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In-kind Government Assistance and Crowd-out of Charitable Services: Evidence from Free School Meals

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ABSTRACT

Many community organizations provide services similar to government programs, but there is limited evidence how increased government aid affects the use and availability of charitable services. This study examines how greater access to federal nutrition assistance through schoolwide free meal programs affects food bank use within the U.S.'s largest food bank network. A 10 percent increase in access to free school meals reduces the amount of food that food banks distribute by 0.9-1.4 percent, without significantly reducing donations, fundraising activity, or the amount of food available. The reduction of food bank use is only found in areas where relatively few students previously qualified for government aid. Our findings highlight that even safety net programs that serve a specific population and offer distinct services can reduce pressures on charitable organizations, particularly in areas previously underserved by government assistance.

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1 Introduction

Many community organizations operate as an informal safety net by providing necessities such as food, housing, clothing, and financial assistance to households in need. Although programs offered by the charitable sector have similar objectives to government income assistance programs, there is little empirical work examining how the use of local charitable services responds to changes in the generosity and availability of in-kind government assistance programs, particularly in cases where the populations served and goods provided are not identical. In addition, it is largely unknown how the interaction between the formal and informal safety nets varies with local economic and demographic characteristics.

This paper estimates the degree to which government programs crowd out the use of charitable services, using nutrition assistance programs as an example. Nutrition assistance is a cornerstone of both US government aid and the missions of many community organizations. For example, the federal government provides assistance to low-income families through 15 separate programs, including the Supplemental Nutritional Assistance Program (SNAP, formerly food stamps), the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and free- and reduced-price school meals, at a total of $92.4 billion in fiscal year 2019 (Tiehan, 2020). Each of these programs serves slightly different populations, but eligibility is largely restricted to low-income families.[1] In terms of community resources, food banks provide food assistance to about 40 million individuals each year (Feeding America, 2014). Because food banks typically do not have income requirements, households that rely on food banks might not qualify for government assistance programs or they may have unmet nutrition needs even with public assistance. Despite these differences in eligibility, both government nutrition assistance programs and food bank services help families meet their nutritional needs.

We examine how expansions in government nutrition assistance interact with the use and availability of food bank services by leveraging temporal and spatial variation of a reform that made it easier for schools to implement schoolwide free meal programs. The reform we study, the Community Eligibility Provision (CEP), allows schools to provide free breakfasts and lunches at no cost to students, including students whose families do not qualify for free meals based on income,

[1] For example, SNAP (WIC) is only available to households with income less than 130 (185) percent of the federal poverty line.

as well as students whose families do not complete the application forms. Accordingly, students who were previously ineligible for government assistance gain access to free meals, while students who were already eligible experience no change in their eligibility. Importantly, eligibility for and participation in schoolwide free meal programs has increased over time, providing rich variation in access to free school meals: between 2015 and 2019, the number of students attending a CEP school more than doubled from about 6.5 million to nearly 14 million students (Billings and Carter, 2020; USDA, 2014), and at the start of the 2023 school year, eight states had implemented statewide free meal programs.

We combine information on the adoption of schoolwide free meal programs with novel administrative data on the amount of food distributed by, donated to, purchased by, and available to distribute for each food bank in the Feeding America network (FA). FA is the largest domestic hunger relief charity in the United States, accounting for approximately 70 percent of the nation's food banks and distributing 4.2 billion meals to more than 40 million individuals each year (Feeding America, 2020). Accordingly, this study is among the first to leverage data that covers nutrition-based charitable services across the entire country.

Our empirical approach leverages the staggered introduction of schoolwide free meal programs across counties in a two-way fixed effects framework. We calculate the share of students estimated to gain access to free school meals each year based on local characteristics before the program began in a reduced-form "statutory parameters" approach used in much of the literature on program take-up and eligibility (Currie and Gruber, 1996). Using this measure of expanded access to free school meals, we examine how food bank use, available resources, and organization finances change with expansions in the government safety net. Our results are threefold.

First, we find evidence of significant, albeit imperfect, substitutability between charitable and public food-related resources. On average, increasing access to free school meals by 10 percent reduces food bank use by 0.87 percent. Scaling our results by school meal take-up implies that a 10 percent increase in the number of free meals served reduces food bank use by approximately 1.24 percent. We then apply these estimates to calculate the net costs (government + charitable sector + private grocery expenditures) of universal free school meals and find that the savings to charitable organizations offset at least 11.7 percent of the net government costs. Incorporating estimates from the existing literature on grocery expenditures further offsets approximately 80 percent of total

government costs.

Second, we find substantial heterogeneity in changes in food bank use. Food bank use falls more in low-poverty areas in which a relatively small share of students qualified for free meals based on their families' incomes. Students in these areas are also unlikely to qualify for other forms of government assistance (SNAP, Medicaid) and therefore are likely to only have access to charitable services as a safety net. In contrast, there is no significant reduction in food bank use in high-poverty areas. Other characteristics of the local food environment are also important: crowd-out is also larger in urban locations and areas with a small black population. These patterns are consistent with previous work showing that that the charitable sector is more robust in urban areas and more racially homogeneous areas (Allard and Pelletier, 2023; Hungerman, 2009), and therefore may have greater scope to adjust when government aid expands.

Third, we examine how expanded free school meals affect the availability of food bank resources by examining donor and organization behavior in order to provide insights on motivations for voluntary giving. We do not find a significant reduction in the amount of food available for distribution, a change in the number of nutrition-focused charities operating in an area, or significant changes in food bank revenue and fundraising activities. Instead, donations – particularly from large corporations operating in an area – increase and the amount of food that food banks purchase directly falls. Accordingly, there is a slight increase in organizations' net income. These patterns indicate that donors to food banks are not exclusively motivated by altruism concerns, but that warm glow or social pressure factors play a role in donation decisions. That fundraising behavior does not change, even as direct purchases fall, illustrates that charitable organizations may not fully internalize expansions in government assistance, at least in the short run.

This paper relates to work examining the interactions among government social services, the private market, and third-party resources, and the extent to which government services crowd out private provision of similar resources. Much of the existing work on crowd-out focuses on the relationship between government funding and individual contributions – that is, the monetary amount of charitable resources available – and finds partial crowd-out in the context of state educational budgets and classroom donations (Meer and Tajali, 2021) and government grants (Andreoni and Payne, 2011, 2003; Payne, 1998; Kingma, 1989). While government funding and individual donations (e.g., financial resources) are expected to be near-perfect substitutes from the perspective

of charitable organizations, our setting is slightly different in that the government and charitable organizations provide a similar, but not identical, resource (food). Since food provided by food banks and at school differs by the point of access and potentially quality, clients may have distinct preferences for food types due to stigma costs, taste preferences, and accessibility. At a broad level, this setting bears some similarities to the early education sector, in which the government and private organizations provide a similar good that might differ in terms of accessibility, quality, or other features. In education, the more similar the goods provided, the greater the crowd-out (Bassok, Fitzpatrick and Loeb, 2014). Given the differences between prepared meals provided in schools and grocery items provided at food pantries and food stores, our finding on imperfect crowd-out aligns with these earlier findings.

There is also a more limited literature examining how the non-profit sector responds to expansions and contractions in government programs. Earlier policy changes that potentially affected the non-profit sector include greater cash welfare eligibility restrictions for immigrants following the 1996 welfare reform legislation (Hungerman, 2005) and greater assistance to families through New Deal spending (Gruber and Hungerman, 2007). In these settings, the extent of crowd-out is context-specific, ranging from 20-38 percent in response to welfare reform to nearly complete crowd-out during the Great Depression. We build upon the extant work by examining the crowd-out of in-kind services and an outcome that directly measures how much assistance is distributed to clients, which may not be fully captured on organizations' balance sheets. Our estimate of crowd-out (approximately 8.7-14.4 percent) is smaller than these historical instances. This lower estimate indicates that clients and organizations may respond differently to changes in cash-based government assistance than for in-kind services.

Closely related to this paper, several observational studies show that changes in household circumstances that increase SNAP and WIC eligibility reduce food bank use (Byrne and Just, 2021; Mabli and Worthington, 2014; Si and Leonard, 2020). We build upon these findings by leveraging variation in access to government programs that is independent of changes in individual circumstances, thereby alleviating empirical concerns about changes in families' economic circumstances coinciding with changes in food bank use. In addition, ours is the first study to leverage administrative data for an anti-hunger organization that has operations across the country.

Finally, this paper builds upon existing work examining the effect of the school meals program

on food security, as well as recent work examining the effects of CEP. Schoolwide free meals increase school meal consumption, both among students who qualify for free meals based on income and students who are not income-eligible (Hecht, Pollack Porter and Turner, 2020; Rothbart, Schwartz and Gutierrez, 2020; Ruffini, 2022; Schwartz and Rothbart, 2020). Previous work has shown that the school meals program (both the traditional, income-based design and schoolwide free meal programs) reduce food insecurity and increase nutritional intake (Ratcliffe, McKernan and Zhang, 2011; Mabli and Worthington, 2014; Arteaga and Heflin, 2014; Bhattacharya, Currie and Haider, 2006; Gleason and Suitor, 2001; Frisvold, 2015; Fletcher and Frisvold, 2017; Gundersen, Kreider and Pepper, 2012; Schanzenbach and Zaki, 2014; Schwartz and Rothbart, 2020). Closely related to our study, Handbury and Moshary (2021) and Marcus and Yewell (2022) examine how grocery prices and expenditures change when students in an area gain access to CEP. They find households with children reduce grocery spending by about $11-14 a week, and Handbury and Moshary (2021) additionally document that chain retailers respond by lowering prices in all of their locations. Our study complements the existing work by providing some of the first empirical evidence of the extent to which the documented increases in food intake and changes in grocery purchasing behaviors are net of changes in charitable service use.

2 Institutional setting

2.1 Policy reform: School meals and the Community Eligibility Provision (CEP)

The school meals program is one of the oldest and largest nutrition assistance programs for families with school-aged children. Historically, students were eligible to receive free meals if their family income was below 130 percent of the federal poverty line ($27,014 for a family of 3 at the end of our analysis period in 2018), and paid a reduced price of up to $0.40 a meal if their income was below 185 percent of the poverty line ($38,443 for a family of 3 in 2018). Students from families with income above 185 percent of the poverty line paid the full price, determined by schools and averaging $5 a day for breakfasts and lunches in 2018.

In the past decade, the nature of the school meals program has fundamentally changed due to reforms that allow schools to offer free meals to all students, regardless of family income. The largest schoolwide free meals program, the Community Eligibility Provision (CEP), began as a

pilot program in the 2011-12 school year and rolled out across the entire country over a four-year period. Eligibility over this four-year period depended on the state in which a school was located.[2] The order of states was determined by the Secretary of Agriculture, based on criteria that changed over time. The 2012 pilot states (Illinois, Michigan, West Virginia) were selected based on states with the largest number of schools that would likely qualify to participate in the program. The following two years, pilot states were selected based on state-level knowledge and awareness of CEP (District of Columbia, New York, Ohio, and West Virginia in 2013; Florida, Georgia, Maryland, and Massachusetts in 2014) (Ruffini, 2022). In the 2015 school year, schools in the remaining states became eligible. Participation in CEP has increased over time and more than 20 percent of school-aged children attended a CEP school at the end of our sample period in 2018 (Appendix Figure A1 panel a), with substantial geographic variation across the country (panel b).

Once a state became eligible to participate in CEP, schools could opt in to the program if at least 40 percent of their students were "directly certified" for free meals because they received another form of assistance for low-income families, most commonly SNAP. Adopting schools then are reimbursed for school meals at a rate of 1.6 times the directly certified share, up to a maximum of 100 percent. Multiple schools within a local educational agency — usually a district — can "pool" their directly certified shares and operate CEP as a group.[3] Therefore, the out-of-pocket cost to schools for participating in CEP is weakly decreasing in the share of students receiving SNAP and other income assistance programs.

It is important to note that schoolwide free meals under CEP replaced a setting in which free meals were based on students' family income. Therefore, the students who gained access to free meals under CEP were those who did not qualify under the income-based definition (e.g.: those with family incomes above 130 (free meals) or 185 (reduced-price) percent of the federal poverty line). In contrast, students from lower-income families experienced no change in their eligibility and continued to be eligible for free meals.[4]

[2] We refer to each school year by the calendar year of the spring semester for brevity.

[3] For example, two schools each with 100 students, one with a direct certification share of 70 percent and the other with a direct certification share of 30 percent could pool their students and participate in CEP in order to receive federal reimbursement equal to $\frac{30+70}{100+100} * 1.6 = 80\%$.

