (and its square), whether the child is black or Hispanic, the child's family size, indicators for the presence of the mother (and/or father) in the household, and interactions between indicators for the mother's (father's) presence and the mother's (father's) education, marital status, age, and citizenship. Regressions include controls for local economic and policy variables: the county unemployment rate, an index of state SNAP policies (Ganong and Liebman, 2015), the state minimum wage, EITC, and Medicaid/CHIP income eligibility limits, TANF generosity, but do not include controls for HUD's fair market rent, and regional CPIs for non-food, non-housing categories (apparel, commodities, education, medical, recreation, services, transportation and other goods and services). Finally, all models include year and market group fixed effects. Outcomes in columns 1-3 are observed only for children in the Sample Child files.