

Determining the Impact of Pandemic Financial Assistance on Household Food Insecurity

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Abstract

The United States federal government expanded financial support to needy families during the COVID-19 pandemic to levels not seen before. These policies were linked to substantial declines in child poverty rates, but additional evidence can help better assess their impact on food insecurity. Research on the connection between pandemic financial support and food hardship has examined the effects of single policies on short-term measures of food insufficiency. These studies rely primarily on cross-sectional data and may not fully account for the impacts of other policy changes during the pandemic. This paper adds to the existing literature by testing the relationship between annual measures of financial assistance received by households during the pandemic and annual household food insecurity using panel data from the Survey of Income and Program Participation (SIPP). The availability of household panel data allows me to more accurately estimate the causal impact of these programs by only exploiting changes to annual benefits that occurred within households. I impute benefit levels for households in the SIPP to show that federal assistance became considerably more generous during the pandemic and then use changes in the amount of assistance received within households to test how expected financial assistance impacted the likelihood that households experienced food insecurity. I find that an additional \$1,000 of financial assistance during the pandemic reduced the incidence of food insecurity among low- and middle-income households by 1.0 percentage points. The effect of assistance was about 20 percent larger for low-income households and nearly identical for liquidity-constrained households. Interactions with household demographics indicate that the impacts are largest and concentrated among unmarried and female-headed households. While additional financial assistance appears to have increased the likelihood households report having any savings, I do not find evidence that assistance significantly altered household balance sheets. Additional analyses suggest that past research using cross-sectional data may underestimate the impacts of assistance from these programs on food insecurity.

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1 Introduction

In response to the COVID-19 pandemic, the U.S. federal government substantially increased the amount of financial assistance provided to needy families, especially for those with children. This began in spring 2020 with extensions to unemployment insurance (UI) benefits and food assistance through SNAP emergency allotments (EA) that provided the maximum benefit amount to all eligible households. Pandemic-EBT (P-EBT) was implemented in all states by the end of the 2020 fiscal year, providing transfers to households that would normally receive free- or reduced-priced school meals through the National School Lunch Program but did not due to school closures at the end of the 2019/20 school year.

Each of these programs were reauthorized and expanded in 2021. Maximum SNAP benefits increased by 15% for most of the 2021 fiscal year before a large cost of living adjustment in October. The American Rescue Plan Act (ARPA) increased minimum SNAP EA payments and nearly doubled the 2021 federal child tax credit (CTC). Half of the total CTC was advanced to households in six monthly payments between July and December. These policy responses resulted in exogenous changes in the amount of assistance households received that varied based on state-level policy choices and household characteristics. Several studies have used the variation in the details or implementation of these policies to estimate their impact on household economic well-being and food hardship.

Much of this research has focused on the CTC payments. Surveys showed that households spent most of the payments on food, housing and child-related goods and services (Schild et al. 2023) and that the earlier, summer payments were more likely to be used to pay down debt (Fisher, Schild, and Johnson 2023). In the short term, advanced CTC payments were linked to better financial outcomes including fewer overdrafts and lower use of payday loans in the week following their receipt (Lourie et al. 2025). The same is true for food hardship, which declined among low-income households who received advanced CTC payments relative to those who did not (Adams et al. 2022; Parolin et al. 2023).

Variation from increases to SNAP or the introduction of P-EBT have received less attention. One study using differential state cancellation of SNAP EA payments concludes that the payments reduced food insufficiency and child food hardship (Schanzenbach 2023). Another, using the differential timing of the first P-EBT payments in 2020, found that they also reduced the likelihood that low-income or SNAP-eligible households with children experienced food insufficiency in the past week (Bauer, Ruffini, and Schanzenbach 2024).

This research sits within a broader literature demonstrating the relationship between social programs and food hardship. Programs such as SNAP (Gundersen and Oliveira 2001; Kreider et al. 2012), the EITC (Lenhart 2023; Winkler et al. 2025), and the overall social

safety (Borjas 2004) have been consistently linked to lower levels of food insecurity. One study used variation in federal and state EITCs, SSI, TANF, Medicaid and CHIP, and SNAP in the 2000s to estimate that an additional \$1,000 in potential cash or food benefits reduces the incidence of food insecurity by 1.1 percentage points (Schmidt, Shore-Sheppard, and Watson 2016). Food security is worth pursuing on its own to help reduce hunger and promote nutrition, but it also serves as a general indicator of economic wellbeing and is correlated with other outcomes indicating material hardship (Ouellette et al. 2004; Cook et al. 2006). Despite these findings, less has been done to study the collective impact of the unprecedent program expansions that occurred in 2020 and 2021. The pandemic expansion of financial assistance provides a valuable opportunity to study how large changes to these programs in combination with each other could influence food insecurity during future downturns.

The research that has examined the impacts of federal policies on food hardship during the pandemic uses variation from a single policy change, focuses on a narrower measure of food insufficiency, primarily uses cross sectional data such as the Census Pulse surveys, and may not fully control for the magnitude of changes to other benefits during the pandemic. As a result, existing research may attribute impacts that stem from several changes to a single policy change and may not account for potential complementarities that exist across programs.

The simultaneous changes to SNAP, P-EBT, and CTC policies and overlap in the populations that they target make analyzing the impact of just one policy change very challenging. Knowing the impact of each policy on food security and other well-being measures would be valuable to policymakers when assessing funding tradeoffs. Drawing conclusions about the impact of the totality of financial assistance is more tractable and still provides valuable information to policymakers given the similarity in populations targeted by each policy examined here. As a result, my analysis focuses on the impact of annual financial assistance households received in 2020 and 2021 above what they would have normally expected to receive from SNAP. The continuous nature of my treatment allows for some generalizability about how changes to cash or cash-like assistance from a single or multiple policies would impact food security.

Using a panel of households from the Survey of Income and Program Participation (SIPP) surveyed between 2019 and 2021, I size the changes in financial assistance during the pandemic and use differences in the amounts of benefits that households received over time to examine how federal financial assistance impacts households' food insecurity and balance sheets. I focus on households with annual incomes below 300 percent of the poverty line which represents the upper threshold of who received various benefits that were expanded during the pandemic. This represents roughly 41 percent of the US population and 42

percent of the households in the SIPP.

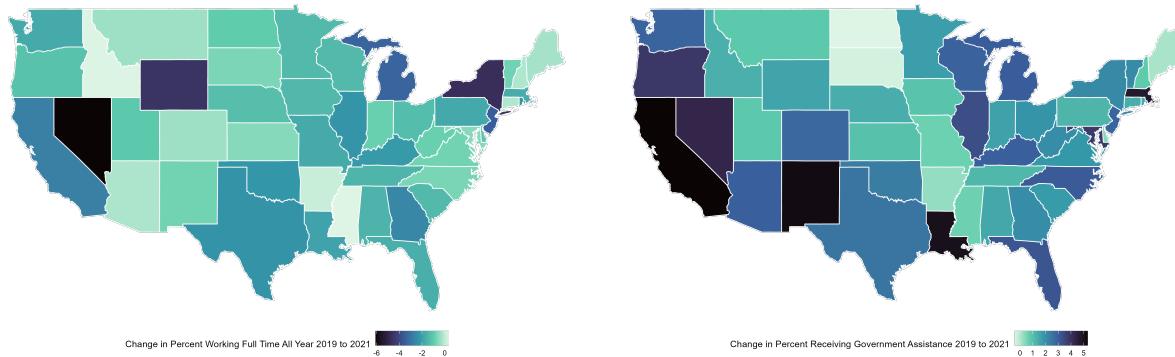
Due to underreporting challenges in the SIPP (Giefer, King, and Roth 2022)¹, I impute expected benefit amounts for each policy based on information from state-level policy documents and reported household income, assets, and other characteristics which are more reliably captured by the survey. The imputation method and panel structure of the SIPP means that variation in my measure of financial assistance stems only from state and federal policy variation over time and changes to household characteristics. This then serves as an intent-to-treat framework where I estimate the causal relationship between the amount of benefits that a household expected to receive during the year and their food security status.

My results indicate that expanding federal financial support to households during the pandemic reduced food insecurity. Among low- and middle-income households, a \$1000 increase in financial support reduced the likelihood of experiencing food insecurity by 1.0 percentage points. This decline is on a base rate of 21 percent for the sampled households prior to the pandemic, representing a 4.8 percent decline in the incidence of food insecurity. The magnitude of the impact was slightly larger for low-income households. For the overall sample and just low-income households I find that the impacts of the pandemic programs were concentrated on reducing the likelihood of low food security but did not significantly impact the likelihood of very low food security. I also determine that these effects were not driven by negative impacts to household balance sheets and that additional financial support slightly increased the likelihood that a household had a savings account.

The results are robust across a range of sample and model selections. Additional analyses allow me to conclude that the benefits of these policy changes were strongest for female-headed and unmarried households. Finally, a rough comparison to estimates of the impact of expanded federal support treating the SIPP data as if it were multiple cross-sections highlights the importance of having panel data for this analysis. I find smaller estimates of the impact of financial assistance on food insecurity when estimated as a cross-section with demographic and economic controls, particularly for the full sample that includes middle-income households.

¹Census Bureau researchers linking the SIPP to administrative data in several states found that while the survey compared well relative to others such as the CPS, annual SNAP receipt was underreported. They found that 14.4% of person-years in the SIPP included SNAP receipt at some point relative to 18.6% in their matched administrative records. At the same time, they found that the SIPP overestimates the number of months the benefit was received for the full year.

Figure 1: Change in the Proportion of Workers Working Full Time All Year and Households Receiving Government Assistance (2019 to 2021)



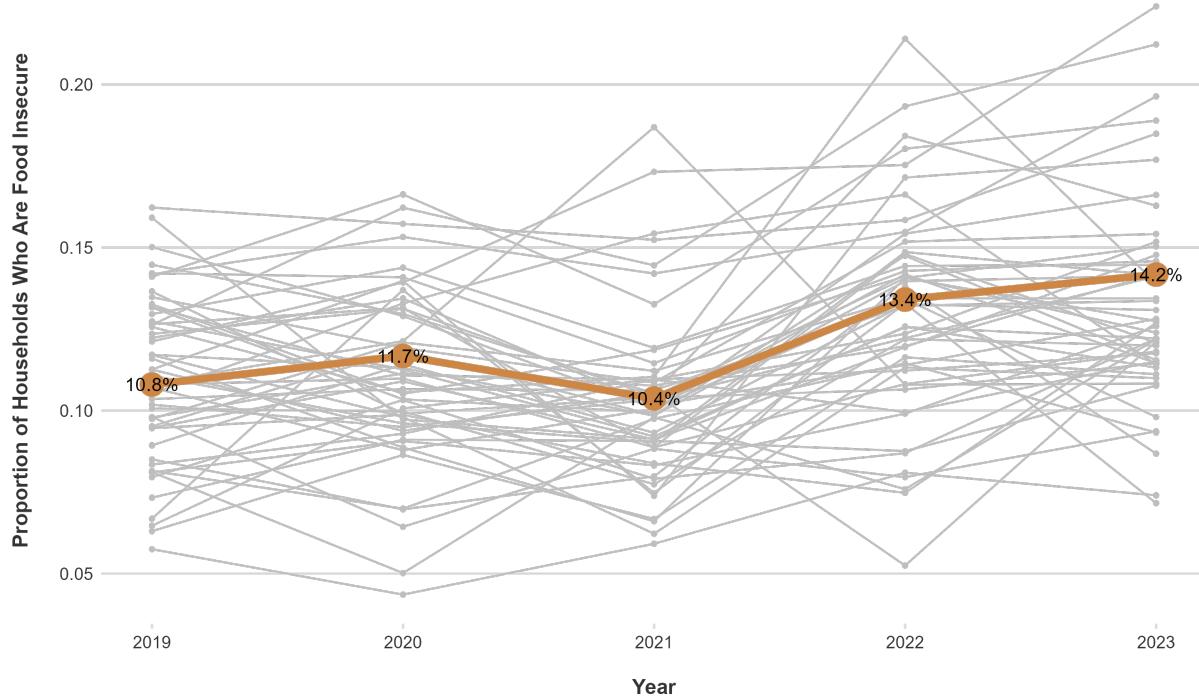
Source: Author's calculations from 2019 and 2021 American Community Survey (ACS) data tables sourced through the Census API

2 Pandemic Economic Environment and Policy Changes

The COVID-19 pandemic had a profound impact on economic life and household well-being as schools and employers closed, hiring stalled, workers were furloughed or had their hours reduced, and much of the work that remained moved to remote settings. Although the US Census Bureau did not conduct the American Community Survey (ACS) in 2020, comparisons of economic indicators from 2021's ACS to 2019's show how challenging economic circumstances had become for US households. From 2019 to 2021 the proportion of workers who reported working full time all year declined in nearly every state and by as much as seven percentage points in some (see Figure 1). Nationally, nearly 2 percentage points fewer workers were working full time all year from 66.5% in 2019. At the same time, labor force participation and employment rates were also down from their pre-pandemic levels in nearly every state and nationally. The result was that many households had fewer resources and less consistent income to rely on to meet their food needs.