[4] Although eligibility for free school meals did not change for the lowest-income students, existing work shows that schoolwide free meals increase actual consumption of school meals among students who previously qualified, as well as students who became newly eligible (Leos-Urbel, Schwartz, Weinstein and Corcoran, 2013; Ruffini, 2022). With available data, we are unable to measure changes in school meal consumption, therefore the measures of crowd-out we present are best interpreted as changes to charitable resources for an expansion in government service availability,

The split between high- and low-poverty areas is also important in the context of food bank services since the income threshold for free school meals is similar to income requirements for other safety net programs. For example, SNAP requires that households have a gross monthly income of no more than 130 percent of the poverty line, and WIC is limited to pregnant and post-partum persons and children under 5 living in families with income less than 185 percent of the poverty line. Therefore, children who are not eligible for school meals based on their family income are also unlikely to receive other forms of government nutrition assistance, and charitable organizations like food banks are typically the only nutrition-based safety net available to these families.

For these reasons, we expect the adoption of schoolwide free meals to have a greater effect on food bank use in areas with low baseline participation in the free meals program – that is, in relatively low-poverty areas. To explore this potential heterogeneity across high- and low-poverty areas, we partition our main analyses at the median of the baseline (2010) free meal participation distribution among all counties that would eventually adopt CEP. In the relatively low-poverty areas, fewer than 55.7 percent of students qualified for free meals prior to CEP.

2.2 Community resources: Food banks

Feeding America (FA) is the largest domestic hunger-relief charity in the United States. FA operates a network of 200 food banks that includes more than 70 percent of the nation's food banks. These FA-affiliated food banks serve nearly all counties, including both rural and urban areas. In 2019, food banks distributed 4.2 billion meals (about 5 billion pounds of food) to over 40 million individuals (Feeding America, 2020).[5]

FA food banks receive grocery products from donations made by food retailers, manufacturers, local farmers, corporations, and individuals. In addition, food banks can purchase food directly from retailers. They also receive commodities from the federal government through the Emergency Food Assistance Program (TEFAP). Over our sample period, the vast majority (70 percent) of food came from donations; about 13 percent was purchased, and about 17 percent came from federal commodities.

Clients receive this food either directly from food banks or through over 60,000 "partner agen-

rather than government receipt.

[5]In comparison, approximately 35 million individuals experienced food insecurity in 2019.

cies," which include food pantries, churches, shelters, soup kitchens, and youth and senior feeding programs. Appendix Figure A2 illustrates this distribution system and how food reaches clients through food banks and partner agencies. There is typically no income or other requirements for clients to access food bank services, and food bank clients include individuals who do not qualify for government nutrition programs.

The demand for food bank services from clients may not equal the amount of food that food banks have available. Some food banks may have excess supply, while others have excess demand. In order to help equate supply and demand across the FA network, FA relies on a bidding mechanism called the Choice System. Under the Choice System, food banks are allocated a specialized currency ("shares") based on the number of potential clients in an area. They then use these shares to bid on truckloads of food. Food banks can save shares and run deficits, which allows them to meet long-term demand and respond to short-term fluctuations in need (Prendergast, 2022). Food banks can also distribute food to other food banks to reduce inventory and meet demand elsewhere in the system. During our sample period, approximately 11 percent of food was transferred within the network through the Choice System (Prendergast, 2022; Feeding America, 2011).

When considering the total amount of food in an area, the Choice System presents a potential violation of the stable unit treatment value assumption (SUTVA). Specifically, for a given amount of food across the entire FA network, a reduction in food bank use in areas with schoolwide free meals could lead to excess supply in these areas, resulting in schoolwide free meal areas transferring food to the "control" counties with less schoolwide free meal access. Accordingly, estimates of the overall food distributed in an area will overstate the effect of free school meals on food bank use if these Choice System transfers are included. In order to minimize potential violations of the SUTVA, our main estimates only include food that comes from donations, purchases, and federal commodities. This measure does not include the share that is transferred within the network. We separately examine within-network transfers and find that transfers fall in counties with greater access to schoolwide free meals. In addition, we present robustness results using a stacked-difference-in-difference approach that pairs each county that adopts CEP to "clean" control counties that have similar baseline use of food banks and free school meals, but do not adopt a schoolwide free meal program *and* are located at least 500 miles away – making (perishable) transfers logistically difficult. Results are largely robust to this alternative approach.

2.3 Conceptual framework: How greater government assistance can affect food bank use

The amount of food that food banks distribute depends first, on the amount of food that potential clients wish to procure from food banks, and second, on the amount of food that food banks have available to distribute. The amount of food available for distribution in turn depends on actions by donors, the government, and food banks themselves, as illustrated in Appendix Figure A2. This section outlines how each group's actions may change when free school meals become more widely available in a community.

Food bank clients Households consume food items from grocery purchases, government assistance, and community resources. Each type of food has a price, which can include actual prices in the case of groceries, as well as travel or time costs and stigma costs. These costs vary across households. For example, households in food deserts face greater travel costs to obtain groceries, while costs associated with food bank use could depend on how "visible" use is or the perceived stigma of using these resources. Households choose a combination of groceries, government assistance, and community resources in order to maximize utility, subject to a budget constraint, fixed nutritional needs, and their eligibility for government assistance. All food items are substitutes – that is, the cross-price elasticity across all goods is positive, but the degree of substitutability can vary across households.

Schoolwide free meal programs increase the availability of government assistance among students who were previously not certified to receive free school meals. Students who were bringing meals from home may now choose to consume the meal provided at school. Other students who were previously paying the full "paid" rate can now consume the same meal for free, resulting in additional disposable income for their families. Therefore, CEP weakly increases government consumption among higher-income students. Given the universal nature of schoolwide free meal programs, the stigma associated with free school meals may fall for students who were previously eligible (Leos-Urbel et al., 2013; Gutierrez, 2021), and increase government consumption for lower-income students as well.

The remainder of households' food budgets come from groceries and community resources. With a lower "price" of school meals through increased eligibility for higher-income students and reduced

stigma for low-income students, demand for grocery items and food bank services falls. Handbury and Moshary (2021) and Marcus and Yewell (2022) document this pattern for groceries, finding that grocery expenditures fall 5-10 percent following CEP adoption in an area and that prices of grocery items fall. The lower price of groceries could reinforce a lower demand for food bank services. In sum, when free school meals become more available, demand for food bank services falls.

Donors As noted above, 70 percent of food bank goods comes from donations from agents such as individuals, farmers, retailers, manufacturers and corporations. There are two rationales for voluntary charitable giving that are relevant to our setting (Andreoni, 1990; Becker, 1974; Glazer and Konrad, 1996; Ribar and Wilhelm, 2002; Roberts, 1984). First, in "warm glow" models, individuals derive utility from the act of giving rather than the outcome of their donation. If individuals are only motivated by warm glow factors, increases in free school meals will not change the amount of donations. In contrast, in models of pure altruism, donors care about the well-being of food bank clients, but the act of giving does not directly enter the donor's utility function. If altruism is the only factor in donation decisions, schoolwide free meals should reduce donations on a 1:1 basis (i.e.: complete crowd-out).[6]

Federal government Another 17 percent of food bank food comes from the federal government in the form of commodities through the TEFAP program. TEFAP allocates food on a formula basis; over our analysis period, there were no substantial changes in the TEFAP program. Therefore, we do not expect changes in federal commodities to affect the food available. Section 5 empirically verifies this hypothesis.

Charitable organizations Charitable organizations, including FA, engage in fundraising efforts and solicit donations (Andreoni and Payne, 2003, 2011). These efforts are not costless, but require staff time and other resources. In addition, FA food banks can directly purchase food from retailers, or make and receive transfers within the FA network through the Choice System. FA's net revenue is then the sum of the fungible value of individual donations, federal commodities, minus costs of purchased food, fundraising costs, and other expenses. As described in Andreoni and Payne

[6]Models with social pressure or norms, as in Akerlof and Kranton (2000) and DellaVigna, List and Malmendier (2012) operate similar to warm glow models although the welfare implications for the donor differ.

(2003), theoretically food banks could choose to maximize the amount of food available or they could minimize fundraising costs while maintaining a given service level. As one of FA's explicit goals is to minimize food waste, minimizing fundraising costs or saving unspent revenue are likely more applicable in this setting. Accordingly, when free school meals expand in an area, the amount of food FA needs to procure to meet community needs falls. This reduction in food needs should reduce the amount of food directly purchased from retailers, the amount received in within-network transfers from other food banks, and/or lower fundraising expenses. In turn net revenue should weakly increase.

This stylized overview highlights that the amount of food ultimately distributed to clients depends not only on clients' demand for food bank services, but also the actions of donors and charitable organizations. In the following section, we examine changes in the amount of food distributed and the extent to which these changes result from individual donors or the FA organization.

3 Data

3.1 Food bank resources

FA food bank distribution ("food bank use") Our primary measure of community resources is food bank use, defined as the pounds of food distributed to clients by FA within a county. This measure of food bank use includes food that was donated, directly purchased by the food bank, and received through federal commodities, but does not include transfers within the FA network through the Choice System for either receiving or sending food banks. The data provide quarterly information for all counties served by the approximately 200 FA food banks for the calendar years 2010 through 2018. For the baseline analysis, we drop the third quarter in the calendar year which corresponds to July through September, when many districts are on summer vacation for most of the quarter.[7] We define our main outcome variable as the (natural log of the) total pounds distributed in each county each quarter divided by the number of school-aged children in the county. We also explore seasonal patterns throughout the year in event study and robustness analyses.[8]

[7] Based on school start and end dates for the 10 largest districts in each state, the median and mean student spent about 46% of the 3rd quarter in school.

[8] Results are attenuated, but still show a significant decline in food bank use, when including the third quarter. This pattern is consistent Figure 1 that shows a smaller drop in food bank use during the summer months.

FA food bank availability ("food bank receipt") Food bank use indicates how much food FA distributes to clients, but this measure is necessarily bounded by the amount of food available. As outlined in Section 2, donors and the FA organization could also respond to changes in government assistance in ways that affect how much food is available.

In order to investigate how schoolwide free meals change the amount of food that is available to FA food banks, we disaggregate the amount of food received into receipt from donations, direct purchases, and federal commodities. We also separately examine changes in a service area's bids "won" through the Choice System as a proxy for (reductions in) excess demand. Each measure of food received is reported on a quarterly level for calendar years 2010 through 2016 at the food bank level. Since the receipt data are not disaggregated across the counties a food bank serves, these analyses are conducted at the food bank level.

Charitable sector finances FA is the nation's largest anti-hunger organization, but other, smaller non-profit organizations also provide nutrition assistance. In order to provide a more comprehensive view of how food bank operations respond to free school meals, we measure revenues, expenses, and net fundraising efforts (donations minus costs) among non-profit organizations that operate food programs.[9] These data come from the Core Data files from the National Center for Charitable Statistics (NCCS), derived from 990 tax filing reports and are used in much of the existing literature examining crowd-out in the non-profit sector following receipt of government grants (Andreoni and Payne, 2011, 2003; Payne, 1998).

While the NCCS data have the advantage of including data on charitable services for a wider range of organizations than FA, they only include financial information for non-profits that submit 990 forms to the IRS, and therefore do not include some smaller organizations or religious institutions. Beyond these coverage considerations, the challenges of using these data for geographic-based analyses has been well documented as the reported address may be incorrectly reported, assigned to a bank or PO Box, or based on organization headquarters for those that have multiple service locations (see, for example McDougle (2015)). To address these data limitations and to maximize

[9] Our sample includes all organizations ever classified with IRS activity code K ("food programs"), which includes food banks and pantries, as well as food distribution programs and soup kitchens. Results are qualitatively robust to limiting to organizations classified with the narrower K31 ("food banks and pantries"), which does not include programs such as food distribution programs or soup kitchens.

comparability with the FA data, we aggregate the NCCS data to the county level.[10]

Other variables In order to isolate the effect of greater access to free school meals from other changes in the policy and educational environments that could affect the adoption of CEP and food bank use, our preferred specifications control for county-level student characteristics that vary over time such as race and ethnicity from the Common Core of Data (CCD); county-level quarterly unemployment rates from the Bureau of Labor Statistics (BLS) Local Area Unemployment Statistics (LAUS); and other state-level income assistance programs, including TANF benefit levels and state Earned Income Tax Credit (EITC) parameters from the University of Kentucky Poverty Database.

Section 5.3 also examines how local food prices and grocery store availability mediate the relationship between government and community assistance. For local demographic and geographic characteristics, we use baseline (2010) urban location and student demographic characteristics from the CCD. In order to investigate whether characteristics of the local food environment affect the degree of crowd-out, we define food deserts following the USDA as counties in which at least 33 percent of the population lives more than 0.5 mi from a grocery store (10 mi in rural areas) in 2010 and define high-cost areas as counties in which the estimated cost of food in 2010 was above the national median using data from FA's Map the Meal Gap project.

3.2 Access to free school meals

A student's eligibility for free school meals depends on whether they attend a school offering schoolwide free meals, and if not, whether their family's income is below 130 percent of the federal poverty line (185 percent for reduced-price meals). This second criterion – family income – reflects local economic conditions that could affect demand for food bank services. Families could also sort into schools based on preferences for schoolwide free meals, for example, by moving to a school zone that offers free meals or selecting schools that provide schoolwide free meals in areas with school choice. Accordingly, the actual share of students who are eligible for free meals is likely correlated with factors that also affect demand for food bank services.

In order to provide a measure of access to free school meals that is less prone to these selec-

[10] This aggregation circumvents some of the issues arising from multiple service locations since many organizations operate within a single county, even if they have multiple locations (Allard and Pelletier, 2023). Results are also robust to excluding organizations that ever had annual revenue in the top five percent of all organizations (approximately $11 per school-aged child) – the organizations that are most likely to operate in multiple counties.

tion concerns, our empirical strategy leverages *expected* changes in access to free meals, based on initial area characteristics. Importantly, this measure is not influenced by current attendance or contemporaneous family income. In doing so, we follow a long literature adopting a "statutory parameters" approach where the change in access to free school meals is a function of baseline characteristics and whether a school had implemented CEP in the current year (for related work, see Currie and Gruber (1996) and Bastian and Michelmore (2018)). For each school, s, we construct the percentage change in the share of students with access to free school meals between the 2010 base year and the current school year y as:

$$\%\Delta access_{sy} = \begin{cases} \frac{enroll_{s,2010} - FRP_{s,2010}}{FRP_{s,2010}} & \text{if } CEP_{sy} = 1 \\ 0 & \text{if } CEP_{sy} = 0 \end{cases} \quad (1)$$

In Equation 1, CEP_{sy} equals one if a school has adopted CEP by year y; $enroll_{s,2010}$ is the baseline student enrollment in the 2009-2010 school year, a year before the legislation creating CEP was signed into law; and $FRP_{s,2010}$ is the number of students eligible for free- or reduced-price meals in the 2010 base year.[11] Note that Equation 1 implies schools in which all students previously qualified for free meals experience no change in access following CEP adoption, consistent with the program design outlined in Section 2.1.

Since measures of charitable services are only reported at the county (food bank use, revenues, and expenditures) or food bank service area (available food, donations, commodities, purchases, and transfers), we aggregate the school-level changes to the county (c) or food bank service area (f) level, $\%\Delta access_{(f,c)y}$ by first assigning each census tract to the nearest elementary, middle, and high school and then summing across all tracts in the county or service area level, with each tract-by-grade level observation weighted by the age-specific population in a tract.

4 Empirical framework

As described in Section 2, CEP adoption has increased over time (Appendix Figure A1). We leverage this variation across- and within- counties in a two-way fixed effects (TWFE) specification.

[11] Data on CEP adoption extends previous work in Gordon and Ruffini (2021) and Ruffini (2022). We exclude the 0.1 percent of county-year observations that had an implausibly large (160 percent and higher) increase in the share of students gaining access to free meals.

This approach combines two sources of variation: first, food bank use in an area before and after CEP adoption relative to areas where no school has adopted, and second, food bank use as CEP coverage expands within an area. Denoting an area of observation $x \in \{c, f\}$ for counties c (food bank use, financial information) or food bank service area f (food receipt), the basic TWFE specification takes the form:

$$y_{xt} = \beta(\%\Delta access_{xy(t)}) + Z'_{xt}\Phi + \gamma_x + \gamma_t + \varepsilon_{xt} \tag{2}$$

where y_{ct} is the outcome of interest in area $x \in \{c, f\}$ and quarter t. $\%\Delta access_{sy}$ is the share of students gaining access to free school meals due to CEP adoption, as defined in Equation 1. Accordingly, the coefficient of interest, β, provides an elasticity of food bank use with respect to free meal access and can be interpreted as a measure of crowd-out between government school-based nutrition programs and use of community resources. This elasticity definition is useful for interpretation purposes since school meals (number of students with access) and food bank services (pounds of food) are measured in different units.[12]

Z_{xt} is a vector of time-varying characteristics in an area, including student racial-ethnic composition; the quarterly area unemployment rate; the maximum TANF benefit for a 3-person family; and the existence, rate, and refundability of a state EITC. γ_x and γ_t are area and time fixed effects, respectively, accounting for time-invariant features of an area and all factors affecting all counties at the same time, such as changes in school meal nutrition requirements.

The standard TWFE framework has several benefits: first, the existing literatures on both school meal programs and charitable sector crowd-out largely rely on similar approaches; therefore, this specification provides a benchmark to earlier work. Second, this design is flexible and captures changes in implementation within a county over time, including both changes that occur with the initial CEP introduction and changes that occur as CEP coverage expands within a county. Under the assumption that without the implementation of CEP, food bank services would have evolved similarly in areas that implemented CEP as counties that implemented the program to a different extent (including non-adoption) at that date, Equation 2 uncovers the average average treatment

[12] FA estimates each 1.2 pounds of foods provides a single meal. However, the number of school meals served is not systematically reported at a sub-state level across states or over time. While district-level expenditures on school meals are available, a monetary value of food bank services at the food bank level is not reported, as a large share of FA goods come from in-kind donations.

effect (i.e.: the average ATT) (Callaway, Goodman-Bacon and Sant'Anna, 2024a). While this "strong parallel trends" assumption is not empirically testable, Appendix Table A3 plots raw data on food bank use by the year in which schools in a county first implemented CEP. Trends in food bank use are similar in adopting and non-adopting counties in the years before CEP implementation. After CEP adoption, food bank use falls in adopting areas. These patterns bolster confidence in the identifying assumption, and we provide more rigorous tests in event study frameworks discussed below.

However, the basic TWFE is not without shortcomings: as counties adopted (and expanded) CEP at different times, this estimator includes comparisons between areas that newly implemented CEP and those that had been operating schoolwide free meals for several years. These comparisons of "already" and "newly" treated observations could bias β if the treatment effect changes over time (Callaway and Sant'Anna, 2020). In addition, as the share of students gaining access to free meals operates along a continuum, a causal interpretation of the results requires that the share of students gaining access to free meals is uncorrelated with changes in food bank use had CEP not been introduced (Callaway et al., 2024a). Relatedly, as nearly all schools provide free meals to some students through either schoolwide free meals programs or income-based eligibility, a parameter that is arguably more policy relevant than the average ATT would measure the effect of *incrementally* increasing access to free school meals. This incremental change, the average causal response (ACR), also requires a "strong parallel trends" assumption – namely that the share of students gaining access in an area is uncorrelated with potential changes in food bank use (Callaway et al., 2024a).

We provide several robustness exercises that address these shortcomings. First, we supplement the static TWFE approach with an event study analysis. The vector of event time quarters, k, is defined so that $k = 0$ is the fall quarter of the first year at least 1 percent of students attended a CEP school. In order to account for the continuous nature of treatment, we then scale each event time dummy by the share of students gaining access in the first year of CEP adoption, $\%\Delta access_{sk=0}$, consistent with the approach in De Chaisemartin and d'Haultfoeuille (2024).[13]

[13]The event study approach excludes county-year observations where participation was between 0 and 1%, exclusive. Results are robust to using different thresholds of CEP adoption.

$$y_{ct} = \sum_{k \neq -1} \beta_k \mathbb{1}[(t = k) * (\%\Delta access_{c,k=0}) + X'_{ct}\phi + \gamma_c + \gamma_t + \varepsilon_{ct} \quad (3)$$

Because each event study coefficient is scaled by the change in access, each β_k can be interpreted as the effect of doubling the share of students with access to free meals by time k.

The event study framework complements the TWFE by capturing within-year changes to observe whether patterns differ in summer months when school is not in session for most of the period. By tracing out changes over time non-parametrically, it can also indicate whether food bank use followed a different trajectory before CEP adoption. These patterns inform the validity of the parallel trends identifying assumption. Relatedly, patterns after CEP adoption provide information on whether changes in food bank use grow or diminish over time.

Our second extension implements the event study version of the group-time average treated on the treated (ATT-GT) estimator in Callaway and Sant'Anna (2020) that excludes comparisons between "newly-treated" counties and counties that have already been implementing CEP for several quarters. While the ATT-GT approach overcomes one limitation of the TWFE design – comparisons between counties at different points after CEP adoption – it cannot capture continuous treatments. In order to address this shortcoming of the ATT-GT approach, we partially account for the continuous nature of the treatment effect by taking the ATT-GT event-study and partitioning the sample between counties that received "high" treatment dosages (a large increase in the share of students with access to free meals) and those receiving lower dosages, following the "dose-aware" ATT-GT approach in Callaway, Goodman-Bacon and Sant'Anna (2024b). Consistent with the TWFE event study approach, we find that the treatment effect is much larger in the counties with the higher treatment dosages and that areas were not on different trajectories of food bank use before CEP. Together these complementary event study approaches bolster confidence in the finding that greater access to free meals in school reduces use of community-based nutrition services.

Finally, as highlighted in Callaway et al. (2024a), even when the strong parallel trends assumption is valid, the standard TWFE estimator aggregates treatment effects across different treatment dosages and may not have an intuitive interpretation. In order to show how food bank use changes throughout the treatment distribution (i.e.: the share of students gaining access to free school meals), we estimate a dose-response curve that allows for the treatment effect to be a non-linear

function of the share of students gaining access to free school meals, following the approach in (Callaway et al., 2024a).

For all of our results, we first pool all areas, and then partition the sample based on the median share of students in a county qualifying for free school meals prior to CEP implementation (e.g.: the baseline 2010 school year).[14] "High-poverty" counties are those in which at least 55.7 percent of students were eligible to receive free school meals in 2010; "low-poverty" counties are those in which fewer students were eligible based on family income.

5 Results

In order to describe the characteristics of CEP-adopting and non-adopting counties, Table 1 shows summary statistics for counties with no CEP coverage (column 1) and those with any CEP coverage (column 2). Columns 3-6 further disaggregate counties with CEP coverage into "low" and "high" poverty counties, based whether on the share of students eligible for free meals in 2010 was above or below the median of counties that adopted CEP over our analysis period (55.7 percent). Areas that participate in CEP tend to have larger non-white shares of the student population; higher unemployment rates; higher baseline amounts of food bank food distributed, and higher eligibility for free- and reduced-price meals. These differences appear in both low- and high-poverty counties.

If all schools in an area implemented CEP, the share of students gaining access to free meals, $(\frac{enroll_{2010}-FRP_{2010}}{FRP_{2010}})$, would be higher in low-poverty counties, i.e.: counties with a smaller FRP_{2010}. However, as discussed in Section 2.1, eligibility for and participation in CEP was effectively determined at the school level, so even within a county some but not all schools may have adopted CEP. Table 1 shows that conditional on at least one school in a county adopting CEP, the share of students attending a CEP school is higher in high-poverty counties. However, Appendix Figure A1 panel d shows that conditional on the share of students attending a CEP school, the share of students gaining access to free school meals is substantially higher in low-poverty areas. Panel e plots the distribution of the share of students gaining access to free school meals for each group of counties. There is substantial overlap between high- and low-poverty counties in the share of students gaining access to free meals through most of the distribution – reflecting that fewer *schools*

[14] For the food bank service area analyses (Table 4), halves are defined based on the half of the distribution for the median student in a service area.

in low-poverty counties adopted CEP, but fewer *students* within each school gained access in high-poverty areas.[15] Therefore, the high vs. low-poverty split does not perfectly partition the share of students gaining access to free meals.

It is also important to note that even in "low-poverty" counties that adopt CEP, poverty rates are higher than in non-CEP counties (Table 1). As all specifications include county fixed effects, level differences across counties will not affect the internal validity of the results; however, we emphasize that our analyses examine the interaction between the social safety net and community resources in areas that tend to be higher poverty and lower income than the national average. Therefore, the results may not fully generalize to recent *statewide* free meal programs that expanded access in affluent areas, such as those in California and Massachusetts.