Despite these economic challenges, the proportion of households nationally who were food insecure declined by more than a percentage point from 2020 to 2021 and was below pre-pandemic levels (see Figure 2). Other research has shown that food insecurity increased at the start of the pandemic (Bitler and Figginski 2024) and that this was particularly acute during periods when government support was not provided (Waxman, Gupta, and Gonzalez 2020). Improvements in food security coincided with substantial increases in the levels of financial assistance provided to needy families, including several modifications to SNAP and school meal programs focused on promoting food security. Increased generosity of these programs was also met with greater use as more households became eligible and policies simplified applications and renewals. As demonstrated in the ACS data again, the proportion

Figure 2: Proportion of Households Who Are Food Insecure Over Time



Source: 2019-2023 CPS Food Security Supplement sourced through IPUMS.

Notes: State-level averages shown in grey lines and national average in orange. Averages were generated using household-level weights specific to the food security supplement.

of households who reported receiving federal assistance increased by 2.7 percentage points from 2019 to 2021 while the proportion who reported receiving SNAP increased by 1.7 percentage points. As seen in Figure 1, many of the states with substantial declines in full time work saw simultaneous increases in the proportion of households who received government support.

While these overall trends suggest that a relationship between pandemic financial support and food security exists, there are reasons to be skeptical about whether or not it is causal. Many policies at the state and local level were also changing around the same time and it is reasonable to expect different types of households to be impacted differently by both the pandemic and financial assistance. Without reliable comparison groups, drawing causal conclusions is difficult. As mentioned above, the research focused on studying pandemic policies has mostly relied on cross-sectional data requiring comparisons across different types of households which may not always serve as valid comparison groups. My analysis seeks to provide additional causal evidence on the relationship between expanded federal support for households during the pandemic and the decline in food insecurity that we saw. The availability of panel data allows me to examine how changes to assistance over a year within

Table 1: Description of Key Policy Changes During the COVID-19 Pandemic

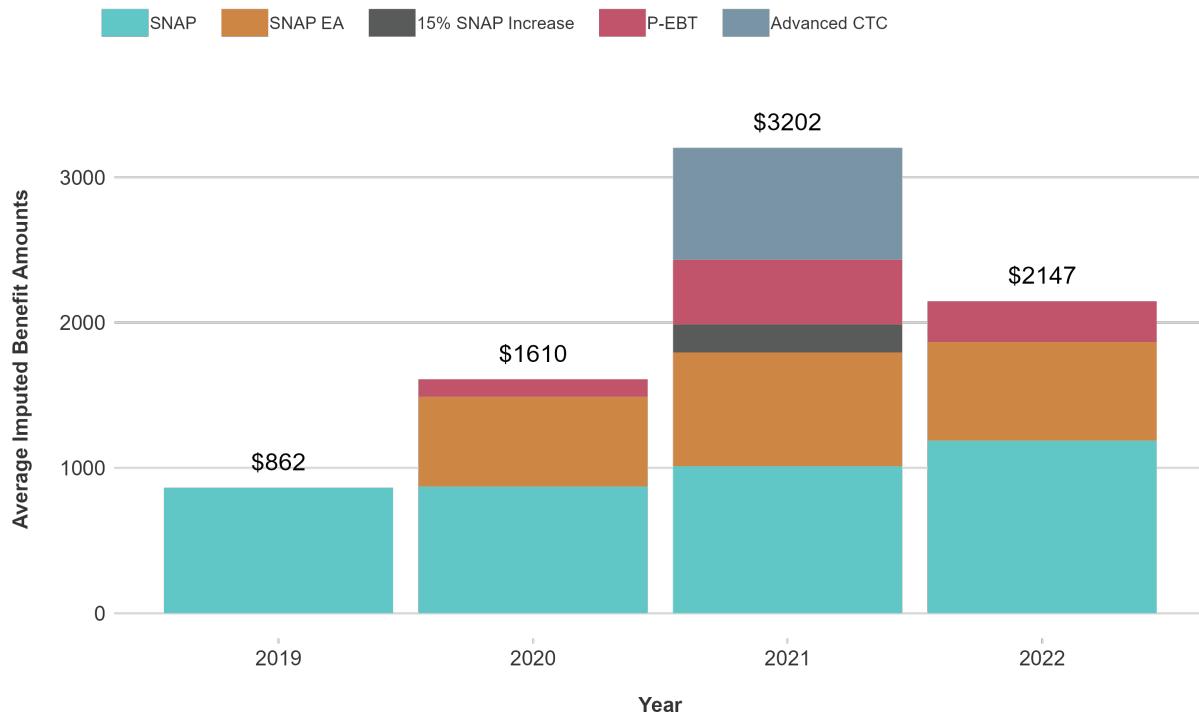
Policy	Recipient	Time Frame	Amount	Variation
Advanced CTC	Households w/ Children	July - December 2021	\$250/month for children 6+; \$300/month for children under 6	Received for six months, June to December 2021 Varied by income and age
SNAP EA	All SNAP households	April 2020 to February 2023	Difference between normal SNAP benefit and max SNAP payment Average \$115/month	Change to minimum amount (\$95 in April 2021) 2021: States began opting out 2021: 15% overall increase
P-EBT	School-aged children receiving free or reduced price meals Children under 6 eligible for SNAP	Summer 2020 to Summer 2023	Cost of school meals (breakfast, lunch, snack) \$6.72 per day in 2021 Days varied (180/year)	Partial year in 2020 with different number of days by state Varied state participation after 2021 and added childcare benefits Differences in assumptions

a household impacted their likelihood of being food insecure.

I use variation in assistance from three major policies implemented between 2020 and 2022 that provided substantially greater financial assistance to households struggling due to the pandemic. First, increases to SNAP occurred several times, first in 2020 with emergency allotments allowing states to provide the maximum SNAP benefit to all households. Overall SNAP was increased temporarily by 15 percent for most of 2021 and the American Rescue Plan Act (ARPA) set a minimum EA payment of \$95 beginning in March of 2021. Also starting March of 2021, some states began opting out of EA, introducing variation to the amount of benefits households would receive. Second, in 2020, the USDA authorized the P-EBT program to provide electronic benefits to children who would normally receive free or reduced school meals but could not due to school closures. These varied based on differences across states in how long schools were closed in 2020 and how states determined hybrid and remote schooling status and benefit amounts for students and children in childcare in 2021 and onward. Lastly, ARPA expanded the federal CTC and advanced monthly CTC payments of between \$250 and \$300 per child to households with children between July and December 2021. Table 1 briefly describes each of these policies and key sources of variation.

These policies, in aggregate, represent substantial additional income for low- and middle-income households. Figure 3 plots the annual transfers from SNAP and the pandemic programs from 2019 to 2022 for households with income under 300% of the poverty line using imputed benefit amounts for households in the SIPP. Among these households, average federal assistance increased from \$862 in 2019 from the average SNAP benefit to \$1,610 in 2020 due to the introduction of EA and P-EBT programs. It then nearly doubled to \$3,202

Figure 3: Changes to Average Amount of Financial Assistance Over Time For Low- and Middle-Income Households



Source: 2020-2023 SIPP Surveys.

Notes: Averages are taken for the sample of households with earnings under 300% of the poverty line. All values are expressed in real 2019 dollars.

in 2021 as SNAP temporarily increased by 15%, the advanced CTC payments were made, and P-EBT and EA programs became more generous. In 2021, financial assistance to the average household with income under 300 percent of the poverty line represented more than twice their gross monthly income. The average household with income under 150 percent of the poverty line received about four times their average gross monthly income in financial assistance. The amount of financial assistance declined nearly as quickly in 2020 as advanced CTC payments were no longer made, more states chose not to reauthorize EA payments, and P-EBT became less generous as states chose to exempt schools or childcare and more schools opened for the 2021/2022 school year.

Each of the three policies that I examine were introduced or expanded in response to the COVID-19 pandemic, primarily targeted low-income households, provided a substantial amount of resources to these households, and were generally cash or cash-like benefits. While the SNAP EA and P-EBT benefits were only available to use for non-hot food, past research has shown that SNAP benefits are spent relatively quickly and typically cover less than

a household's full monthly food budget (Castner et al. 2025)². Larger P-EBT issuances may make up more than a household's weekly or monthly food budget when combined with other SNAP resources, but this is unlikely to be the case over the course of an entire year. Research on the 2020 P-EBT payments concluded that they were spent more slowly than SNAP benefits, but still at a pace that would exhaust the benefits for most households within two to four months (Bauer, Ruffini, and Schanzenbach 2024).

Most importantly for this research, the increases in assistance represent exogenous shifts in income that varied for households with and without children and among those with children depending on the child's age. As noted above, the key sources of variation in each policy are related to children's ages or state decisions about program participation over time and program generosity. Households in the sample are unlikely to be able to predict these changes or respond to them from one year to the next given how quickly the bills advancing them were passed and implemented. The exception to this is for standard SNAP benefits which remain relatively stable from one year to the next outside of cost-of-living adjustments that are announced in advance.

Overall phase-outs of the policies are also less likely to represent good exogenous shifts in financial assistance given that they happened more gradually and required notice periods to affected households. For example, SNAP EA continued through February 2023 for any states who did not opt out earlier, and states were able to participate in the P-EBT program through the 2022-2023 school year and summer of 2023, although several states limited the benefits they provided prior to then. For these reasons, my final treatment measure of exogenous changes to financial assistance runs only through 2022 and excludes the regular SNAP income a household would have expected to continue absent changes to EA and the 15% overall increase.

²USDA periodically publishes reports on benefit redemption patterns of SNAP benefits. Their most recent pre-pandemic examination of FY 2017 SNAP benefits found that 78 percent of benefits were spent within two weeks of receipt and 96 percent within a month. A review of redemption patterns and benefit exhaustion from FY 2022 found that households redeemed 79 percent of the benefits issued to them within two weeks and 94 percent by the end of the month even though most states were still participating in EA. They found that in FY 2022 most households redeemed most of their benefits by the end of the month and that 75 percent of households left \$25 or less unspent. Households receiving greater SNAP benefit amounts took longer to redeem their benefits, but groups receiving large issuances still redeemed at least 90 percent by the end of the month on average.

3 Panel Data Allows for Better Causal Estimates of the Impact of Pandemic Assistance

To answer how federal assistance during the pandemic affected food security, I use publicly available waves of the Survey of Income and Program Participation (SIPP) between 2019 and 2022. The SIPP is a nationally representative survey focused on assessing the use of social programs, employment, and various income sources. The SIPP is conducted as a series of overlapping panels, following households for a period of four years. This allows me to observe changes to annual food security and income from government programs over time. While I have reported estimates for benefits from 2022 above to highlight the temporary nature of the policies, I exclude the year from the remaining analysis given the slow phase out of the policies and because the year was marked by rapid inflation that may impact recall about food insecurity relative to other years.

Research focused on SNAP EA, P-EBT, or CTC payments have often used repeated cross sections from surveys such as the Census Pulse and data or questions focusing on a very narrow time frame around receipt of a specific benefit. These sources, particularly the Pulse, were valuable in providing rapid answers to important policy questions during the pandemic. However, they are not ideal for conducting causal analyses of the impacts of policy changes on material well-being. Researchers had to rely on comparisons across households within or across states after controlling for household demographic characteristics. As a result, comparisons may not fully account for household characteristics linked to both the likelihood of receiving additional food assistance and the likelihood of experiencing food insecurity.

The primary advantage of the SIPP data is that its panel structure allows me to include household-level fixed effects and control for important household characteristics and circumstances that may change over time. As a result, my analysis determines how changes to assistance over time within households impact their likelihood of experiencing food insecurity while existing studies have only been able to assess differences in food insufficiency across different households who were exposed or not exposed to a policy change. I therefore can control for household-level factors that are not observable in the data and that do not change over time during my sample such as food preferences and habits, access to and willingness to seek out nutritious food, or financial knowledge and access.

Three SIPP panels (2018, 2020, and 2021) surveyed households at least twice between 2019 and 2021. To take advantage of the panel structure of the data, my final analytic sample only includes households who were observed in each possible survey wave that was possible for their panel. This drops households that moved, split off of a different household,

Table 2: Number of Households Observed Over Time by SIPP Panel

SIPP Panel	Calendar Year		
	2019	2020	2021
2018	2938	2938	0
2020	791	791	791
2021	0	1044	1044
Total	3729	4773	1835

Note: Household counts for the final analytic sample include households with income under 300% of the poverty line. The SIPP panel is labeled based on the first year during which a household was sampled. The 2018 SIPP panel was surveyed for the final time in 2021 for the 2020 calendar year. The 2021 SIPP panel was surveyed for the first time in 2021 for the 2020 calendar year.