5.1 Free school meals and food distributed to clients

We first examine how greater access to government assistance affects use of community resources from the consumer perspective – the amount of food distributed by food banks to clients. *A priori* is it not guaranteed that greater government assistance will change food bank use since the school meals program serves a specific population – school-aged children – and provides prepared meals rather than grocery items. In addition, even if food bank use among families with children falls, if food banks are not able to serve all clients in an area, this expansion in school meals may free up resources that can be used for individuals who were previously under-served.

In order to motivate the main empirical analysis, Appendix Figure A3 presents raw data on food bank use over time based on the year in which counties first implemented CEP (defined as at least 1 percent of students attending a CEP school) compared to counties that did not implement CEP during the analysis period. To ease comparability, each group's food bank use is normalized to 100 in the year before the "treated" counties adopted CEP. These figures show that food bank use generally trended similarly between the two groups of counties immediately prior to implementation, but after CEP, food bank use fell relative to the never-treated counties. This reduction is largest in cohorts with a large share of low-poverty counties (counties that first adopted CEP in 2012, 2013, and 2017; see Appendix Figure A1 panel f).

The event study analysis outlined in Equation 3 formalizes the logic in Appendix Figure A3.

[15] The share of students gaining access to free meals is mechanically 79% ($= \frac{1}{0.557} - 1$) in high-poverty counties.

We split the sample into "low-" and "high-poverty" counties depending on whether at least 55.7 percent of students received free meals prior to 2010 and present results in Figure 1.[16] The top panel shows the quarterly change in food bank use; the bottom panel aggregates the school year quarters (i.e., Q4 through the following Q2, omitting Q3 that mostly covers the summer months) in a semi-annual measure. These two versions are complementary: the quarterly version highlights seasonal changes in food bank use throughout the year, whereas the annual approach is better suited to examining longer-term effects.

These figures show three findings. First, there are no significant differential trends prior to CEP between treated and not-treated counties, which supports the plausibility of the parallel trends identifying assumption. Second, after CEP adoption, food bank use falls and the initial drop is larger in relatively low-poverty counties. Third, the decline in food bank use is fairly constant over time but tends to be less pronounced during the summer months when school is largely not in session (red diamonds). Based on these patterns, the remaining analyses excludes the third quarter of the calendar year.[17]

The main TWFE results are shown in Table 2. Across all counties, column 1 shows that increasing access to free school meals by 10 percent reduces food bank use by 0.87 percent. Since approximately 69 percent of eligible students consume a free school meal on a given day (Moore, Hulsey and Ponza, 2009), the results in column 1 imply that increasing the number of free meals served by 10 percent reduces food bank use by approximately 1.24 percent ($\frac{0.865}{0.6934}$).

As discussed in Section 2.2, the FA network consists of 200 food banks that distribute food via local partner agencies within each county. However, most food banks operate in multiple counties and can therefore allocate food across counties in their service area depending on local need or other factors.[18] This structure presents a potential violation of the SUTVA assumption – that is, for a food bank serving two counties A and B, if county A adopts CEP, county B might receive the food that would otherwise be allocated to A, thereby overstating the effect in column 1.

In order to account for the potential spillovers across counties, we proceed in two ways. First,

[16] Counties in which between 0 and 1 percent of students attended a CEP school are excluded from these analyses (about 2.5 percent of all observations). Appendix Figure A4 shows that results are nearly qualitatively similar using an alternative threshold of 5 percent students attending a CEP school.

[17] Appendix Table A1 column 2 includes the third quarter and shows similar qualitative patterns to the main TWFE approach that are slightly attenuated, consistent with Figure 1 panels a and b.

[18] Table 2 does not include food that was received from or donated to other food banks in the FA network through the Choice System.

column 2 of Table 2 controls for the share of students gaining access to free school meals in the other counties in the same FA service area. Here, the main coefficient on local access to free meals is nearly identical to the value in column 1 and the spillover estimate indicates that a 10 percent increase in access in other counties in the service area would reduce the amount of food distributed by an insignificant 0.08 percent. The lack of a significant positive spillover effect is inconsistent with food banks reallocating food across counties within their service area.

The second approach, in Appendix Table A1 column 6, estimates a stacked TWFE design that limits comparisons to counties that are unlikely to have received food from food banks in CEP-adopting areas. To implement this design, for each county c, we identify the subset of counties $-c$ that are located at least 500 miles away and did not implement CEP during the analysis period. From $-c$ we then select the 5 counties that are the most similar in terms of baseline (2010) food bank distribution per student and free lunch eligibility to form group g. We then modify Equation 2 by stacking each group and including time-by-group and county-by-group fixed effects.[19] Appendix Table A1 column 6 shows a slightly larger treatment effect than the main specification: a 10 percent increase in free school meal access reduces food bank use by about 1 percent. Combined, these extensions indicate that the reduction in food bank use observed in Table 2 is not being driven by increased use in non-CEP counties.

The remaining columns of Table 2 partition the sample into high- and low-poverty counties. Mirroring the patterns shown in Figure 1, the TWFE results show that the entire reduction in food bank use is driven by changes in low-poverty counties, and there is no significant change in high-poverty areas. In low-poverty counties, expanding access to free school meals by 10 percent reduces food bank use by 1.4 percent, implying that increasing the number of free meals by 10 percent reduces food bank use by approximately 2.1 percent. These patterns are consistent with existing work showing that benefits of schoolwide free meals, including academic achievement and disciplinary infractions, are concentrated among groups that have more moderate incomes and were unlikely to previously have access to free meals (Gordon and Ruffini, 2021; Ruffini, 2022; Schwartz and Rothbart, 2020). Again, accounting for within-service area spillovers and limiting comparisons to non-proximate counties generally yield similar results. The one exception is that comparing

[19] Specifically, we estimate $y_{cgt} = \beta(\%\Delta access_{cgy(t)}) + Z'_{cgt}\Phi + \gamma_{cg} + \gamma_{gt} + \varepsilon_{cgt}$ and cluster standard errors at the county-by-group level.

high-poverty counties to non-proximate counties (Appendix Table A1 panel c column 6) yields a slight reduction in food bank use, although this estimate is 52 percent smaller than the effect found in low-poverty counties.

As discussed in Section 4, interpreting β as the average treatment effect requires a stronger version of the canonical parallel trends assumption. In addition, β is a function of the distribution of treatment doses (Appendix Figure A1 panel e) and may not have a transparent interpretation. In order to address these limitations of the TWFE set-up, Figure 2 presents a non-parametric dose-response curve that plots the treatment effect in the first full year of implementation relative to the year before CEP adoption. We follow the guidance in Callaway et al. (2024a) and Callaway et al. (2024b) and estimate a cubic b-spline with three kinks separately for high- and low-poverty counties. For high-poverty counties, the treatment effect is close to 0 for most of the distribution other than a narrow band between 5-15 percent of students gaining access where food bank use falls by a marginally significant 6-9 percent. In contrast, food bank use significantly falls over most of the treatment distribution and this decline tends to increase with treatment dose in low-poverty counties. The slope of the dose response curve recovers an estimate of the average causal response (ACR), the effect of incrementally increasing the share of students with free school meal access. For students in low-poverty counties, the largest ACRs are found in areas between 5-25 percent of newly-eligible students. Since not all schools in these low-poverty areas participate in CEP, these results suggest that increasing CEP take-up in low-poverty areas where few schools are participating in the program could generate large reductions in food bank use.

The results presented above are noteworthy as much of the existing literature examining the relationship between the government and charitable sectors focuses on government grants to organizations or cash-based assistance (Hungerman, 2005; Andreoni and Payne, 2011). In cases of government grants and cash assistance, a dollar from the government is identical to a dollar from a private donor or a charity. In contrast, in the case of nutrition assistance, aid provided by the federal government and non-profit organizations differs on several dimensions. First, the type of food differs: free school meals provide prepared meals during the school day, whereas most food bank resources are distributed to clients as grocery products via food pantries so that clients can prepare meals at home. The grocery nature of these services allows clients to meet their nutritional needs during times when meals in congregate settings (including school) might be inconvenient or

infeasible, such as evenings and weekends. Another difference is that school meals only serve school children, whereas food banks can serve all individuals, including adults. These two differences suggest that school meals and food bank services are likely imperfect substitutes, and comparing the magnitude of crowd-out between the government and non-profit sector from Table 2 to measures of crowd-out to more similar services can broaden our understanding of how the government and charitable sectors interact. For example, Hungerman (2005) finds church spending increased 20-38 cents for a $1 reduction in federal welfare spending, and Andreoni and Payne (2011) find increased government grants to organizations reduce fundraising by 30-70 percent, depending on the type of organization. The smaller response in Table 2 suggests that crowd-out is lower in situations where the government and charitable sector are providing more dissimilar goods.

5.2 Robustness and extensions with staggered CEP adoption

Appendix Table A1 further shows that our main results are robust to slight modifications of the TWFE framework. Column 2 adds in the third quarter (July through September), a period that largely covers the summer months when students are not in school.[20] When the third quarter is included, the reduction in food bank use is 7.9 percent (all counties) to 12.8 percent (low-poverty counties), 9-11 percent lower than the main results in Table 2. The difference in magnitude is fully consistent with students being out of school for approximately half of the third quarter. Column 3 further shows that the results are not sensitive to excluding state-level policy controls.[21] Weighing each county by student enrollment generates somewhat larger effects overall and less precisely estimated effects among the lowest baseline poverty quartile (column 4), suggesting that the reductions in food bank use are larger in highly-populated areas. We return to this point in Section 5.3. Finally, these patterns also hold when limiting the sample to the years for which donation and receipt information is available (2010 through 2016, column 5).

The TWFE approach in Table 2 leverages two sources of variation stemming from the staggered implementation of CEP: first, changes in access to free meals when schools in an area first implement schoolwide free meals, and second, changes in access as schoolwide free meals become adopted by

[20] Among the 10 largest districts in each state, the average student spends about 46 percent of the third quarter in school, according to data collected from state websites.

[21] Additional results show similar findings when using the inverse hyperbolic sine, rather than the natural log transformation.

additional schools over time. A recent econometrics literature points out that in such cases of staggered adoption with a continuous treatment, TWFE approaches can lead to biased estimates of both the average treatment effect among CEP-adopting counties (ATT) and the marginal treatment effect of slightly increasing access to free meals (ACR) (Callaway and Sant'Anna, 2020; Callaway et al., 2024a; Goodman-Bacon, 2021).

In order to account for the staggered timing in when counties first implemented CEP, we begin with the standard group-time average treatment on the treated (ATT-GT) estimator in Callaway and Sant'Anna (2020) which breaks apart the TWFE approach into the 2x2 difference-in-differences building blocks that only compare counties in each treatment cohort with counties that had not yet adopted CEP. Since the simple ATT-GT estimator only permits a binary treatment, we follow Callaway et al. (2024b) and implement a "dose-aware" version of the ATT-GT estimator by partitioning the sample into groups that received "high-doses" of treatment – a large share of students gaining access to free meals – and those that received smaller treatments. In "high-dose" counties, the number of students with free meal access increased at least 11.2 percent (the median among counties that ever adopted CEP). Appendix Figure A5 implements the dose-aware ATT-GT estimator in an event study framework, which like Figure 1 allows for visual inspection of the plausibility of the parallel trends identifying assumption. As in the TWFE approach, prior to CEP adoption, there is no systematic trend in changes in food bank use. Following CEP, counties with the largest changes in the share of students with free meal access experienced larger reductions in food bank use than counties in which few students gained access in both high- and low-poverty counties. At the end of the first year of CEP adoption, food bank use falls an average of 5.6-5.8 percent in high-treated counties, compared to an insignificant change of -0.4-2.5 percent in low-treated counties (both high- and low-poverty). Since free meal access increased an average of 37 percent in high-treatment counties a 5.6-5.8 percent reduction is comparable to the averages implied by Table 2.

5.3 Heterogeneity by local characteristics

Besides the share of students that were previously eligible for free school meals based on family income, the crowd-out between government and community nutrition resources may vary with other features of the food environment, the non-profit sector, or local population.

First, as outlined in Section 2, households can obtain food from grocery purchases, government assistance programs, and food banks. If there are few grocery retailers in an area (i.e., a "food desert") or if food is expensive, the value of in-kind nutrition assistance from either school meals or charitable organizations is expected to be higher than in areas where grocery options are readily available or inexpensive. Crowd-out is expected to be lower in high-cost and low-availability areas, as the additional resources to household budgets from additional government aid can be used to purchase non-food items.

Consistent with this prediction, columns 1-2 of Table 3 indicate that the overall reduction in food bank use is driven by non-food desert and low-cost areas. There is no significant change in food bank use in high-cost areas. The estimate for food deserts is imprecisely estimated and not significantly different from non-food deserts, but we cannot rule out a null effect in these areas.

Second, urban centers tend to have more non-profit organizations than rural or suburban areas (Shapiro, 2021), and previous work finds that the non-profit sector is more responsive to economic conditions in urban places (Allard and Pelletier, 2023). Consistent with the higher responsiveness documented in past work, column 3 shows that crowd-out is much greater in urban areas. In urban centers, a 10 percent increase in free meal access reduces food bank use by 2.2 percent, while food bank use does not significantly change in non-urban areas.

Finally, columns 4-5 examine whether crowd-out varies by racial and ethnic composition. This split is motivated by warm glow models of charitable giving that incorporate local racial and ethnic diversity (e.g. Hungerman (2009)). In these models, when charitable giving is driven by altruism, areas with greater diversity have fewer charitable services and are less prone to crowd-out when government services expand.[22] Consistent with frameworks where greater diversity leads to less crowd out, significant crowd-out is only found in areas with small black populations (column 4) or large non-Hispanic white populations (column 5). Altogether, the results in Table 3 indicate that the extent of crowd-out varies with local economic and social conditions, which suggests caution in extrapolating national averages or single case studies to other contexts.

[22]Our set-up slightly differs from the individual donor viewpoint in Hungerman (2009) as our measure of food bank use depends on both donations (since food banks can only distribute the food they have available) and how clients use charitable services. Section 5.4 directly considers the amount of food that food banks have available.

5.4 Mechanisms: Amount of food bank resources

These reduced-form effects show how greater free school meal access affects food bank use, but do not indicate the intermediate mechanisms at play. The most direct mechanism is that when schools offer free meals to all students, students consume additional meals at school. Ruffini (2022) provides evidence consistent with this direct channel, showing that breakfast and lunch consumption increases following CEP adoption. By eating meals prepared at school rather than bringing a lunch from home, families need to procure less food from groceries and food banks. Consistent with this channel, previous work finds that CEP access reduces grocery expenditures by about 5-10 percent (Handbury and Moshary, 2021; Marcus and Yewell, 2022). Therefore, increased affordability of groceries and more meals consumed at school reduce the demand for food bank resources.

Another way that schoolwide free meals could reduce food bank use is by providing families with additional income. For example, for families that were previously paying full-price for school meals (about $5/day for breakfasts and lunches at the end of our sample period), free school meals provide additional income that families can use in order to purchase other goods (including groceries). In order to estimate what share of students receive an "income" shock by continuing to consume school meals, but not paying the full price, and what share of students no longer bring meals from home, we examine children in families with family income above 200 percent of the federal poverty line throughout the 2014 panel of the Survey of Income and Program Participation (SIPP, covering calendar years 2013-2017). We identify children whose parents report they consume a free breakfast or lunch in the current school year, but did not report receiving a free meal in the previous school year. About half of these students were previously paying full-price for a school meal, and the other half were bringing meals from home. Therefore, both changes in families' disposable income for some families and less need for groceries among others likely contribute to lower food bank use.

As outlined in Section 2, however, another possible mechanism that could account for the change in the amount of food distributed to clients is how much food is *available* for distribution. Changes in food availability could result from changes in food bank, donor, or offsetting federal government actions. This subsection explores outcomes related to each of these actors.

FA, like most charitable organizations, receives most of its resources from donations. Individual donors (including corporations, retailers, and farmers) may donate to FA for reasons related to

altruism, "warm glow," or social pressures (Andreoni, 1990; Glazer and Konrad, 1996; Ribar and Wilhelm, 2002; Roberts, 1984). Examining changes in donation behaviors can shed light on these underlying motivations. For example, under pure altruism, increased government services should reduce charitable donations one-for-one, whereas if individuals derive utility from the act of giving itself (as in "warm glow" or social signaling models), crowd-out of individual donations will be less than 100 percent. FA may also change its operations in response to free school meals, for example, by changing its fundraising intensity, its direct purchases of food from retailers, or its bids on within-FA transfers through food the Choice System.

5.4.1 Food available to distribute: Donations, direct purchases, and within-network transfers

We first examine the total amount of food available for distribution, Table 4 column 1 shows that greater access to free school meals does not significantly reduce the amount of food available at food banks. For the full sample, a 10 percent increase in free school meal access reduces availability by a statistically insignificant 0.1 percent, and the 95% confidence interval can rule out reductions greater than 0.7 percent.

Even though the overall amount of food available to distribute does not significantly change, the source of this food does. In particular, purchases made by FA (the costliest way of procuring food from the perspective of the organization) fall by 1.9 percent for every 10 percent increase in school meal access, and 2.2 percent in low-poverty areas (column 2). Federal commodities, which are largely determined by statute, do not significantly change (column 3), indicating that in this setting, the federal government did not replace one type of nutrition assistance with another.

Columns 4-6 examine changes in donations, disaggregating between donations from local (including local retailers and individuals) and national (corporate organizations that are located within the service area) sources.[23] Overall, donations increase by about 0.8 percent for a 10 percent increase in free school meal access, although this increase is not significant when partitioning the sample by baseline poverty. There is no significant change in donations from local sources, but an increase in donations from national groups (column 6), both overall and in low-poverty counties.

That there is no significant reduction in individual donations, and an *increase* in corporate

[23] Example of national donations are food from a Target or Kraft plant that is located in the service area.

donations suggests that donations to food banks are not driven by pure altruism. Instead, warm glow or social considerations are likely to play a role in donor motivations. In addition, columns 1-6 of Table 4 indicate that the reductions in food bank use shown in Table 2 use are not due to decreased availability of resources, but that the composition of food shifts away from direct purchases to more donations.

Food banks may adjust how much food they have available by transfering excess food to other food banks or receive less food through the Choice System. Recall that transfers made and received are not in our primary measure of food bank use and will not drive the main results. However, changes in transfers are important to examine as large net transfers to other food banks can indicate excess supply and large receipt indicates excess demand. Column 7 of Table 4 shows that after CEP implementation, net transfers fall. That is, transfers *to* other food banks increase, suggesting areas with CEP now have more food than they can distribute. The magnitude of this estimate is likely biased upward since transfers from one area are transfers received by another (thereby violating the SUTVA assumption). Therefore, only the sign of this finding, and not the magnitude, is interpretable.

5.4.2 Charitable sector finances

An outstanding question is how these changes in food bank use affect charitable organizations' balance sheets. Table 5 shows no economically or statistically significant change in the number of organizations operating in an area, based on NCCS data dervied from tax filings, and indicating that the charitable sector does not contract on the extensive margin when government assistance expands. Columns 2-3 show an insignificant increase in total revenue in all types of counties and a decrease in total expenses overall and in low-poverty counties, with the point estimate for expenses exceeding the revenue reduction. In contrast with changes in fundraising activity documented following more generous government grants to non-profits (Andreoni and Payne, 2003, 2011), column 4 shows no significant change in fundraising activity. One possible explanation for this difference is that revenues in the form of government grants are more salient to an organization than increases in in-kind government assistance that does not flow through charitable organizations but is instead provided in schools. Combining changes in revenues and expenses, net income increases, although not significantly in low-poverty counties. This improvement in organizations'

financial positions suggests that greater government assistance could help the charitable sector amass resources that could later be drawn down in times of economic hardship.

6 Total nutrition spending

Section 5 showed how the informal safety net responds to increases in in-kind government assistance. These results, however, do not account for potentially different costs of providing services through the government versus charitable organizations or how total nutrition expenditures change when the government safety net expands. In order to understand how increased government provision affects the costs of service provision from the perspective of charitable organizations and households, we perform a back-of-the-envelope calculation that compares increases in government outlays from expanding schoolwide free meals to the savings to FA and individual households.

To perform this exercise, we first calculate the share of students gaining access to free meals in each school district, following the approach outlined in Section 3.2. We merge these district-level estimates to annual federal, state, local, and total governmental expenditures on school based nutrition assistance from the Common Core of Data Financial Survey F-33 report. We then estimate a district-level version of Equation 2 over our analysis period where the dependent variable is the log of per-pupil nutrition spending from federal, state, local, or total sources.

Results are presented in Table 6. A 10 percent increase in eligibility for free meals increases total government spending by 0.9 percent (column 1), driven by a 2.8 percent increase in federal spending (column 2). State expenditures do not significantly change (column 3), but local expenditures fall by 12.6 percent (column 4). In fiscal year 2018, total government spending on school meals reported on F-33 forms was approximately $22.4 billion, so a ten percent increase in free meal access would increase government costs by $203 million ($22.4 billion $*$ 0.0908 $*$ 0.1).

In 2018, total FA expenses for food procurement, program operation, and the fungible value of in-kind donations was $2.8 billion (Feeding America, 2018). If each pound of food has an equal cost to the organization, FA's costs would fall by about $23.9 million with a 10 percent increase in free school meal access (0.9 percent reduction in pounds of food needed by the organization). If costs are increasing in the amount of food procured, FA's expenses would fall by even more. Therefore, for every $1,000 the government spends on free school meals reduces FA's costs by at least $117.

A full accounting of the net costs of government assistance would also incorporate changes in grocery spending. Handbury and Moshary (2021) find that when CEP is introduced in an area, grocery expenditures fall by about 6.6 percent among households with children and increase about 2 percent among households without children. In 2018, there were approximately 127.6 million households in the US, 34.5 million of which had children (U.S. Census Bureau, 2024). In our sample, full CEP access would increase the share of students with access to free school meals by approximately 50 percent. The estimates and average annual grocery expenditures from Handbury and Moshary (2021) imply that a 10 percent increase in access to free school meals would reduce annual expenditures by about $33.80 for households with children and would increase expenditures by about $10.80 for households without children. In total, grocery spending would fall by about $163 million, or about 80 percent of the total government cost of expanding free school meals. Therefore, more than 90 percent of government costs are accounted for by measuring direct savings to the charitable sector and individual households.

This exercise illustrates that expansions in government assistance provide meaningful savings to both the charitable sector and individual households. Nonetheless, this type of calculation only considers the direct monetary costs and savings of greater government aid, without accounting for potential differential quality in the food served in schools, purchased in groceries, or received through food banks.[24] Nor does this calculation include other non-financial benefits of schoolwide free meals to families, such as reduced stigma (Gutierrez, 2020), improved academic performance or fewer suspensions (Gordanier, Ozturk, Williams and Zhan, 2020; Gordon and Ruffini, 2021; Hecht et al., 2020; Ruffini, 2022). Accordingly, these savings should be interpreted as a lower bound of the full net costs of greater federal nutrition assistance.

[24] Accounting for quality could either decrease or increase the net benefits, depending on nutritional differences between school meals and food bank groceries. School meal quality varies dramatically across districts (Anderson, Gallagher and Ritchie, 2018). For most of our analysis period, schools were required to offer at least 1 cup of produce, serve whole grain-rich foods, limit the amount of sodium and saturated fat in each meal, and could not serve food with trans-fats. Comparable information is not available for food banks, but food banks encourage donations of highly-nutritious food, including produce, whole grains, lean proteins, and low-fat dairy products. In 2018, 70 percent of donations were categorized as these types of "foods to encourage." Given that both schools and food banks focus on providing healthy foods, to an approximation it is reasonable to assume a similar quality of food.

7 Conclusion

This paper shows that increased access to in-kind government resources reduces use of charitable services, even in settings where the government and charitable sectors do not provide identical assistance. In the context of schoolwide free meals, we find that increasing the share of students with access to free meals by 10 percent reduces food bank use by about 0.9 percent overall, and 1.4 percent in areas where few students qualify for other forms of government assistance. In contrast, there are no significant changes in food bank use in high-poverty areas, or in areas where groceries are expensive or grocery retailers are located far away. These patterns are consistent with the existing literature showing the largest improvements in students' outcomes are concentrated in settings where fewer students qualify for free meals based on family income (Ruffini, 2022). Since charitable services are often the only form of nutrition assistance available to these more moderate-income families, reduced food bank use in low-poverty areas after universal free meal provision is consistent with the government safety net not covering all those in need of assistance.