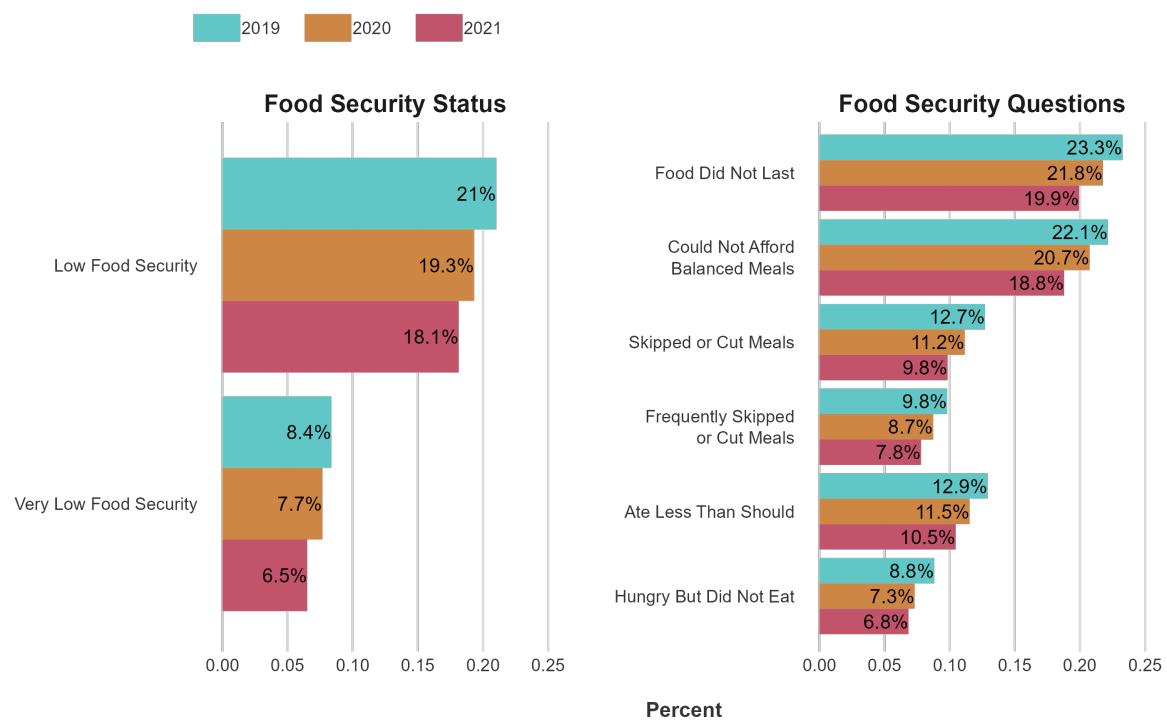
or otherwise did not respond to the survey in a future year. Given a very small number of households with eight or more members or more than six children, I drop these outlier cases from my analytic sample. Overall, I am left with 4,730 households that I observe at least twice between 2019 and 2021. Table 2 breaks this sample out by SIPP panel year and observation year.

Another advantage of the SIPP is that, while prior studies of the policies examined here look at food insufficiency, the SIPP contains a broader measure of food insecurity. Food insecurity is captured in the SIPP using a six-question instrument developed by USDA. This is a shorter version of their 18-question food security questionnaire asked in the CPS food security supplement. Each question is annual and asks about the reference calendar year. The questions are agreement questions with two or three response options and are identical for each survey year.

Responses to these questions are used to construct a raw food security score which takes values from zero to six. This is then used to create indicators for low (a score of three or four) and very low (a score greater than or equal to five) food security. A household is said to be food insecure if they have either low or very low food security. My main outcomes of interest are indicators of whether or not a household was food insecure (had either low or very low food security) or had very low food security in a given year. Figure 4 reports averages for the outcomes and each contributing question. As can be seen, all declined

These measures compare to food insufficiency in surveys like the Census Pulse which stems from a single question and asks if households sometimes or often did not have enough food to eat in the past seven days. Asking this question has the advantage of being easier to field in a quickly operating survey like the Pulse and potentially easier to interpret. However, it covers a narrow time frame and much narrower range of overall food hardship that a household could experience. The first of the six food security questions in the SIPP

Figure 4: Changes to Average Amount of Financial Assistance Over Time For Low- and Middle-Income Households



Source: 2020-2023 SIPP Surveys.

Notes: Averages are taken for the sample of households with earnings under 300% of the poverty line.

is similar to this question but is asked about the past year. By focusing on food insecurity rather than food insufficiency, my research fills a gap in the prior literature on these policies by examining impacts on a broader range of food hardship outcomes over a longer time frame.

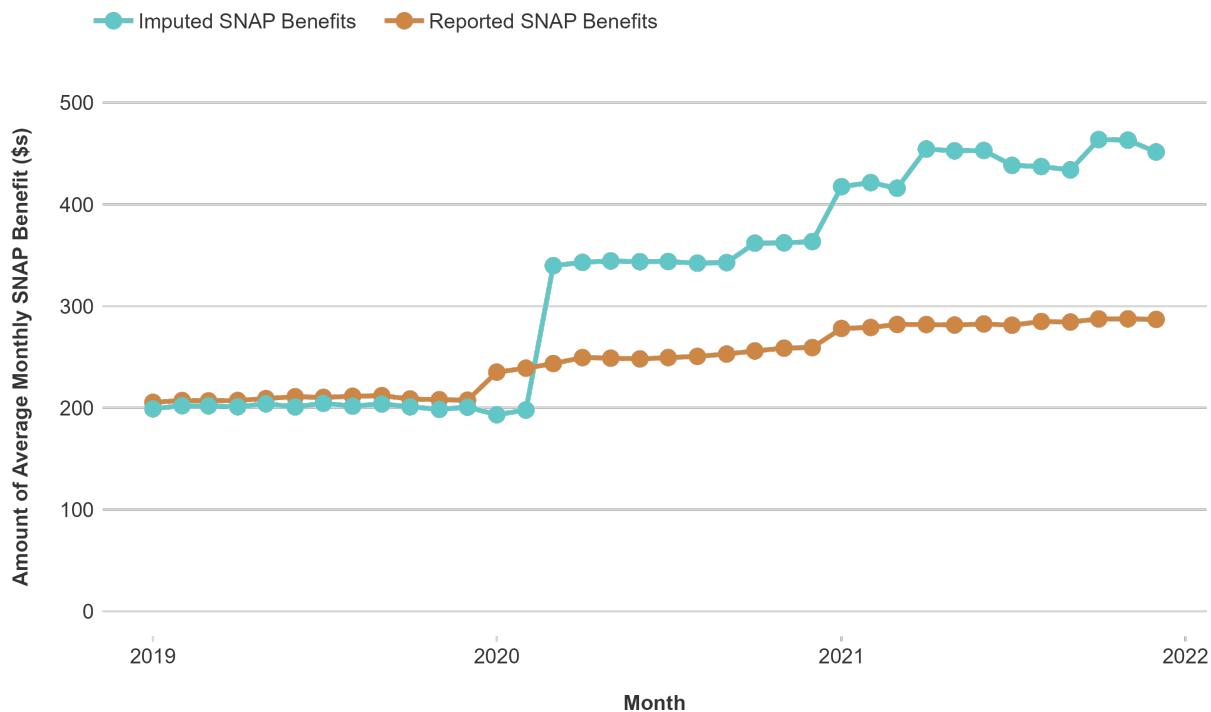
Other outcomes available in the SIPP are related to household balance sheets which I use to test if improvement to food security coincided with any major changes to household financials. The survey captures detailed information on household income and assets which I use to examine how additional financial assistance impacted credit and savings. I focus on binary measures of having savings at a financial institution and having credit as well as a continuous measure of credit and savings. The SIPP collects details on household financials at the end of each calendar year, so these also represent annual outcomes.

The main independent variable of interest is an imputed, annual measure of additional financial support. While the SIPP reports information on SNAP receipt and benefit amounts, these tend to be underreported, and the averages do not reflect policy changes that should have impacted the total amount of SNAP benefits received (Giefer, King, and Roth 2022). The SIPP also asks directly about advanced CTC payments, although the amounts reported there do not always match the number of related children in the household or total biological children an individual has and frequently take values that would not be possible for households with income under the adjusted CTC phase-out thresholds for 2021. As a result, I impute benefit eligibility and amounts for SNAP, SNAP EA, P-EBT, and the advanced CTC using monthly household characteristics and income.

I constructed calculators that take household characteristics for each month, estimate SNAP eligibility and a minimum and maximum expected SNAP benefit given various deductions that a household may take. This SNAP calculator is then used to estimate SNAP EA payments to each household and the fifteen percent overall increase to SNAP benefits for January through September 2021. I created a separate calculator to estimate annual P-EBT benefits that takes each child's age, educational enrollment, and reported information on school closure and typical school meal receipt. Policy details all come from publicly available information from the USDA on SNAP policy and state plans for P-EBT that are merged onto the SIPP. More details on this imputation process can be found in the data appendix.

Figure 5 highlights the monthly imputed SNAP values relative to the reported values in the SIPP among households who reported receiving SNAP benefits. While the reported monthly benefits are relatively close in 2019, they do not capture the landscape of changing policies seen in 2021 and 2022 and appear to miss large policy changes related to the introduction of EA benefits, cost of living adjustments, and other benefits. According to

Figure 5: Changes to Average Amount of Financial Assistance Over Time For Low- and Middle-Income Households



Source: 2020-2023 SIPP Surveys.

Notes: Averages are taken for the sample of households who were eligible for and reported receiving SNAP.

the USDA, total SNAP benefits increased dramatically in fiscal year 2021 to \$113.8 billion (Jones, Toossi, and Hodges 2022). The total reported values of SNAP benefits in the SIPP fall substantially short of that, estimated at \$52 billion in total SNAP benefits received by households in the US for fiscal year 2021. The monthly imputed values over the same time period get much closer, estimating \$109 billion in total SNAP benefits. While the imputed measures more closely reflect the overall amount of benefits dispersed by these programs, I also show below that results estimated using reported SNAP and advanced CTC measures are similar in direction and magnitude to those from my imputed measures.

After monthly values are created, I aggregate to a measure of annual financial assistance from each policy and overall. The main independent variable of interest is the overall annual measure of federal financial assistance a household received net any regular SNAP payments they would have reasonably expected to continue in 2020 and 2021 absent the federal policy changes that occurred. This represents the expected exogenous change to financial assistance that households received during the pandemic.

4 Estimating the Relationship Between Financial Assistance and Food Insecurity

Assessing the impact of financial assistance that households were eligible for on their food security requires that the amount of assistance received by households varied exogenously. As previously discussed, the amount of assistance received is driven primarily by household characteristics such as the number and age of children, and state participation in various federal programs. To a lesser extent, income was a driver of child tax credit amounts for those above the first income phase-out limit and SNAP EA amounts given that they depended on original SNAP benefits. In general, financial assistance amounts were made without much lead time and among dimensions that would be hard for households in my sample to change, making the shifts in assistance from these programs a plausibly exogenous source of variation. The main analysis uses the variation in benefit amounts created by the different policies within households over time to estimate how transfers affect food insecurity. I do so with a two-way fixed-effects model with household and year fixed effects shown in the equation here. These estimate the probability that a given household, i , is food insecure in year t given the amount of financial assistance above any anticipated SNAP they were expected to receive.

$$Pr(y_{it} = 1) = \beta_{assistance_{it}} + \sum \beta_j X_{it} + household_i + year_t + \epsilon_{it}$$

The coefficient of interest is $\beta_{assistance_{it}}$ which estimates the impact of an additional \$1,000 of federal assistance on the probability that the outcome of interest (food insecurity, very low food security, etc.) occurs. I report regression results that only include household and year fixed effects, but also those with additional covariates for household characteristics that may change over time and are linked to the amount of financial assistance received and food insecurity or financial well-being outcomes. These covariates include indicators for household size, the number of children in a household, gross monthly income measured at the end of each calendar year, and the householder's employment status at the end of each calendar year.

I run these models as linear probability models for the binary outcomes. They therefore estimate the likelihood of a household experiencing food insecurity or very low food security given the year and changes to their income, marital status, number of children, and level of financial assistance received. Conditional logistic regression models can also be used to estimate regressions with binary outcome variables, but these models only retain households who have variation in the outcome of interest. As a result, households who received different levels of assistance but did not have their food security status change are not used to estimate

the treatment effect, dropping important variation from the estimate and complicating interpretation of the results. Nonetheless, my results are similar in direction and magnitude when using a conditional logit to estimate the effects.

I then test how results vary for different types of households by estimating the effect of financial assistance using the same formula for various subsets of households in the SIPP. In particular, I look at differences in the effect among just low-income households with income under 150% of the poverty line and liquidity constrained households who reported have access to no savings or no credit in the year they were first surveyed. I interact the treatment variable with demographic indicators to test if there are differences in impacts based on householder sex, marital status, or race.