We also find that in contrast to work showing substantial crowd out from government grants (Andreoni and Payne, 2003, 2011), food banks do not reduce their fundraising activities. This difference is consistent either with greater school meal provision being more "hidden" from the perspective of organizations than grants that go directly to non-profits, or with food banks amassing reserves that they can later draw down in the case of greater community need. In addition, we shed light on motivation for food bank giving. That donations do not fall is inconsistent with food bank donors only being driven by altruism. Instead, either warm glow or social pressure factors contribute to donor behavior.

The setting we examine — in-kind nutrition assistance — exemplifies a case where the services provided by the government and charitable organizations are similar, but not identical, and the populations served do not perfectly overlap. Specifically, in our setting, the government program provides prepared meals to a relatively narrow group – school-aged children – but food banks provide groceries to any household in need, including higher-income families without children. That we find smaller crowd-out in nutrition assistance than previous work has found in response to monetary resources (cash assistance or government grants) highlights that when the public and private safety nets provide slightly different resources to different populations, crowd-out is likely lower than in

settings where the services provided by the government and non-profits are identical and targeted to similar populations (Hungerman, 2005; Andreoni and Payne, 2011).

This general pattern of non-identical services to partially-overlapping populations is found in other contexts as well: in the case of nutrition assistance, WIC provides grocery items to pregnant people and young children, but food banks provide resources to all those in need. Medicaid provides health insurance based on income (and in areas without Medicaid expansions, largely excludes non-elderly adults), but free clinics provide on-site medical care often without similar requirements. Public housing waitlists often prioritize very low-income families with children, but organizations like the Salvation Army, Catholic Charities, and Modest Needs offer emergency housing assistance grants (United Way, 2024). The extent of crowd-out may differ across these settings, but our results highlight that even government programs targeted at small groups can have meaningful effects on the provision and receipt of non-profit services.

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Table 1: Summary statistics

	(1)	(2)	(3)	(4)	(5)	(6)
	All counties		Low-poverty counties		High-poverty counties	
	No CEP	CEP	No CEP	CEP	No CEP	CEP
Panel a: County-level FA pounds disbursed (2010-2018)						
Share FRP 2010	0.4395 (0.1415)	0.5580 (0.1624)	0.3881 (0.1046)	0.4289 (0.0969)	0.6421 (0.0718)	0.6886 (0.1007)
FA pounds/student	18.1541 (19.5386)	21.0483 (18.6365)	16.9766 (18.6798)	18.0518 (15.3543)	22.6725 (21.9362)	24.0505 (21.0953)
Share CEP schools | any CEP	. (.)	0.4640 (0.3519)	. (.)	0.2725 (0.2528)	. (.)	0.6529 (0.3334)
% change access FRP | any CEP	. (.)	0.2318 (0.2315)	. (.)	0.2065 (0.2616)	. (.)	0.2578 (0.1964)
Share Black	0.0555 (0.1077)	0.1734 (0.2351)	0.0399 (0.0732)	0.0964 (0.1287)	0.1202 (0.1795)	0.2525 (0.2873)
Share Hispanic	0.1094 (0.1504)	0.1322 (0.1925)	0.0904 (0.1152)	0.1100 (0.1471)	0.1843 (0.2302)	0.1529 (0.2259)
Share Non-Hispanic White	0.7778 (0.1953)	0.6216 (0.2772)	0.8136 (0.1641)	0.7213 (0.2168)	0.6366 (0.2370)	0.5226 (0.2944)
Unemployment rate	5.7377 (2.7133)	7.5777 (3.0856)	5.4775 (2.5613)	6.8540 (2.6810)	6.7854 (3.0149)	8.3211 (3.2850)
TANF amount	396.2570 (135.3357)	368.4843 (159.3077)	419.9157 (129.6436)	426.3043 (167.4571)	300.6629 (114.7179)	309.8517 (125.4597)
Any state EITC	0.5014 (0.5000)	0.3925 (0.4883)	0.5520 (0.4973)	0.4915 (0.4999)	0.2960 (0.4565)	0.2936 (0.4554)
State EITC rate	0.0718 (0.1017)	0.0551 (0.1127)	0.0810 (0.1056)	0.0761 (0.1212)	0.0346 (0.0738)	0.0340 (0.0988)
Refundable state EITC	0.4250 (0.4943)	0.3259 (0.4687)	0.4703 (0.4991)	0.4160 (0.4929)	0.2439 (0.4294)	0.2370 (0.4253)
Panel b: Service area-level FA pounds received (2010-2016)						
Purchases/student	2.0429 (1.9398)	2.4879 (3.2210)	2.2485 (1.9504)	2.6544 (3.4461)	1.0216 (1.5268)	1.9294 (2.2225)
Commodities/student	3.7001 (4.9348)	3.6250 (3.8947)	3.3882 (3.3185)	3.3399 (2.7153)	5.2499 (9.4094)	4.5820 (6.3383)
Donations/student	15.1126 (15.5573)	12.9745 (10.2919)	14.2456 (7.1487)	12.5740 (8.4879)	19.4204 (34.3327)	14.3185 (14.7464)
Local donations/student	7.4821 (12.2386)	6.2988 (7.9978)	6.5824 (5.7055)	5.9671 (6.3505)	11.9522 (26.7304)	7.4122 (11.9078)
National donations/student	6.2049 (5.3723)	5.2919 (4.2071)	6.1608 (3.8030)	5.2531 (3.9506)	6.4241 (10.0628)	5.4221 (4.9724)
Wi/ FA transfers/student	1.4256 (2.2283)	1.3838 (2.1107)	1.5024 (2.1844)	1.3538 (2.2119)	1.0441 (2.4112)	1.4843 (1.7256)
Total pounds received/student	19.3951 (16.1670)	17.7108 (12.8764)	18.5396 (7.8893)	17.2057 (9.1381)	23.6454 (35.2137)	19.4049 (20.9395)
Panel c: County-level food assistance non-profit financials (2010-2018)						
Revenue/student ($2019 mil)	1.1238 (3.6809)	2.8853 (10.1711)	1.1521 (3.7148)	3.2423 (10.0783)	1.0176 (3.6034)	2.2667 (10.4690)
Expenses/student ($2019 mil)	1.0725 (3.6208)	2.7842 (9.9614)	1.0985 (3.6644)	3.1270 (9.8570)	0.9775 (3.4835)	2.1906 (10.2796)
Net income/student ($2019 mil)	0.0513 (0.2422)	0.1011 (0.8138)	0.0537 (0.2454)	0.1153 (0.8520)	0.0402 (0.2310)	0.0760 (0.7478)
# organizations/student	0.2333 (0.3299)	0.1126 (0.1244)	0.2178 (0.2783)	0.0979 (0.1117)	0.3225 (0.5340)	0.1414 (0.1419)

Notes: Mean (standard deviation) for 2010-2018 counties in Table 2 (panel a), 2010-2016 food bank service area in Table 4 (panel b), and 2010-2018 counties in Table 5 (panel c). Share of students attending a CEP school and the change in students with access to free meals are calculated as the average share and change after a county implements CEP. Columns 1-2 include all counties; columns 2-6 split the sample by halves of the share of students certified to receive free- or reduced-price meals in the 2009-10 school year (55.7%).

Table 2: Food bank use and free school meals

	(1)	(2)	(3)	(4)	(5)	(6)
	All counties		**Low poverty counties**		**High poverty counties**	
% Δ access	-0.0865**	-0.0868**	-0.1427***	-0.1441***	0.0487	0.0291
	(0.0364)	(0.0369)	(0.0477)	(0.0492)	(0.0582)	(0.0578)
Service area leave-out		-0.0084		-0.0053		-0.0095
% Δ access		(0.0053)		(0.0065)		(0.0082)
Observations	78471	78471	49830	49830	27679	27679
DV mean (level)	19.6666	19.6666	17.3816	17.3816	23.6738	23.6738
Average % Δ	0.2317	0.2317	0.2065	0.2065	0.2578	0.2578

Notes: Dependent variable is the natural log of food distributed through FA food banks in pounds per school-aged child. "Service area leave-out % Δ access" defined as the change in the share of students gaining access to free meals in other counties within the same service area. Columns 1-2 includes all counties; columns 2-6 split the sample by halves of the share of students certified to receive free- or reduced-price meals in the 2009-10 school year (55.7%). "DV mean" reports the average pounds of food per student distributed in FA food banks. "Average % Δ access" is the average percentage increase in student access to free school meals after CEP implementation. All specifications include controls for student racial and ethnic composition, county unemployment rates, and generosity of state-level income assistance programs, as well as county and year-quarter fixed effects. Robust standard errors clustered by county. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Food bank use and free school meals, by local characteristics

	(1)	(2)	(3)	(4)	(5)
	Food desert	High baseline meal cost	Urban	% black students (2010)	% white students (2010)
β_1: % Δ access	-0.1034**	-0.1581***	-0.0276	-0.0931**	0.0615
	(0.0488)	(0.0419)	(0.0495)	(0.0408)	(0.0975)
β_2: % Δ access X char	0.0534	0.1360**	-0.1923**	0.0458	-0.2092*
	(0.1408)	(0.0690)	(0.0980)	(0.1717)	(0.1195)
Observations	78464	75806	78464	78303	78303
p-value $\beta_1 + \beta_2$	0.6587	0.7181	0.0028	0.7636	0.0012

Notes: Dependent variable is the natural log of food distributed through FA food banks in pounds per school-aged child. All specifications estimated as in Equation 2 where each column specifies a different local characteristic (*char*) interacted with CEP coverage: (1) food desert (counties where at least 33 percent of the population lives more than 0.5 mi from a grocery store (10 mi in rural areas)); (2) estimated cost of food above the national average in 2009-10 school year; (3) urban county; (4) share of students who identify as black in 2010; and (4) share of students who identify as white in 2010. All specifications include controls for student racial and ethnic composition, county unemployment rates, and generosity of state-level income assistance programs, p-value $\beta_1 + \beta_2$ denotes the p-value from the test that the coefficients on "%Δ access" and "%$\Delta access * (char)$" equals 0. as well as county and year-quarter fixed effects. Robust standard errors clustered by county. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 4: Effect of free meals on food bank resource receipt

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	IHS(pounds received/ student)	**IHS(Purchases/ student)**	**IHS(Commodities/ student)**	**IHS(Donations/ student)**	**IHS(Local donations/ student)**	**IHS(National donations/ student)**	**IHS(Wi/FA transfers/ student)**
Panel a: All counties							
% Δ access	-0.0122	-0.1915***	0.0542	0.0832**	0.0883	0.2241***	-0.1050*
	(0.0307)	(0.0730)	(0.0389)	(0.0411)	(0.0898)	(0.0620)	(0.0555)
Observations	3823	3823	3823	3823	3823	3823	3823
DV mean (level)	17.7001	2.3265	3.7334	11.7106	6.4110	5.2996	1.4284
Average % Δ	0.0960	0.0960	0.0960	0.0960	0.0960	0.0960	0.0960
Panel b: Low-poverty counties							
% Δ access	-0.0230	-0.2242***	0.0306	0.0707	0.0679	0.2339***	-0.1109**
	(0.0359)	(0.0549)	(0.0322)	(0.0466)	(0.0993)	(0.0675)	(0.0537)
Observations	2974	2974	2974	2974	2974	2974	2974
DV mean (level)	17.2609	2.4847	3.4828	11.3642	6.0522	5.3120	1.4027
Average % Δ	0.1014	0.1014	0.1014	0.1014	0.1014	0.1014	0.1014
Panel c: High-poverty counties							
% Δ access	-0.0322	0.4537	0.5107	0.1908	0.3113	-0.5213	-0.0653
	(0.2461)	(0.7395)	(0.3741)	(0.2815)	(0.7552)	(0.7747)	(1.0725)
Observations	849	849	849	849	849	849	849
DV mean (level)	19.2389	1.7723	4.6113	12.9240	7.6678	5.2561	1.5183
Average % Δ	0.0738	0.0738	0.0738	0.0738	0.0738	0.0738	0.0738

Notes: Dependent variable is the inverse hyperbolic sine of total food received by FA food banks (column 1), direct purchases (column 2), federal commodities received (column 3), total donations (column 4), donations from local sources (column 5), donations from national organizations (column 6), or transfers within the FA network (column 7). All units in pounds per school-aged child at the food bank service area. Panel a includes all areas; panels b-c split the sample by halves of the share of students certified to receive free- or reduced-price meals in the 2009-10 school year (55.7%) in the median county within the service area. All specifications include controls for student racial and ethnic composition, county unemployment rates, and generosity of state-level income assistance programs, as well as service area and quarter fixed effects. Robust standard errors clustered by service area. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Effect of free meals on food bank resources and organizations' financial status