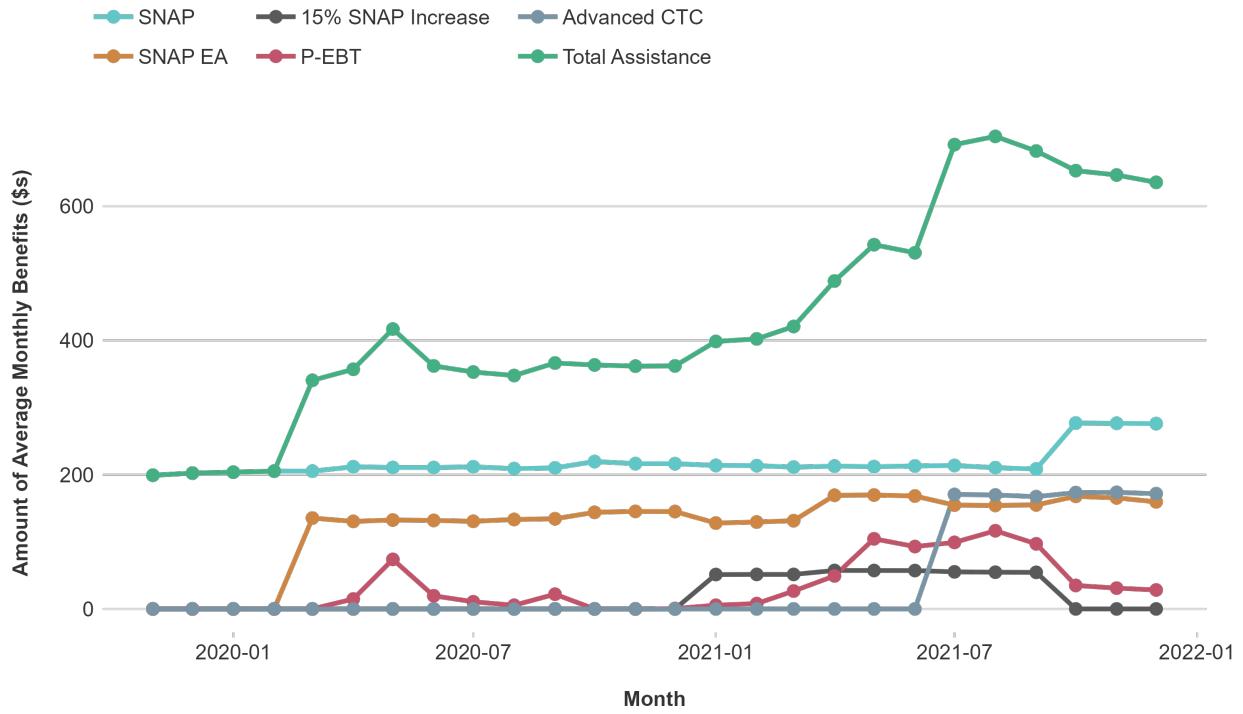
In subsequent analyses, I demonstrate that my results are not sensitive to my sample selection decisions. Given observations of households in the SIPP across several panels and different possible years, my main results are based on an unbalanced sample of households. I show that the magnitude of the estimates are similar when using a balanced sample for just the two pandemic years (2020 and 2021) or a balanced sample for 2019 through 2021 from just the 2020 SIPP panel.

5 Results Show That Financial Assistance Reduced Food Insecurity

The imputed annual amounts of financial assistance households received varied considerably from year to year as shown in Figure 1. Relevant for comparisons to other research, there was also substantial variation within each year. Figure 2 shows the monthly payments the average household with income under 300% of the poverty line would expect to receive each month between 2019 and 2022. In 2019, payments not otherwise counted in gross income came only from SNAP. Then, starting early 2020, EA payments increased average SNAP recipients benefits by a little more than \$100. Later in the year, initial P-EBT payments were issued with more substantial benefits in the middle of 2021 and lower benefits in 2022.

Figure 6 highlights that several pandemic programs were phasing in or out around the same time. Therefore research on a single policy, such as the advanced CTC payments, may be biased if it does not also account for the fact that many household were receiving substantial lump sum payments through P-EBT around the same time, that EA payments had increased on average a few months earlier due to a new minimum benefit amount of \$95 per month, and that the 15% overall increase to SNAP benefits expired while there was also a corresponding cost of living adjustment to SNAP as CTC payments were being made.

Figure 6: Changes to Average Amount of Financial Assistance Over Time For Low- and Middle-Income Households



Source: 2020-2023 SIPP Surveys.

Notes: Averages are taken for a subset of households who reported receiving SNAP benefits each month.

The direction of any bias is hard to determine and likely depends on the exact time frames being considered. By using a continuous measure of the total federal assistance received from each of these programs applied to a panel of households that are observed over several years, my results provide additional context to these results and may serve as upper bounds for the types of impacts we expect to see on food insecurity and financial well-being outcomes during this period.

5.1 Financial Assistance Reduced Pandemic Food Insecurity

Consistent with past research on financial assistance and food insecurity, increases in the financial assistance households received during the pandemic lowered the likelihood that they were food insecure during the year. Table 3 reports results from the linear probability models for binary treatment outcomes for a household being food insecure (low or very low food security) and having very low food security. By including the fixed effects and indicators for household size and number of children, the analyses only compare differences in the likelihood of the outcomes that stem from changes to financial assistance households receive

Table 3: Food Security Regression Results for the Main Sample (Income \leq 300% of Poverty Line)

	Food Insecurity (1)	Food Insecurity (2)	Very Low Food Security (3)	Very Low Food Security (4)
Additional Assistance (1000s of Dollars)	-0.0092** (0.0033)	-0.0104** (0.0035)	-0.0030 (0.0022)	-0.0029 (0.0024)
Household and Year FEs	Yes	Yes	Yes	Yes
Household Characteristic	No	Yes	No	Yes
N	10337	10337	10337	10337
# Households	4773	4773	4773	4773

Note: All regression results use a panel of SIPP respondents who are present for all months in each calendar year they could have been observed for the years from 2019 through 2021. This includes 2019 through 2021 for the 2020 SIPP panel, 2019 and 2020 for the 2018 SIPP panel, and 2020 and 2021 for the 2022 SIPP panel. The sample is also restricted to households who had annual income in all years that was 300% or less of the federal poverty line. Food security is measured annually and the coefficient of interest captures the impact of additional financial assistance on the likelihood of being food insecure. All of the models reported here include household and year fixed effects. Household characteristics controlled for include marital status, number of children, gross monthly income, employment status at the end of each year, if a household experienced a job loss during the year, and if a household was eligible for SNAP during the year. Standard errors are clustered at the household level.

* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

due to policy changes affecting specific household types and not changes to a household's composition during the panel. Including covariates in the second model for each outcome accounts for time-varying characteristics that would influence both food insecurity and the amount of assistance we expect the household to receive. The included covariates are householder marital status, the number of children in the household, average monthly income, employment status at the end of the year, SNAP eligibility at the end of the year, and any job loss during the year.

These results indicate that an additional \$1000 of financial assistance a household received during the pandemic reduced the likelihood of food insecurity by 1.0 percentage points. The average household with income less than 300 percent of the poverty line saw their non-SNAP assistance increase by about \$1,600 in 2021 relative to 2020. Given the scale of the transfers, my results suggest that transfers reduced the average likelihood of food insecurity by 1.6 percentage points. Relative to the baseline of roughly 21.0 percent of households in the sample being food insecure in 2019, these are meaningful effect sizes. An additional \$1,000 of assistance in 2020 or 2021 reduced the likelihood that a household is food insecure by 4.8 percent and would result in nearly 250,000 households experiencing food insecurity.

The estimated coefficients for the likelihood a household experiences very low food security are smaller and not statistically significant. Therefore, additional financial assistance

appears to have primarily aided households experiencing more moderate levels of food insecurity but did not significantly reduce the most severe forms of food insecurity, at least as reported over an entire year. This matches roughly with a descriptive analysis of the percentage of households responding affirmatively to each food security question in the SIPP. The proportion of households answering affirmatively to the more mild food insecurity questions about their food not lasting or not being able to afford declined consistently throughout the pandemic. Affirmative responses to more severe questions such as frequently skipping or cutting meals or being hungry but not eating declined from 2019 to 2020 and then saw substantially smaller declines in 2021.

The lack of results on more severe food insecurity outcomes could be the case because the financial component driving very low food security—already at a fairly low level—is addressed reasonably well by regular SNAP benefits. The lowest-income households most likely to have very low food insecurity are also most likely to receive the greatest regular SNAP benefits and therefore receive less from SNAP EA than other households. Therefore, additional improvements on the most severe forms of food insecurity require non-financial interventions. It is possible that much of the causes of very low food security are environmental in nature and therefore outside the scope of this research. For example, if very low food security is most prevalent among those in food deserts or for households with disabled members, that variation would be captured by the household fixed effects.

My overall results are similar to estimates found by past research examining the impact of state level variation in safety-net programs between 2001 and 2009 on low-income, single parent households' food insecurity. They used data from the full set of food security outcomes in the CPS and concluded that an additional \$1,000 in assistance reduced the incidence of food insecurity by 1.1 percentage points Schmidt, Shore-Sheppard, and Watson 2016. The similarity of my findings to past research on similar programs providing both cash and cash-like assistance to households indicates that these programs continue to play an important role in reducing food insecurity.

5.2 Effects Are Similar for Low-Income and Liquidity Constrained Households

Research looking at P-EBT, SNAP EA, and advanced CTC payments found that their impacts on food hardship were concentrated primarily among low-income households. The bulk of the increase in financial assistance outside of what was provided by the advanced CTC payments was targeted to low-income households. Table 4 reports results for a subset of households with income under 150 percent of the poverty line. For these households, an

Table 4: Food Security Regression Results for the Low-Income Sample (Income \leq 150% of Poverty Line)

	Food Insecurity (5)	Food Insecurity (6)	Very Low Food Security (7)	Very Low Food Security (8)
Additional Assistance (1000s of Dollars)	-0.0122** (0.0046)	-0.0125** (0.0048)	-0.0031 (0.0033)	-0.0036 (0.0037)
Household and Year FEs	Yes	Yes	Yes	Yes
Household Characteristic	No	Yes	No	Yes
N	5090	5090	5090	5090
# Households	2335	2335	2335	2335

Note: All regression results use a panel of SIPP respondents who are present for all months in each calendar year they could have been observed for the years from 2019 through 2021. This includes 2019 through 2021 for the 2020 SIPP panel, 2019 and 2020 for the 2018 SIPP panel, and 2020 and 2021 for the 2022 SIPP panel. The sample is also restricted to households who had annual income in all years that was 150% or less of the federal poverty line. Food security is measured annually and the coefficient of interest captures the impact of additional financial assistance on the likelihood of being food insecure. All of the models reported here include household and year fixed effects. Household characteristics controlled for include marital status, number of children, gross monthly income, employment status at the end of each year, if a household experienced a job loss during the year, and if a household was eligible for SNAP during the year. Standard errors are clustered at the household level.

* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

additional \$1000 in assistance during the pandemic reduced their likelihood of experiencing food insecurity by 1.3 percentage points relative to a base of 25.9 percent of these households who were food insecure. Given the roughly \$1,700 increase in non-SNAP assistance these households received on average, these findings indicate that their likelihood of experiencing food insecurity in 2021 was 2.3 percentage points lower than expected if federal assistance had not increased. Once again, the impact of additional assistance on very low food security was smaller and not statistically significant.

I anticipated that a key component of the benefits of the assistance provided by the pandemic policies would be that the large, monthly transfers would particularly help households who were liquidity constrained. I tested that by estimating effects for the same outcomes using a subset of households who reported not having any credit card debt at the end of the first year that they were observed. I did the same for a smaller subset who reported having no savings or assets at a financial institution. This measure is broad in the SIPP, including nearly every financial asset that could constitute an emergency fund for households. As a result, my no savings group is relatively small for each panel that I examine in the SIPP.

Table 5 reports the results for replicating the same regressions for each of these subsets. The magnitude of impacts for the no credit sample is similar to those found for the overall sample, but the impacts are smaller and not statistically significant for the sample reporting

Table 5: Food Security Regression Results for Liquidity Constrained Sample

	No Credit Access		No Savings	
	Food Insecurity	Very Low Food Security	Food Insecurity	Very Low Food Security
	(1)	(2)	(3)	(4)
Additional Assistance (1000s of Dollars)	-0.0099*	-0.0009	-0.0004	0.0075
Household and Year FEs	Yes	Yes	Yes	Yes
Household Characteristic	Yes	Yes	Yes	Yes
N	6927	6927	1576	1576
# Households	3200	3200	717	717

Note: All regression results use a panel of SIPP respondents who are present for all months in each calendar that they could have been observed for the years from 2019 through 2021. This includes 2019 through 2021 for the 2020 SIPP panel, 2019 and 2020 for the 2018 SIPP panel, and 2020 and 2021 for the 2022 SIPP panel. The sample is also restricted to households who had annual income in all years that was 300% or less of the federal poverty line and reported not having credit or savings when first observed. Food security is measured annually and the coefficient of interest captures the impact of additional financial assistance on the likelihood of being food insecure. All of the models reported here include household and year fixed effects. Household characteristics controlled for include marital status, number of children, gross monthly income, employment status at the end of each year, if a household experienced a job loss during the year, and if a household was eligible for SNAP during the year. Standard errors are clustered at the household level.

* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

having no savings. For the no credit sample, after controlling for household size and income and employment changes, the impact of an additional assistance is statistically significant and suggest a 0.9 percentage point decline in the likelihood of low food security for every \$1000 in additional assistance. This is slightly lower than what was found for the overall sample. On the other hand, the magnitude of this estimate for the sample with no savings is not statistically significant and suggests a 0.3 percentage point decline in the likelihood of low food security for an additional \$1000 in assistance.