	(1)	(2)	(3)	(4)	(5)
	# org'ns/ student (X1000)	**IHS (Revenue/ student)**	**IHS (Expenses/ student)**	**IHS (Fundraising/ student)**	**IHS(Net income/ student)**
Panel a: All counties					
% Δ access	0.0047	0.0430	-0.0890	-0.0849	0.3990*
	(0.0116)	(0.1385)	(0.1421)	(0.0836)	(0.2367)
Observations	8696	8696	8696	8696	8696
DV mean (level)	0.1607	64.8039	61.3322	0.4002	3.4717
Average % Δ	0.1620	0.1620	0.1620	0.1620	0.1620
Panel b: Low-poverty counties					
% Δ access	0.0040	0.0618	-0.0991	0.0409	0.1889
	(0.0115)	(0.1839)	(0.1894)	(0.0816)	(0.2670)
Observations	6366	6366	6366	6366	6366
DV mean (level)	0.1536	60.5921	56.9793	0.4487	3.6128
Average % Δ	0.1442	0.1442	0.1442	0.1442	0.1442
Panel c: High-poverty counties					
% Δ access	-0.0056	0.2385	0.1486	-0.3547*	1.0168**
	(0.0433)	(0.2180)	(0.2131)	(0.2080)	(0.5018)
Observations	2249	2249	2249	2249	2249
DV mean (level)	0.1815	77.2880	74.1227	0.2627	3.1652
Average % Δ	0.1949	0.1949	0.1949	0.1949	0.1949

Notes: Dependent variable is the number of food assistance organizations in a county that file a 990 form (column 1); the (inverse hyperbolic sine) of organizations' per-student revenue (column 2), reported expenses (column 3), gross fundraising costs (column 4), or net income (column 5) among food assistance organizations that file a 990 form in a county. Panel a includes all counties; panels b-c split the sample by halves of the share of students certified to receive free- or reduced-price meals in the 2009-10 school year (55.7%). All amounts in 2019 dollars. All specifications include controls for student racial and ethnic composition, county unemployment rates, and generosity of state-level income assistance programs, as well as county and year-quarter fixed effects. Robust standard errors clustered by county. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

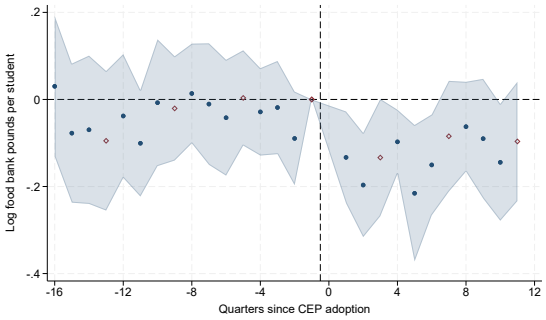
Table 6: Government nutrition expenditures and free school meals

	(1)	(2)	(3)	(4)
	ln(Total gov't)	ln(Federal)	ln(State)	ln(Local)
% Δ access	0.0908***	0.2833***	0.0257	-1.2626***
	(0.0191)	(0.0110)	(0.0200)	(0.0365)
Observations	95585	92296	76360	91582
DV mean	495.79	331.66	23.84	162.75

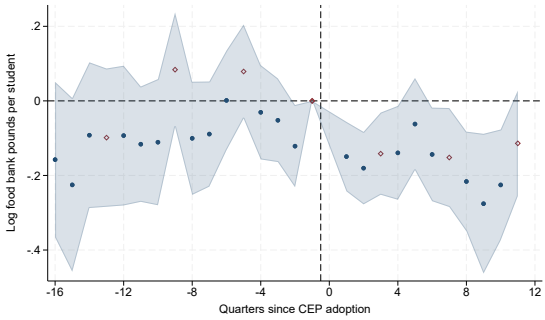
Notes: Dependent variable is the natural log of per-student school-based nutrition assistance spending from all levels of government (column 1); federal funds (column 2); state funds (column 3); or local funds (column 4) in 2019 dollars for school years 2010 through 2018. All specifications include controls for student racial and ethnic composition, county unemployment rates, and generosity of state-level income assistance programs, as well as county and year-quarter fixed effects. Robust standard errors clustered by county. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Figure 1: Event study: Food bank use and CEP

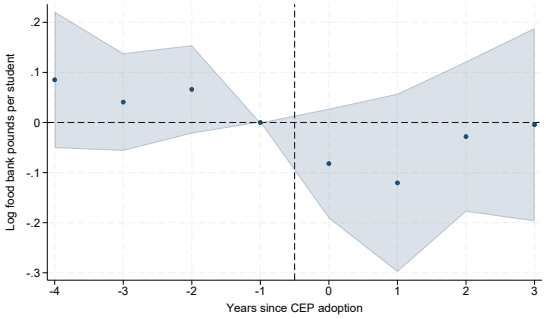
(a) Quarterly change in food bank use, low-poverty counties



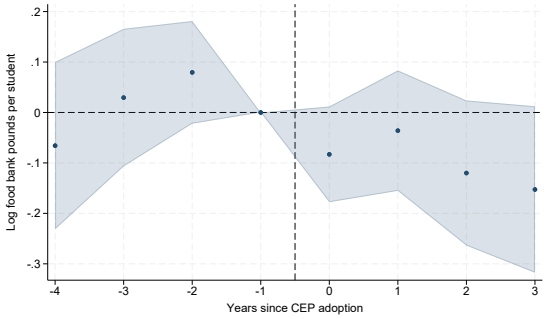
(b) Quarterly change in food bank use, high poverty counties



(c) Annual change in food bank use, low-poverty counties

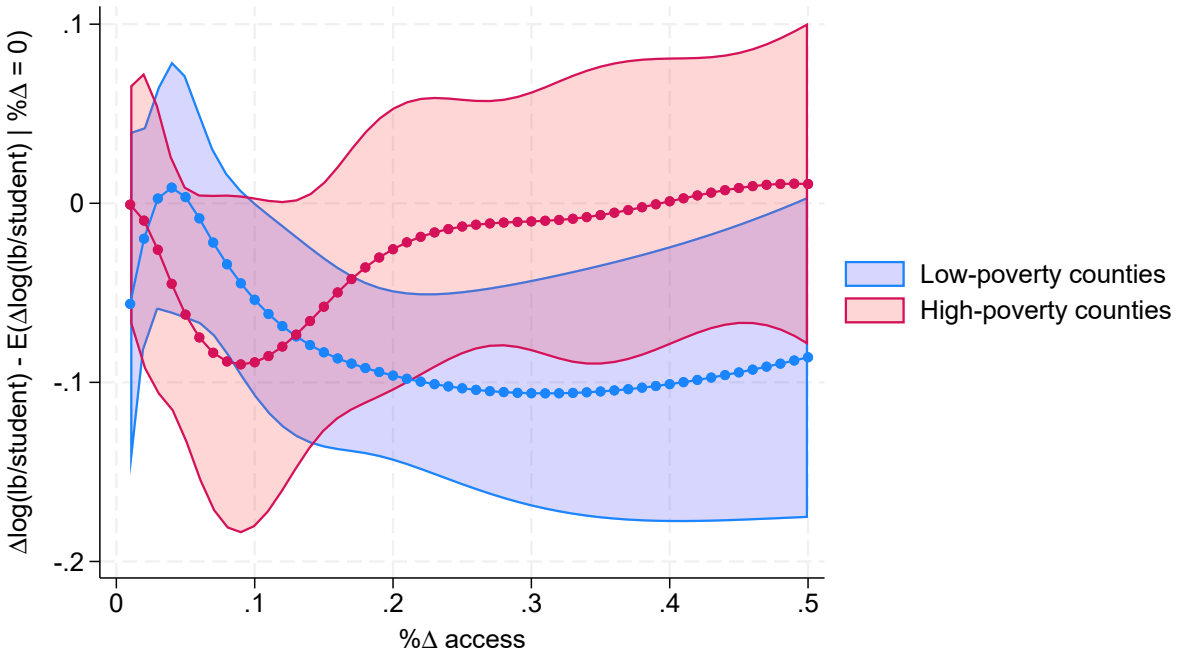


(d) Annual change in food bank use, high poverty counties



Notes: Figure shows event study of food bank use relative to the first quarter (panels a-b) or year (quarters 1, 2, and 4; panels c-d) at least 1 percent of students in a county attended a CEP school. Hollow diamonds in panels a-b denote the 3rd quarter of each calendar year (omitted in the averages for panels c and d). Each estimate is scaled by the share of students gaining access to free school meals in the first year the county implemented CEP as in Equation 3. All specifications control for student demographics and local policy controls. Shaded areas denote 95 percent confidence intervals, clustered by county.

Figure 2: Dose response curve, low- and high-poverty counties

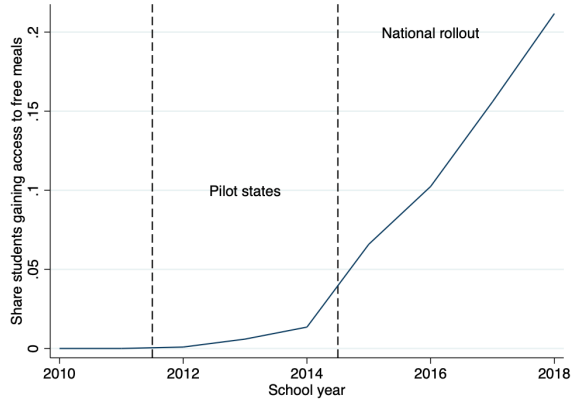


Notes: Figure shows treatment effect by treatment "dosage" (share of students gaining access to free school meals for the first full school year of implementation (calendar quarters 4, 1, and 2). Dosage curve estimated as a cubic split with three knots, following (Callaway et al., 2024b). Shaded areas denote bootstrapped 95 percent confidence intervals.

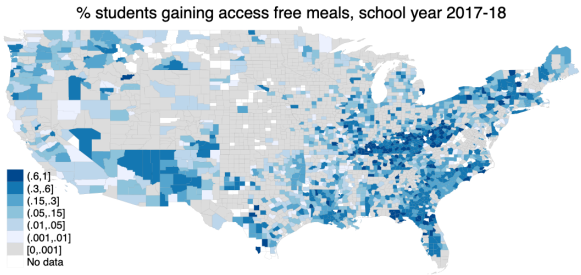
A Appendix

Appendix Figure A1: CEP eligibility and timing

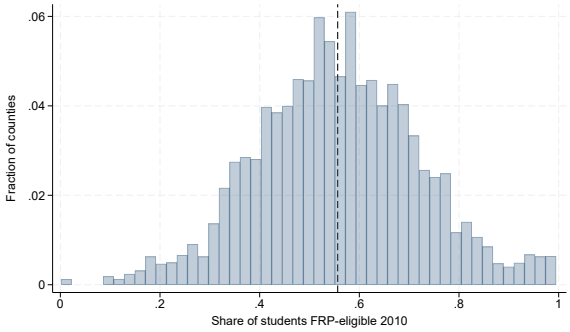
(a) Timing and CEP participation



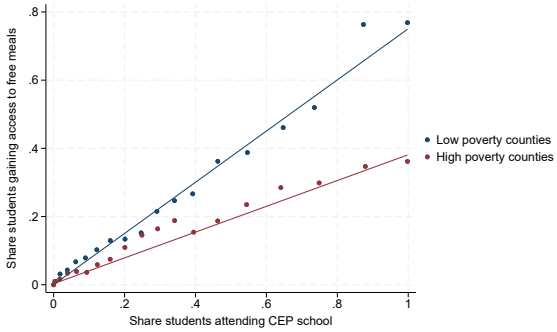
(b) Geographic variation in CEP participation



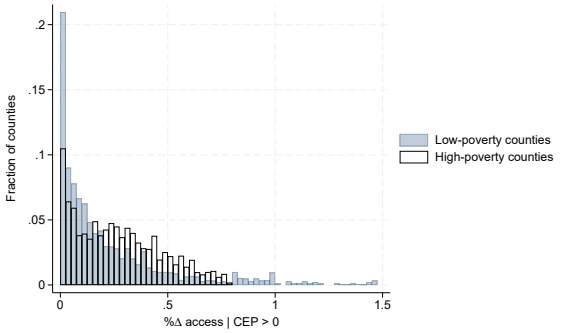
(c) Share of students FRP-eligible in 2010 among CEP adopting counties