Overall, the results for both the low-income sample and the credit-constrained sample do not yield results that are statistically different from those for the overall sample. While the impact for the low-income sample was larger, the estimated coefficient still represents a five percent decline in the likelihood of food insecurity for every \$1,000 of assistance given differences in the base rates of food insecurity for the overall and low-income samples. The lack of notable findings for the liquidity constrained households may stem partly from challenges fully determining access to credit or savings from reported measures of the balances that households have at the end of each year. Additional research should explore different data sources with better measures of credit access and savings.

5.3 Main Results Are Robust to Sample Selection and Using Reported Values

My samples use an unbalanced sample from the SIPP to maximize the number of households included that are observed during the pandemic and at least one other year. This results in households being observed at least twice between 2019 and 2020, however households from the 2020 SIPP panel are observed over all three years. Given sampling challenges during the pandemic, there tend to be fewer observations from the 2020 panel than the other panels for which households are observed twice in this time period. There are also considerably more households observed in 2019, a pre-treatment year, than in 2021.

I test if my results are sensitive to the sample selection by estimating results for two alternative sample constructions that are balanced. The first drops the pre-treatment year and looks at just a balanced sample of households who were surveyed about both 2020 and 2021. The second is a balanced sample of 791 households from the 2020 SIPP panel who were observed for all three years. In addition to the different samples, I also test if my results differ when I use reported SNAP and advanced CTC payment values reported in the SIPP. Results from these regressions for both the overall sample and low-income sample are in Table 6.

The estimated impacts of additional food assistance on food insecurity are slightly larger but similar when using both of the balanced samples. Neither estimates results that are statistically distinct from my main results and both sets of results would lead to identical overall conclusions. Differences between the estimates for the overall and low-income sample are slightly higher than those found before. The same is true when using the reported values, although now we estimate slightly larger overall impacts. However, given that most households reported values that were lower than what was imputed, the overall impacts of the policies are similar. Given the underreporting challenges with SNAP in the SIPP, I expect the imputed values to more reliably capture the overall impacts of the policy changes.

5.4 Which Food Insecurity Outcomes Are Impacted

The results shown above demonstrate that financial assistance broadly impacted food insecurity. However, food insecurity contains several different aspects including food you can afford not lasting (food insufficiency), not being able to afford balanced meals, having to cut or skip meals, and going hungry without eating. As already noted, the impacts appeared to primarily impact questions contributing to low food insecurity that are asked of all respondents and less to more severe forms of food insecurity. The results in Figure 7 reinforce that. Here, I generate result for all six food insecurity questions in the SIPP as

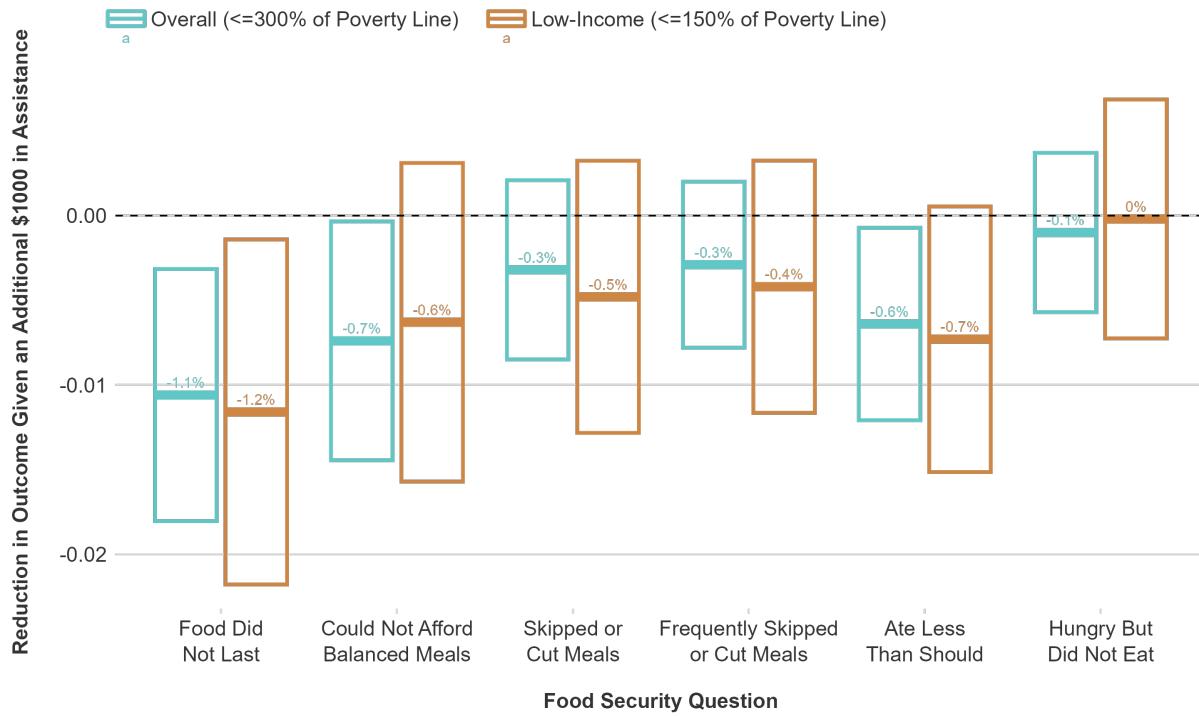
Table 6: Food Security Regression Results for Balanced Samples and Treatment Using Reported SNAP and CTC Amounts

Balanced Panel: Pandemic Years Only (2020-2021)				
	Overall Sample (≤300% of Poverty)		Low-Income Sample (≤150% of Poverty)	
	Food Insecurity	Very Low Food Security	Food Insecurity	Very Low Food Security
Additional Assistance (1000s of Dollars)	-0.0126** (0.0041)	-0.0028 (0.0028)	-0.0166** (0.0058)	-0.0030 (0.0037)
Household and Year FEs	Yes	Yes	Yes	Yes
Household Characteristic	Yes	Yes	Yes	Yes
N	4046	4046	2048	2048
# Households	2023	2023	1024	1024
Balanced Panel: 2020 SIPP Panel (2019-2021)				
	Overall Sample (≤300% of Poverty)		Low-Income Sample (≤150% of Poverty)	
	Food Insecurity	Very Low Food Security	Food Insecurity	Very Low Food Security
Additional Assistance (1000s of Dollars)	-0.0118* (0.0047)	-0.0032 (0.0035)	-0.0159* (0.0068)	-0.0077 (0.0058)
Household and Year FEs	Yes	Yes	Yes	Yes
Household Characteristic	Yes	Yes	Yes	Yes
N	2373	2373	1269	1269
# Households	791	791	423	423
Reported SNAP and CTC Values				
	Overall Sample (≤300% of Poverty)		Low-Income Sample (≤150% of Poverty)	
	Food Insecurity	Very Low Food Security	Food Insecurity	Very Low Food Security
Reported Assistance (1000s of Dollars)	-0.0158** (0.0054)	-0.0042 (0.0037)	-0.0213** (0.0076)	-0.0069 (0.0054)
Household and Year FEs	Yes	Yes	Yes	Yes
Household Characteristic	Yes	Yes	Yes	Yes
N	10337	10337	5090	5090
# Households	4773	4773	2335	2335

Note: Each sample is also restricted to households who had annual income in all years that was either 300% or less or 150% or less of the federal poverty line. Food security is measured annually and the coefficient of interest captures the impact of additional financial assistance on the likelihood of being food insecure. All of the models reported here include household and year fixed effects and variables for household characteristics that could change over time. Household characteristics include marital status, number of children, gross monthly income, employment status at the end of each year, if a household experienced a job loss during the year, and if a household was eligible for SNAP during the year. Standard errors are clustered at the household level..

* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

Figure 7: Impacts to Specific Food Security Questions Over Time For Low- and Middle-Income Households



Source: 2020-2023 SIPP Surveys. Notes: Note: All regression results use a panel of SIPP respondents who are present for all months in each calendar that they could have been observed for the years from 2019 through 2021. This includes 2019 through 2021 for the 2020 SIPP panel, 2019 and 2020 for the 2018 SIPP panel, and 2020 and 2021 for the 2022 SIPP panel. The sample is also restricted to households who had annual income in all years that was 300% or less of the federal poverty line. All of the models include household and year fixed effects. Household characteristics controlled for include marital status, number of children, gross monthly income, employment status at the end of each year, if a household experienced a job loss during the year, and if a household was eligible for SNAP during the year. Standard errors are clustered at the household level.

well as the numerical count of affirmative answers that forms the raw food security score.

The largest impact, and the result driving most of the declines in food insecurity documented above, are a drop in affirmative answers to the first food security question that roughly corresponds to annual food insufficiency of 1.1 percentage points for every \$1000 of additional financial assistance. The question asks if it was often, sometimes, or never true that the food the household bought did not last and they did not have money to get more. Significant results also exist for not being able to afford balanced meals and eating less than one should, but the magnitudes of these effects are lower. This trend is true for both the main sample and just low-income households, although only the effect on food not lasting is significant for the low-income sample.

The large impact on annual food insufficiency relative to other food insecurity outcomes

matches shorter-term examinations of food hardship and program receipt during the pandemic. Studies of both P-EBT and SNAP EA payments during the pandemic have shown that receipt of these payments reduced the likelihood that a household experiences food insufficiency in the prior week as reflected in cross sections from the Census Pulse Survey. In particular, the survey captures if a household reported sometimes or often not having enough to eat in the past seven days. Research has shown that across various demographic groups, food insufficiency measured at the annual level is closely correlated to food insecurity at the annual level, but differences in timing complicate direct comparisons to the past pandemic research (Schanzenbach and Pitts, 2020).

5.5 Financial Assistance Increases Likelihood of Having Savings With No Other Balance Sheet Effects

In addition to food insecurity, I also examined if additional financial assistance impacted household balance sheets and may improve financial well-being. Future research should attempt to apply similar methods to different data sources containing information on subjective financial well-being. Outcomes available for this in the SIPP are the likelihood of a household having any savings or credit card debt at the end of the year and the amount of the balances. Answering this question on its own is important, particularly if financial assistance programs can serve the dual purpose of improving household balance sheets while also reducing food insecurity. However, it is also important to test that any improvements to food security do not correspond with declines in savings or increases in debt that may partially contribute to the results reported above.

I test the impact of financial assistance during the pandemic on balance sheet outcomes following the same process used for food insecurity. Table 6 reports the impact of an additional \$1000 of financial assistance on each outcome for the overall sample of households with earnings under 300% of the poverty line. I only report the coefficients for models that included household characteristics.

The results provide evidence that additional financial assistance did not correspond with negative impacts on household balance sheets. Impacts on savings, credit card debt, and the likelihood of having credit card balances at the end of the year are all small and not statistically distinguishable from zero. Increased assistance does seem to have a small impact on the likelihood that a household has any savings. An additional \$1000 in assistance corresponds to a 0.7 percentage point increase in the likelihood that the household reports having savings. This is a relatively minor change, but does suggest that these programs may have helped some households start savings.

Table 7: Balance Sheet Regression Results for Overall Sample (Income \leq 300% of Poverty Line)

	Has Savings (1)	Has Credit Card Debt (2)	Total Savings (\$) (3)	Total Credit Card Debt (\$) (4)
Additional Assistance (1000s of Dollars)	0.0072** (0.0028)	-0.0065 (0.0034)	-153.54 (247.12)	41.49 (46.41)
Household and Year FEs	Yes	Yes	Yes	Yes
Household Characteristic	Yes	Yes	Yes	Yes
N	10337	10337	10337	10337
# Households	4773	4773	4773	4773

Note: All regression results use a panel of SIPP respondents who are present for all months in each calendar that they could have been observed for the years from 2019 through 2021. This includes 2019 through 2021 for the 2020 SIPP panel, 2019 and 2020 for the 2018 SIPP panel, and 2020 and 2021 for the 2022 SIPP panel. The sample is also restricted to households who had annual income in all years that was 300% or less of the federal poverty line. Credit and savings measures are captured as of the end of each calendar year. All of the models reported here include household and year fixed effects. Household characteristics controlled for include marital status, number of children, gross monthly income, employment status at the end of each year, if a household experienced a job loss during the year, and if a household was eligible for SNAP during the year. Standard errors are clustered at the household level.

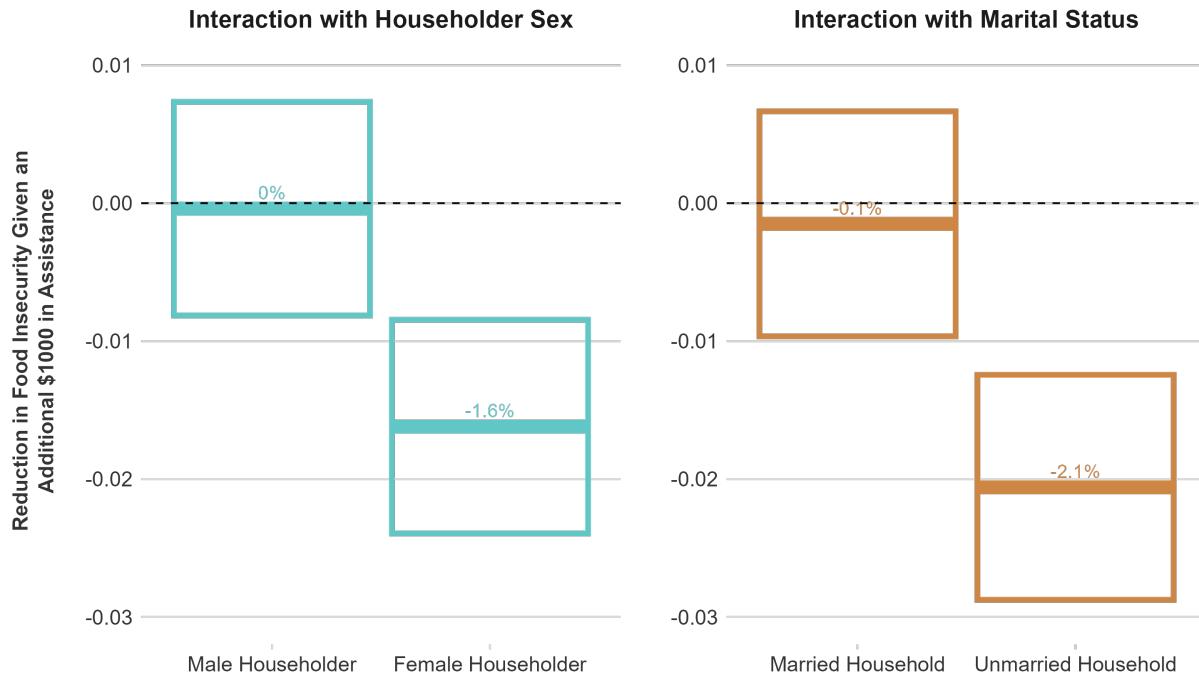
* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

5.6 Who Benefited the Most From Pandemic Financial Assistance

Past research has found that low-income households benefited the most from pandemic policies aimed at reducing poverty and food insecurity. These studies do this primarily by restricting their analytic samples based on reported income or SNAP receipt. As noted above, I only find minor increases to the effects of assistance for low-income households relative to my full sample of low- and middle-income households. I further test if there are differences in outcomes for traditionally disadvantaged households by interacting my continuous measure of financial assistance with variables for householder marital status, race, and sex. I determine that the impacts of the additional assistance on food insecurity are concentrated among unmarried and female-headed households. I find little evidence of differences in the benefits of additional financial assistance for households of different race.

Figure 8, highlights differences in the impact of an additional thousand dollars in financial assistance on the likelihood that a household experiences low food insecurity using a model that interacts the treatment variable with household marital status and the gender of the household head. I find significant interaction terms for both outcomes that indicated the impacts of an additional thousand dollars of financial assistance on the likelihood of food insecurity are stronger for unmarried households and female-headed households. While additional financial assistance had only a small impact on the likelihood that married house-

Figure 8: Interaction Regression Results for the Overall Sample (Income \leq 300% of the Poverty Line)



Source: 2020-2023 SIPP Surveys. Notes: Note: All regression results use a panel of SIPP respondents who are present for all months in each calendar that they could have been observed for the years from 2019 through 2021. This includes 2019 through 2021 for the 2020 SIPP panel, 2019 and 2020 for the 2018 SIPP panel, and 2020 and 2021 for the 2022 SIPP panel. The sample is also restricted to households who had annual income in all years that was 300% or less of the federal poverty line. All of the models include household and year fixed effects. Household characteristics controlled for include marital status, number of children, gross monthly income, employment status at the end of each year, if a household experienced a job loss during the year, and if a household was eligible for SNAP during the year. Standard errors are clustered at the household level.

holds experienced food insecurity, an additional thousand dollars reduced the likelihood that unmarried households experienced food insecurity by two percentage points. A similar trend is true for male vs. female headed households.

5.7 Comparing Panel and Cross-Sectional Results

The major advantage of using data from the SIPP relative to other annual or more frequent surveys conducted during the pandemic is its panel structure. Depending on the exact panel they belong to, I am able to observe households in the SIPP over two or three years, use household characteristics, income, and state policy details to predict monthly pandemic program benefit receipt and the amounts received, and then estimate the impact

of annual assistance on annual food insecurity outcomes.

By including household-level fixed effects, I control for unobservable household characteristics that do not change over time and are linked to both food insecurity outcomes and the amount of assistance a household receives. In studies of policy changes during the pandemic relying on cross sectional data like the Census Pulse Surveys, this is not possible because households are not followed over time. Instead, researchers attempt to construct comparisons between groups that are as similar as possible by including state and year fixed effects and controls for any relevant demographic characteristics available in their data.

However, many factors that are hard to observe and not captured in these surveys, such as household food preferences, ability to obtain food, financial knowledge and skills, may confound these efforts. The fact that my results rely only on the variation in financial assistance within households and the fact that my sample excludes movers, means that my fixed effects control for these non-varying household characteristics in addition to local factors that may be linked to both the treatment and the outcome and do not change over time.

To demonstrate the importance of being able to access panel data to assess the impacts of policy changes, I compared my results to models that treated my sample from the SIPP as if it were multiple cross section. I estimate effects similarly to those for the main analysis, but include a series of demographic controls in place of household fixed effects. Controls for the cross-sectional regressions include household monthly income, SNAP eligibility, job loss, and number of children, and householder age, marital status, education, race/ethnicity, citizenship status, sex, and employment status. These are similar controls to those available in the Census Pulse data. I estimate outcomes both with and without state-level fixed effects.

I compare these results to a conservative estimate of the impact of additional financial assistance from my estimates with household fixed effects and no covariates to highlight the importance of these unobservables and how my conclusions about the impact of pandemic policies would have changed were it not for the ability to include household fixed effects. The estimate for the impact of an additional \$1000 of assistance on the likelihood of food insecurity are found in Figure 9 using the same sample of households for both the main sample with incomes under 300% of the poverty line and the low-income sample with incomes under 150% of the poverty line.

The results from the cross-sectional methods estimating the impact of financial assistance on food insecurity are consistently smaller than what is estimated from regressions with only household and year fixed effects. For the overall sample, a cross sectional model estimates that an additional thousand dollars of financial assistance reduced the likelihood of low food security by 0.5 percentage points compared to 0.9 percentage points from my panel

Figure 9: Comparing Cross Sectional and Panel Regression Results



Source: 2020-2023 SIPP Surveys. Notes: Note: All regression results use a panel of SIPP respondents who are present for all months in each calendar year that they could have been observed for the years from 2019 through 2021. This includes 2019 through 2021 for the 2020 SIPP panel, 2019 and 2020 for the 2018 SIPP panel, and 2020 and 2021 for the 2022 SIPP panel. The sample is also restricted to households who had annual income in all years that was either 150% or 300% or less of the federal poverty line. All of the models include household and year fixed effects. Household characteristics controlled for include marital status, number of children, gross monthly income, employment status at the end of each year, if a household experienced a job loss during the year, and if a household was eligible for SNAP during the year. Standard errors are clustered at the household level.

model. While the results are still statistically significant when focused on just the low-income sample, they also result in lower estimates of the impacts of the policies on food insecurity. Past research may underestimate the impact of pandemic policy changes because the available data does not allow them to fully account for the relationship between household characteristics, financial assistance, and food insecurity.

6 Conclusions and Policy Relevance

My results provide a causal estimate of combined impact of all programs providing additional assistance to low-income households and those with children on their likelihood of being food insecure. While past research has demonstrated the value of these programs individually, substantial increases to all programs in 2021 represents a novel environment to study the impact of large increases to these programs above their baseline level. Prior studies have also been limited by cross-sectional data and shorter-term measures of food hardship. More recently available data from the SIPP allows me to more accurately estimate the causal impact of assistance on a more detailed measure of food insecurity.

I find that households with incomes as high as 300 percent of the poverty line benefited from receiving larger amounts of financial assistance during the pandemic. This occurred with no significant impact to household balance sheets although households were slightly more likely to report having any savings. SNAP, tax credits, and other safety net programs have served as an important means to promote food security and financial well-being among low-income households, and this continued to be the case during the pandemic.

My findings suggest that increasing the amount of financial assistance a household received by \$1000 reduces food insecurity by 1.0 percentage points. This estimate indicates that the average household who received \$1600 in additional financial assistance in 2021 was 1.6 percentage points or 7.7 percent less likely to experience food insecurity than would otherwise be the case. The impact for just low-income households and households that did not have access to credit were slightly larger or about the same. This represents a substantial decline in the number of households who did not go hungry because of the policy changes enacted during the pandemic. My sample from the SIPP suggests that this change in assistance resulted in 386,000 fewer households being food insecure in 2021 than if benefit levels were kept constant.

While food insecurity represents one substantial measure of material well-being, future research should explore different outcomes in the SIPP. The continuous nature of the treatment variable also lends itself to other analyses of the relationship between assistance, poverty, and well-being looking at potential discontinuities and non-linear trends that exist. Performing

similar analyses with different data sources can also help to explore other outcomes such as financial well-being.

Overall, my findings suggest that there is significant room for state and federal governments to increase assistance to needy families and that doing so would meaningfully reduce food insecurity. While the pandemic represents a unique economic and policy environment, the fact that increases of average assistance of thousands of dollars to some households had an impact on their food insecurity means that there is more hunger and malnutrition in the United States than is necessary.

As food insecurity has steadily increased since 2021 and SNAP is becoming less generous for households across the US, we appear to be moving in the opposite direction. My research indicates the collective importance of multiple policies to address food insecurity. Where federal assistance is becoming less generous, states may be able to play a role in filling the gap. Future research efforts should seek to understand the several changes that states have made to the CTCs and EITCs on food insecurity and how those changes interact with federal programs and other state efforts that exist.

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Table 8: SIPP Coverage By Reference Year and Panel

SIPP Panel	Calendar Year			
	2019	2020	2021	2022
2018	X (N=5,888)	X (N=5448)		
2020	X (N=3,346)	X (N=2,061)	X (N=1,605)	X (N=1,338)
2021		X (N=2,731)	X (N=1,424)	X (N=1,137)
2022			X (N=4,510)	X (N=2,656)

7 Data Appendix

7.1 SIPP Data

The analyses conducted for this paper rely primarily on household-level data provided by the Census Bureau’s Survey of Income and Program Participation (SIPP). The SIPP is a nationally representative longitudinal survey examining income, employment, household composition, government program participation, economic well-being, and food security among other topics. Therefore, it is among the best sources to answer questions concerning the amount of financial assistance received from federal programs and how that impacts food security and financial wellbeing.

Since its redesign in 2014, the SIPP has been conducted as a series of overlapping panels where each respondent is interviewed annually over four years (Bureau 2023). Given data availability and the timing of the policy changes examined for my research questions, I collect data from the 2020, 2021, 2022, and 2023 SIPP. These surveys cover the reference years from 2019 through 2022 and contain information on three panels commencing in 2019, 2020, and 2021. The 2020 and 2021 SIPP also contain the final two survey years of the 2018 panel. The table below shows which panels were interviewed in each SIPP survey and corresponding reference year.

As the discussion and table above emphasize, households are interviewed in a given SIPP survey about their income, employment, program receipt, and other topics of interest for the preceding calendar year. While many topics addressed in the SIPP are covered monthly and the SIPP overall employees a person-month structure, some variables used in my analysis

are only collected at an annual level either encompassing the entire year or taken at the end of the year as is the case for many asset and debt measures in the survey.

I downloaded microdata available from the Census website for the 2020 through 2023 SIPP surveys including replication and longitudinal weights which I subsequently merged onto the data. Each survey was then cleaned to create household-level variables for the analysis that are consistent across the surveys. Finally, I stacked the surveys in order to take advantage of the panel nature of the SIPP. The panel nature of the survey and analysis is very valuable to my analyses, because it allows me to control for unobservable characteristics within households that do not change over time. Because not every panel is surveyed across every year, most of my analyses subset to just a balanced panel of individuals who were available and responded in each of the survey years being examined (i.e. an analysis focusing on changes in financial assistance in the two-period case covering 2021 and 2022 would include only individuals from the 2020 and 2021 panels who responded in both years). However, future analyses will pull from

7.1.1 Measuring Food Insecurity in the SIPP

Measures of food insecurity in the SIPP apply questions and constructs from the USDA who define food insecurity as “the limited or uncertain ability of nutritionally adequate and safe foods, or limited or uncertain ability to acquire acceptable foods in socially acceptable ways” (Rabbitt, Hales, and Reed-Jones 2025b). The SIPP captures measures of low food security where “households reduced the quality, variety, and desirability of their diets, but the quantity of food intake and normal eating patterns were not substantially disrupted,” and very low food security where “at times during the year, eating patterns of one or more household members were disrupted and food intake reduced because the household lacked money and other resources for food (Rabbitt, Hales, and Reed-Jones 2025a).

To determine if a household experienced food insecurity during the year, the SIPP asks a series of six questions about their behaviors and experiences around food, roughly ordered in terms of severity. Because these questions are staged, households are only asked questions four if they answered affirmatively to question three and questions five and six if they answered affirmatively to any of the first three questions. The questions follow the six-item short form of the food security survey module developed by USDA and capture a respondent’s view of their food security over the entirety of the reference calendar year. While the short form is less precise and somewhat less reliable than their full 18-question measure and does not ask specifically about children or the most severe levels of food insecurity, they have found that low and very low food insecurity determinations are only minimally biased relative to those based on the larger survey modules (Rabbitt, Hales, and Reed-Jones

2025c). The six-question module corresponds to the intermediate severity range of the full 18-question module, and has been shown to be the strongest available six-item set across households to food security status (Bickel et al. 2000).

The questions are agreement questions with mainly binary (yes/no) or three-option (often/sometimes/never true) response options. Question four is a three-option frequency question. These questions are identical for all survey years used in my analysis and are worded as follows:

1. “The food that we bought just didn’t last, and we didn’t have money to get more.”
Was that often, sometimes or never true for your household in [year]?
2. “We could not afford balanced meals.” Was that often, sometimes, or never true for your household in [year]?
3. In [year], did you ever cut the size of your meals or skip meals because there wasn’t enough money for food? (yes/no)
4. How often did you cut the size of meals or skip meals? (almost every month / some months / only 1 or 2 months)
5. In [year], did you ever eat less than you felt you should because there wasn’t enough money to buy food? (yes/no)
6. In [year], were you ever hungry but didn’t eat because there wasn’t enough money for food? (yes/no)

Answering yes/no or often/sometimes is considered an affirmative to a given question. For each respondent, the sum of affirmative responses is summed to produce a raw food security score that will take a value between zero and six. Using this, a household is determined to have low food security if they answered affirmatively to three or four questions and very low food security if they answered affirmatively to five or six questions. Everyone else is determined to have high or marginal food security.

We will also use an affirmative answer to question one to measure the concept of food insufficiency which is similarly asked in the Census Pulse survey which has been used by other researchers to assess the impacts of specific policies on food security during the pandemic. Whereas food insecurity is generally measured annually, food insufficiency indicates that a household sometimes or often did not have enough to eat. In the Pulse data, this question is asked about the past seven days. So, even using a similar question in the SIPP at the annual level, will not result in completely comparable impacts given the difference in reference

period for this research relative to past research on financial assistance and food insufficiency. However, analysis of the Current Population Survey's food security supplement (CPS-FSS) indicates that there's substantial overlap between food insecurity and food insufficiency within households. Most households who are food insecure also experience food insufficiency when both are measured annually.

7.1.2 Measuring Household Balance Sheets in the SIPP

The SIPP collects detailed information on household income and employment. While it does not collect information specifically on subjective financial wellbeing, it does have financial outcomes related to credit and savings that are important aspects of financial wellbeing. These outcomes are generally captured annually and represent a household's financial records for December of the given reference year. Therefore, my analyses are comparing changes in credit, savings, or other measures from December of one year to December of the next.

The key financial wellbeing outcomes that I measure in the SIPP are self-reported difficulty with or missing a utility or rent/mortgage payment, access to credit and the amount of credit a household has, and having a savings account and the amount of savings. Savings are captured as the amount of resources held at a financial institutions and include a range of interest-earning assets that could serve as a safety net for households. These assets include the household sum of checking, savings, certificates of deposit, and money market deposits. We measure this both as a continuous variable to assess the impact on the total amount of savings as well as a binary variable for if a household reports having any savings at the end of a given year.

7.1.3 Measuring Program Receipt and Amounts in the SIPP

The SIPP has detailed information on program receipt. For the purposes of this research, the most detailed category of information available is for SNAP. As is the case for employment and income, the SIPP captures information on SNAP in spells. A respondent indicates a start and end month for which they received SNAP and then fills in details for each month in between. This includes the length of the spell, the benefit amount received each month, the reason SNAP receipt began or ended, the initial year of SNAP receipt, and, for some but not all years of the analysis, the size of the SNAP unit. Estimates of SNAP receipt within a given year tend to be fairly accurate from the SIPP, but research has shown that the number of months and dollar amounts of SNAP received tend to be underreported in the SIPP, as is the case with many surveys. For this reason, the main estimates used here come from imputed SNAP eligibility and benefit levels for each household. These imputed

benefits take advantage of measures of household size and relationships, gross household income, wages, and childcare expenses at the monthly level and housing costs and liquid assets from December of the reference year. More details on how imputed benefits were estimated are found below.

The SIPP also has details on free and reduced school meal receipt that I use to help determine eligibility for P-EBT benefits. In particular, annual questions about whether or not children received free or reduced could be combined with monthly indicators on school enrollment and whether or not the enrollment was for grade school or pre-k and if the pre-k program was a Head Start program are used to determine eligibility for student and childcare related benefits. In 2021, the SIPP also asked specifically if children continued to receive free or reduced meals through their schools. Response options for the questions included options for schools not being closed. This allowed me to assign virtual, hybrid, and in-person learning models to children who normally would have received free or reduced school meals for 2021 P-EBT benefits to help capture important variation across states on how those cases were handled.

7.2 Policy Data

In addition to the household level SIPP data, I also collected information on policy variation over time at the state and month level. Most of these details were sourced from the United States Department of Agriculture (USDA) which oversees the administration of food assistance programs including SNAP, NSLP and P-EBT.

7.2.1 SNAP Variation

SNAP benefit levels vary from household to household given differences in household characteristics – most notably household size and disability – and different income deductions that alter the net income used to determine benefit levels. Gross and net income levels are set as a threshold of the poverty level rounded to the nearest dollar and are adjusted for inflation each year. Maximum SNAP payments, minimum payment amounts, standard deductions, and shelter deduction maximums also change as USDA issues cost of living adjustments to SNAP. Asset limits remained mostly consistent over the period, but were increased in 2022. To capture this variation over time and across states, I created a state-year-household size level database with details on net and gross income eligibility thresholds, gross income thresholds for elderly or disabled households, maximum SNAP payments, standard deduction amounts, shelter deduction maximums, asset limits, and minimum payment levels for one and two person households. This information was sourced directly from tables included as

part of USDA's cost of living adjustments that are published on their websites. To capture the full range of possible levels that I could observe in the SIPP data from 2019 through 2022, I gathered information for the 2019 through 2023 fiscal years.

In addition to the thresholds and deduction levels which vary over time, I also gathered state-level information on broad-based categorical eligibility available from the USDA's website and database of policy variation. Broad-based categorical is a policy in which households who qualify for non-cash TANF or state MOE funded benefits are categorically eligible for SNAP. This often means that individuals with assets above the thresholds in these states or income above the SNAP gross income threshold but less than up to 200 percent of the poverty line may be eligible for SNAP. For the 45 states with some broad-based categorical eligibility rules, I captured information the types of households eligible (e.g. all households, households with children), new asset thresholds for all households and households with a disabled member, and the proportion of the poverty line that a household's income could be and still allow them to qualify for a benefit that would make them eligible for SNAP (mostly 165, 185, or 200 percent).

In addition to variation in SNAP rules generated by cost of living adjustments each October that may impact eligibility and benefit amounts, in 2021 and 2022 there is also SNAP variation stemming from states opting out of the program early. In these states, households would no longer receive the maximum SNAP benefit for a household their size by default. In general, SNAP EA payments expired for all states after February 2023. The states that ended these benefits earlier and the year and month in which the final EA payment was made are outlined in the table below.

7.2.2 P-EBT Variation

The Pandemic-EBT program was first approved in the spring of 2020 and extended for each year through 2023. As such, it covered the 2019/20, 2020/21, 2021/22, and 2022/23 school years. Benefits were also extended to SNAP recipients with children under six in childcare for the 2021 fiscal year and onward. Summer benefits were also dispersed first for the summer of 2021 and then for each subsequent year. All states eventually ran a school year program for the 2019/20 and 2020/21 school years for school-aged children. As a result, the main sources of variation in this program across states comes from the timing of the payments, amount of days covered in the school years, participation in childcare or summer payments, and differing simplifying assumptions that states made when determining the amount of virtual or hybrid benefits paid to children.

In order to translate variation in P-EBT plans from the states into a dollar amount of benefits received in each month and year, I constructed a database of details from the plans

Table 9: SNAP EA State Participation and Cancellation

State	Early EA End	EA End Year	EA End Month
Alabama	No	2023	2
Alaska	Yes	2022	8
Arizona	No	2023	2
Arkansas	Yes	2021	6
California	No	2023	2
Colorado	No	2023	2
Connecticut	No	2023	2
Delaware	No	2023	2
District of Columbia	No	2023	2
Florida	Yes	2021	7
Georgia	Yes	2022	5
Hawaii	No	2023	2
Idaho	Yes	2021	3
Illinois	No	2023	2
Indiana	Yes	2022	5
Iowa	Yes	2022	3
Kansas	No	2023	2
Kentucky	Yes	2022	4
Louisiana	No	2023	2
Maine	No	2023	2
Maryland	No	2023	2
Massachusetts	No	2023	2
Michigan	No	2023	2
Minnesota	No	2023	2
Mississippi	Yes	2021	12
Missouri	Yes	2021	8
Montana	Yes	2021	7
Nebraska	Yes	2021	7
Nevada	No	2023	2
New Hampshire	No	2023	2
New Jersey	No	2023	2
New Mexico	No	2023	2
New York	No	2023	2
North Carolina	No	2023	2
North Dakota	Yes	2021	5
Ohio	No	2023	2
Oklahoma	No	2023	2
Oregon	No	2023	2
Pennsylvania	No	2023	2
Rhode Island	No	2023	2
South Carolina	Yes	2023	1
South Dakota	Yes	2021	7
Tennessee	Yes	2021	12
Texas	No	2023	2
Utah	No	2023	2
Vermont	No	2023	2
Virginia	No	2023	2
Washington	No	2023	2
West Virginia	No	2023	2
Wisconsin	No	2023	2
Wyoming	Yes	2022	4

and amendments submitted by each state to USDA for school year 2019/20, school year 2020/21, and summer 2021 programs. These plans and approval documents are detailed for each state on the USDA's website (Agriculture 2025). The key details collected are the number of days covered by each plan overall and for each month if reported as well as information on when payment were expected to be disbursed, which months were covered in each payment, and any simplifying assumptions adopted to handle virtual and hybrid learning models. This information was collected separately for plans for school children, children under six in childcare, and summer programs for all children. Using these details, I am then able to report a monthly benefit level for fully virtual and hybrid students and document the months in which payments were expected to be made and the number of months included in each payment. This allowed me to construct a state by month panel for all of 2020 and 2021 that includes if a student, childcare, or summer P-EBT payment was made to qualified households in the given month, the expected amount of the payment for hybrid and virtual students, and the average amount of the payment predicted for all students and childcare recipients.

Every state adopted a P-EBT program for the 2019/20 school year and made payments for the program by the end of 2020. Given that the program covered only a partial school year from early March to the end of each state's academic calendar in May or June and that this period was fully remote and states specified a universal number of days to provide benefits, calculating benefits was relatively simple and merely a matter of determining the number of days of benefits and multiplying by the per-day P-EBT benefit level (\$5.70 per child per day for all states other than Hawaii and Alaska). For this initial plan, every approval document details the number of school days covered and the per-day benefit level to households. I capture this information in my database including amendments that may affect the level of payments made in 2020. The most common amendments included updates to the total number of days that schools were closed (always adjusting upward) along with amendments allowing for additional payments in September for the start of the 2020/21 school year. These latter amendments are documented in the database that I collected and are relevant for 19 states. In each of these cases, subsequent school year 2020/21 payments account for or correct these payments amount which are then documented in the details for that program. Based on approvals in the final week of August or September, all early payments for August and/or September of the 2020/21 school year were required to be made in September, 2020. I calculated these payments using the average number of days reported in the subsequent school year 2020/21 plans and from the average number of days calculated from the total number of expenditures for these payments and estimated number of children in the approved amendment documents.

Table 10: P-EBT School Year 2019/20 Benefit Amounts and Estimated First Payments

State	First Payment	Days in Year	Amount	Sept. Payment
Alabama	May	55	\$313.50	No
Alaska	July	50	\$458.00	No
Arizona	April	55	\$313.50	No
Arkansas	June	56	\$319.20	No
California	May	64	\$364.80	Yes
Colorado	July	49	\$279.30	No
Connecticut	May	64	\$364.80	No
Delaware	May	65	\$370.50	Yes
District of Columbia	May	68	\$387.60	Yes
Florida	June	55	\$313.50	No
Georgia	July	45	\$256.50	No
Hawaii	June	54	\$359.64	Yes
Idaho	June	53	\$302.10	No
Illinois	April	60	\$342.00	Yes
Indiana	May	56	\$319.20	Yes
Iowa	July	54	\$307.80	No
Kansas	May	51	\$290.70	No
Kentucky	May	55	\$313.50	Yes
Louisiana	May	50	\$285.00	No
Maine	May	67	\$381.90	No
Maryland	June	65	\$370.50	Yes
Massachusetts	April	70	\$399.00	Yes
Michigan	May	66	\$376.20	No
Minnesota	May	57	\$324.90	No
Mississippi	June	47	\$267.90	No
Missouri	May	53	\$302.10	No
Montana	July	58	\$330.60	Yes
Nebraska	July	49	\$279.30	Yes
Nevada	August	52	\$296.40	No
New Hampshire	June	66	\$376.20	No
New Jersey	July	73	\$416.10	Yes
New Mexico	May	70	\$399.00	Yes
New York	May	74	\$421.80	No
North Carolina	May	65	\$370.50	Yes
North Dakota	May	48	\$273.60	No
Ohio	May	53	\$302.10	Yes
Oklahoma	August	44	\$250.80	No
Oregon	June	67	\$381.90	Yes
Pennsylvania	May	65	\$370.50	No
Rhode Island	April	68	\$387.60	Yes
South Carolina	July	58	\$330.60	No
South Dakota	June	50	\$285.00	No
Tennessee	June	44	\$250.80	Yes
Texas	May	50	\$285.00	No
Utah	August	54	\$307.80	No
Vermont	May	68	\$387.60	No
Virginia	May	65	\$370.50	Yes
Washington	June	70	\$399.00	No
West Virginia	May	55	\$313.50	No
Wisconsin	May	57	\$324.90	No
Wyoming	June	50	\$285.00	No

Table 11: P-EBT School Year 2020/21 Number of Payments and Expected Payment Months

State	# of Payments	First Payment (Months Covered)	Second Payment (Months Covered)	Additional Payments
Alabama	2	May (Aug-Dec)	July (Jan-May)	
Alaska	2	July (Aug-Dec)	August (Jan-Jun)	
Arizona	3	April (Aug-Nov)	May (Dec-Apr)	
Arkansas	5	July (Aug-Sep)	July (Oct-Nov)	
California	2	August (Aug-Jan)	November (Feb-May)	
Colorado	3	May (Aug-Dec)	June (Jan-Mar)	
Connecticut	2	April (Sep-Jan)	June (Feb-Jun)	
Delaware	7	February (Oct-Nov)	March (Dec-Jan)	Remainder of year on monthly basis
District of Columbia	3	April (Oct-Dec)	May (Jan-Mar)	June (Apr-Jun)
Florida	3	April (Aug-Dec)	June (Jan-Mar)	August (Apr-Jun)
Georgia	3	August (Aug-Oct)	September (Nov-Jan)	October (Feb-May)
Hawaii	5	April (Oct-Dec)	April (Jan-Mar)	Remainder of year on monthly basis
Idaho	3	July (Sep-Nov)	August (Dec-Feb)	September (Mar-May)
Illinois	6	March (half of Oct-Feb)	April (half of Oct-Feb)	Remainder of year on monthly basis
Indiana	3	January (Oct-Dec)	April (Jan-Mar)	July (Apr-May)
Iowa	3	May (Sep-Dec)	June (Jan-Mar)	July (Apr-May)
Kansas	1	June (Aug-May)		
Kentucky	8	March (Oct)	April (Nov)	One-month benefits every two weeks
Louisiana	3	May (Aug-Oct)	June (Nov-Jan)	July (Feb-May)
Maine	3	June (Sep-Dec)	July (Jan-Mar)	August (Apr-Jun)
Maryland	4	May (Oct-Dec)	June (Jan-Feb)	Two-month payments in July and August
Massachusetts	7	December (Oct-Nov)	January (Dec)	Remainder of year on monthly basis
Michigan	3	March (Sep-Jan)	April (Feb-Mar)	June (Apr-Jun)
Minnesota	5	March (Sep-Oct)	April (Nov-Dec)	Two-month payments monthly for the remainder
Mississippi	10	July (Aug)	July (Sep)	Monthly payments issued weekly
Missouri	1	July (Sep-May)		
Montana	4	April (Oct-Nov)	April (Dec-Jan)	Two-month payments monthly for the remainder
Nebraska	4	April (Oct-Nov)	May (Dec-Jan)	Two-month payments monthly for the remainder
Nevada	3	September (Aug-Nov)	October (Dec-Feb)	November (Mar-Jun)
New Hampshire	5	June (Sep-Oct)	July (Nov-Dec)	Two-month payments made weekly for the remainder
New Jersey	2	July (Sep-May)	August (Jun)	
New Mexico	5	February (Oct-Nov)	March (Dec-Jan)	Two-month payments monthly for the remainder
New York	2	June (Sep-Mar)	July (Apr-Jun)	
North Carolina	6	February (Aug-Dec)	March (Jan-Feb)	Remainder of year on monthly basis
North Dakota	6	March (Aug-Sep)	March (Oct-Dec)	Two-month payment in April then monthly payment for remainder
Ohio	8	January (Aug-Nov)	February (Dec)	Remainder of year on monthly basis
Oklahoma	1	August (Aug-May)		
Oregon	3	July (Oct-Dec)	August (Jan-Mar)	September (Apr-Jun)
Pennsylvania	3	May (Sep-Nov)	June (Dec-Feb)	July (Mar-May)
Rhode Island	7	January (Oct-Nov)	January (Dec)	Remainder of year on monthly basis
South Carolina	4	March (Sep-Dec)	March (Jan-Feb)	Two-month payments in May and July
South Dakota	1	July (Aug-May)		
Tennessee	6	February (Oct-Nov)	March (Dec)	Remainder of year on monthly basis
Texas	1	May (Aug-Jun)		
Utah	3	March (Sep-Dec)	May (Jan-Mar)	June (Apr-May)
Vermont	3	February (Sep-Dec)	April (Jan-Mar)	July (Apr-Jun)
Virginia	4	March (Oct-Nov)	March (Dec-Jan)	Remainder of year on monthly basis
Washington	4	March (Sep-Jan)	April (Feb-Mar)	Apr-May paid in June and June paid in July
West Virginia	6	March (Aug-Sep)	April (Oct-Nov)	Two-month payments for the remainder of the year
Wisconsin	3	March (Aug-Nov)	May (Dec-Mar)	July (Apr-Jun)
Wyoming	1	September (Sep-May)		

School year 2020/21 P-EBT issuances are more complicated given greater variation in the length of school years covered and differences in assumptions made about virtual and hybrid schedules. As was the case for the 2019/20 school year, all states eventually had a P-EBT plan approved for school children. All states except for Idaho, North Dakota, and Mississippi also provided benefits for children under six who received SNAP during the fiscal year. For my database, I collected information for both the school year and childcare P-EBT programs on the number of payments made, expected month for each payment, and the specific months that each payment covered. For example, several states made an initial payment covering an entire half of the school year or until the plan was approved (i.e. a single allotment for the three months from October to December) and then made monthly or quarterly payments to cover the remainder of the year.

I then recorded details on the monthly number of days or monthly payment amount for states who paid a consistent amount for all months. These were most commonly calculated

by dividing the total number of days for the school year by the number of months across which payments were made. So a state with a 180 day school year spread over 10 months would pay a benefit of 18 days per month for fully virtual students.

Hybrid payments were generally calculated using simplified payments derived from surveys of a subset of schools within a state (either randomly or by student population size). Most commonly, states assigned a single hybrid amount for all hybrid schools or students. These were often 50% or 60% (3 out of 5 days virtual), although states chose a range of different estimates. Otherwise, states often allowed states to operate under multiple hybrid scenarios, usually on 20% increments based on being virtual from 1 to 4 days in the week. States indicated that they would resurvey and reevaluate hybrid simplifying assumptions, but only Vermont reported doing so (reducing hybrid average plans to \$38 or lower in March and later from \$72 in earlier months).

Several states (Maryland and Florida, for example) did not set average payment amounts but instead indicated that they would be using exact reports at the school level on the number of school days in a month and the percent that were virtual or in-person. In these cases, I use the exact number of school days in the month to calculate the appropriate transfers corresponding to each month and any hybrid assumptions that they use.

P-EBT processes were generally more standardized for the 2021/22 school year. However, states typically relied less on simplified assumptions than prior years. There was also more variation in states that participated in the program. Several states opted to provide benefits either just to school children or just to children under six in childcare who received SNAP. With the exception of Utah which followed the same process set for their school children, all states providing childcare P-EBT followed the same method. Benefits for these children were set based on average benefit level for all eligible children that was determined given declines in Child and Adult Care Food Program (CACFP) lunch claims in each month compared to the claim levels from prior to the pandemic. Therefore the main variation in payments across states for childcare P-EBT in 2022 comes from differences in the averages set, number of months of benefits provided, and whether some payments were made in 2021 or 2023. Childcare payments range from about 18 to 64 dollars per month with an average of about 35 dollars per month. Participating states tended to make either one payment for the full year or two payments for each semester, although some did provide benefits more regularly. Every state provided childcare P-EBT benefits for the 2021/22 school year except for Alaska, Florida, Rhode Island, South Dakota, and Tennessee. Additionally, New York and Wyoming did not issue their benefits until 2023.

7.2.3 Other Policy Variation

As noted in the main text, the federal government made substantial changes to the EITC during the pandemic, mainly making it more generous to low-income one-person households. Additionally, several states expanded their state-level EITCs during the pandemic. This primarily involved changes to the refundability rules and increases to the level of the tax credit – generally by increasing the maximum percentage of the federal EITC the credit could hold. I document these changes, including which states expanded their EITCs in 2021 and the maximum possible benefits households could receive.

Another key state-level policy change during and following the pandemic were introductions or expansions to child tax credits. State-level CTCs are generally targeted at households with lower incomes and younger children. The expiration of expanded federal CTC benefits in 2022 served as a catalyst for states to reassess their own tax credits. As a result, several states created, funded for the first time, or made their CTCs more generous. I document states that had a CTC at any time through 2023, the maximum amount of the credit, any income phase outs and child age limits that exist, and when the credit became effective. Most credits became effective in 2022 or later and are therefore out of the scope of my main analysis.

7.3 Imputing Program Eligibility and Benefit Levels

Given underreporting issues and inconsistencies in the SIPP, I impute eligibility and expected benefit levels for each household in the sample for SNAP, SNAP EA, P-EBT, and CTC benefits. This starts by creating variables for the household characteristics from each household head in the survey. These include measures only for related household members who are likely to be considered to be part of the same SNAP unit and are also most likely in the same tax-filing unit. Household characteristics then include the age of each member, the total number of individuals in the household, the number of children and children under 6 in the household, and if the householder or any other member is elderly or disabled. I also create a gross monthly income variable that only includes income for related individuals in the household. After determining household characteristics, I created calculators that take the rules identified for each program above and predicts monthly eligibility and benefit levels as well as annual transfers for each household.

To predict SNAP benefits, I merged on the SNAP eligibility, maximum payment, and deduction rules collected for each fiscal year for each household observation based on state, household size, and fiscal year. I then used estimated possible deductions for each household including earnings deductions using the reported wage income for all related household

members, dependent care deductions using reported annual childcare costs, the standard deduction that was merged on to the data, and shelter deductions from reported rent or mortgage and utility costs. Because the percentage of SNAP households who take different deductions varies radically, I estimated both a low and high net income levels to determine SNAP eligibility and benefit levels. The high level takes the standard deduction, earning deductions, and shelter deductions that most SNAP households receive. The low level also receives any eligible dependent deductions and child support deductions which are much rarer. In practice, these amounts generally differ by very little and I use the low level to calculate the highest possible SNAP benefit for households for the main analyses.

I determine a household to be eligible for SNAP in a given month if their assets, gross income, and net income fall below the thresholds reported by USDA for that fiscal year or they are eligible through broad-based categorical eligibility rules. I then impute a SNAP benefit for each household by subtracting the maximum benefit for a household that size by the households expected contribution (30% of their net income). Once SNAP eligibility and amounts are handled, imputing SNAP EA amounts is straightforward. I merged on EA end years and months by state to help adjust those payments. I then generated EA benefits for each household equal to the amount of their expected food contribution (or the difference between the maximum SNAP benefit a household their size could have received and the benefit they actually received or were eligible for). I adjusted these values to zero for households in states that had already stopped making EA payments and set a minimum EA payment of \$95 starting in April 2021 corresponding to those policy changes.

Finally, I impute expected P-EBT benefits by merging on my state-month database of P-EBT payments to each household. A household is indicated as receiving a P-EBT payment in a given month if their state anticipated issuing payments that month and the household had school-aged children who normally received free or reduced school meals or children under 6 in SNAP-eligible households. In 2021, I adjust eligibility to exclude households who reported that their schools were not closed. Benefit amounts were then reported in the panel with average, fully virtual, and hybrid benefit options in each month. In 2020 schools were entirely closed and all children received the reported benefit amount, normally in a single installment. In 2021, I assign either the hybrid or virtual benefit to eligible children depending on if the household reported still receiving some free meals through their school. In 2022, that question was not asked and schools were generally open again. As a result, for school children that year I assigned all eligible school children the average monthly benefit level provided to P-EBT recipients multiplied by the number of months each issuance corresponded to. For example, if the average benefit was \$25 per month and the issuance covered the months from September through December, each eligible child in that state

would be given a value of \$100 of P-EBT benefits in that month. Childcare benefits in 2022 were more explicit, with states explicitly assigning a set benefit level to all eligible children. In this case, I assign the correspond benefit level to each eligible child in the month in which states indicated that they would issue payments.