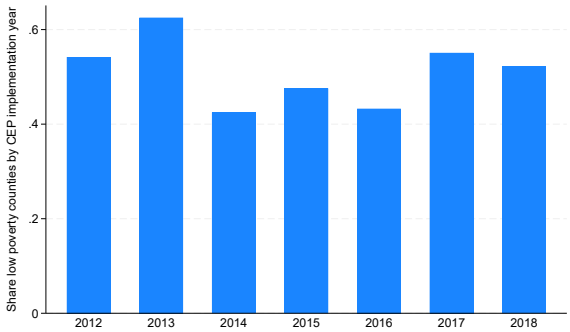
(d) Share of students gaining access to free meals, by share of students attending CEP school



(e) Share of students gaining access to free meals among CEP adopting counties

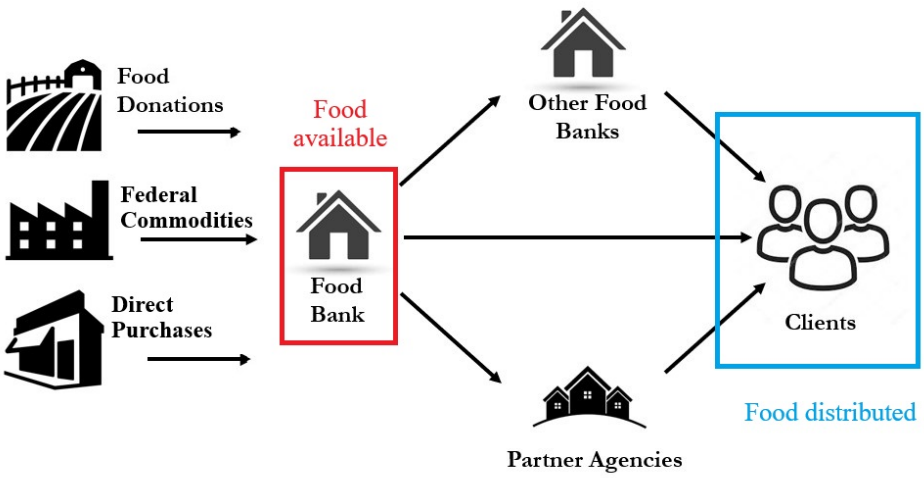


(f) Share counties low-poverty, by first year of CEP implementation



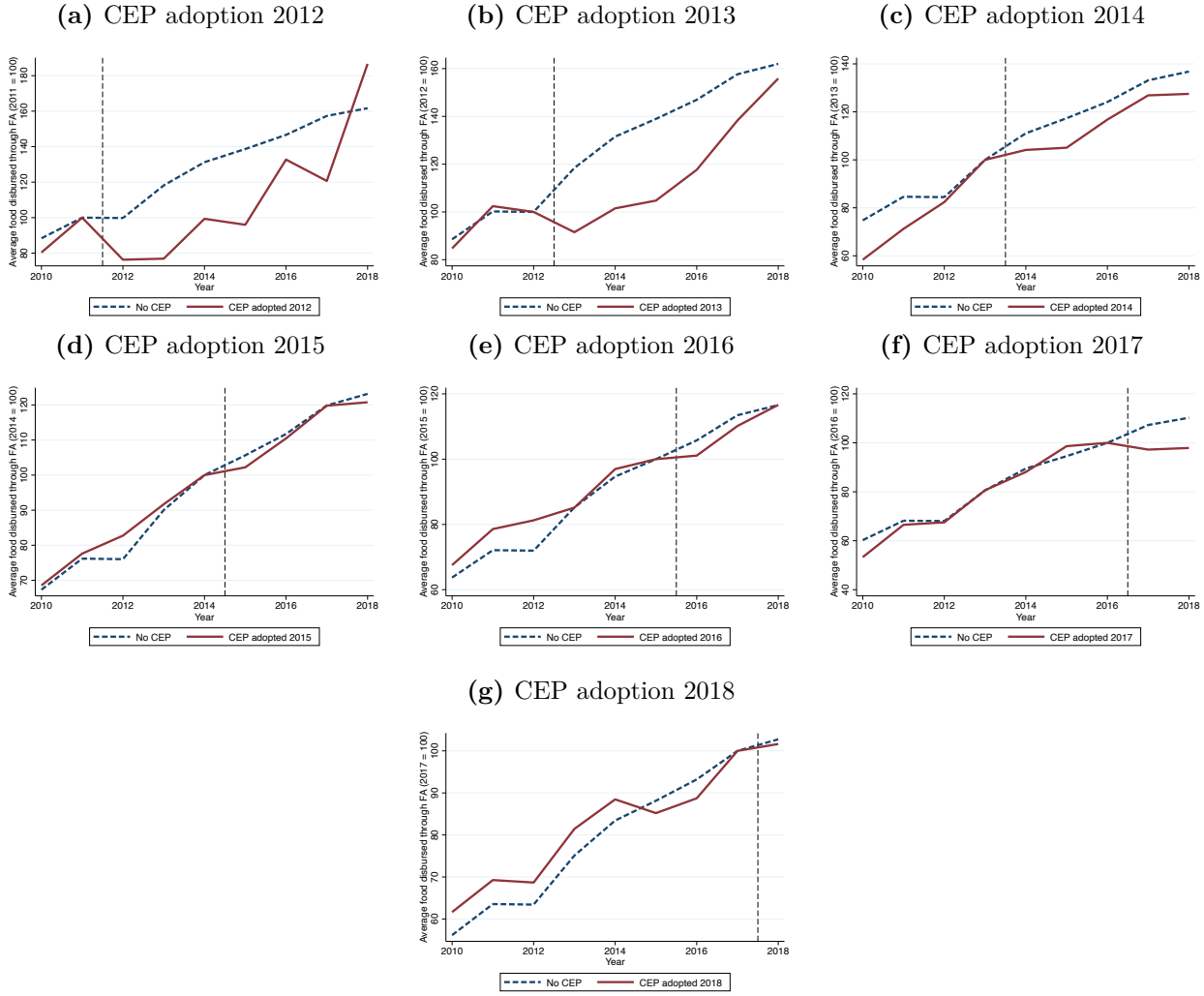
Notes: Panel (a) shows the fraction of public school students attending a CEP school by the spring semester of the academic year. Panel (b) shows the fraction of students in each county who had gained access to free school meals by the 2017-18 school year. Panel (c) shows the share of students qualifying for free-or-reduced price meals in 2010 among counties with any CEP participation by the 2017-18 school year. Panel (d) shows the relationship between the share of students attending a CEP school and the percent of students gaining access to free school meals, partitioned by county baseline poverty halves. Panel (e) shows the share of students gaining access to free school meals after CEP adoption, partitioned by baseline poverty halves. Panel (f) shows the share of low-poverty counties in each treatment cohort. Data from CCD and FRAC.

Appendix Figure A2: Flows of nutrition assistance in Feeding America network



Notes: Figure shows how food moves through the FA network from farms, food manufacturers, and private donations to clients.

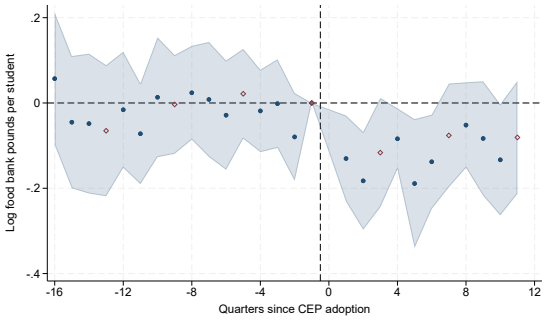
Appendix Figure A3: Raw trends: Food bank use and CEP adoption in low-poverty counties



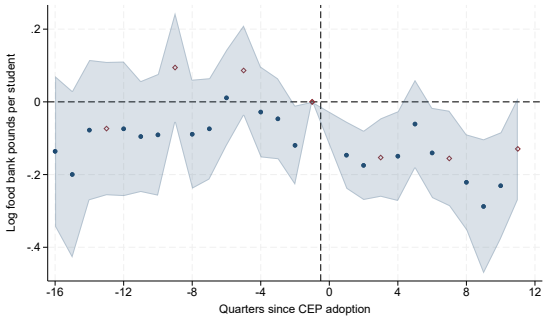
Notes Figure shows average pounds of food distributed by FA food banks among counties with no CEP adoption (blue line) or CEP adoption of at least 1% in a particular year (maroon line) among counties with baseline (2010) free-and-reduced-price shares below the median. Values normalized to equal 100 the year before treated counties adopted CEP.

Appendix Figure A4: Event study: Food bank use and CEP, counties with at least 5% CEP

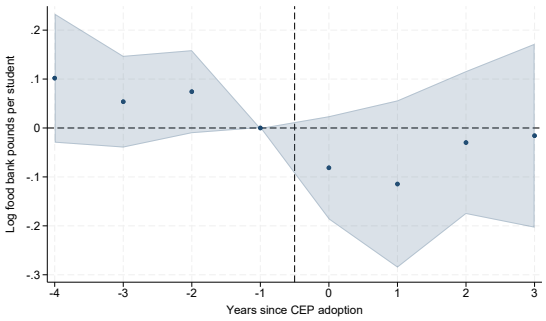
(a) Quarterly change in food bank use, low-poverty counties



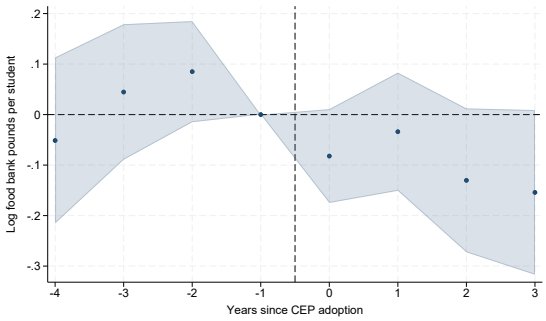
(b) Quarterly change in food bank use, high poverty counties



(c) Annual change in food bank use, low-poverty counties



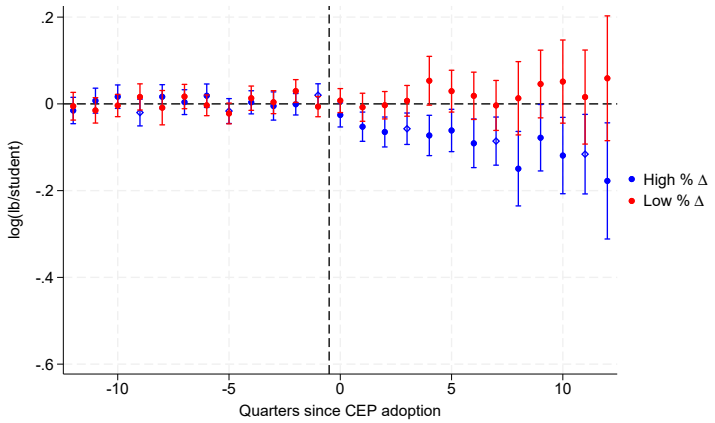
(d) Annual change in food bank use, high poverty counties



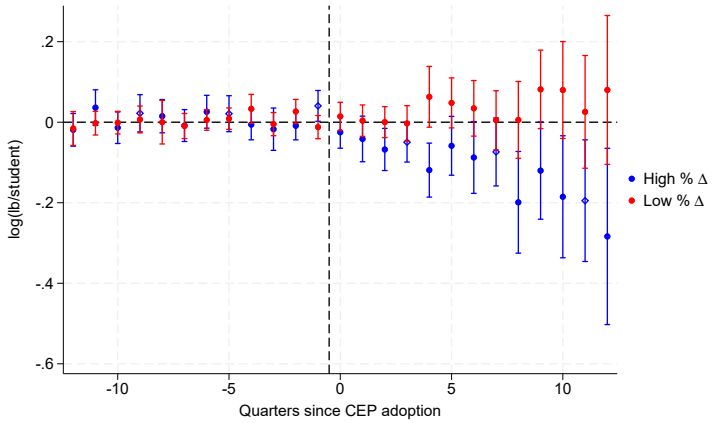
Notes: Figure shows event study of food bank use relative to the first quarter (panels a-b) or year (quarters 1, 2, and 4; panels c-d) at least 5 percent of students in a county attended a CEP school. Hollow diamonds in panels a-b denote the 3rd quarter of each calendar year (omitted in the averages for panels c and d). Each estimate is scaled by the share of students gaining access to free school meals in the first year the county implemented CEP as in Equation 3. All specifications control for student demographics and local policy controls. Shaded areas denote 95 percent confidence intervals, clustered by county.

Appendix Figure A5: Event study by treatment heterogeneity: Food bank use and CEP

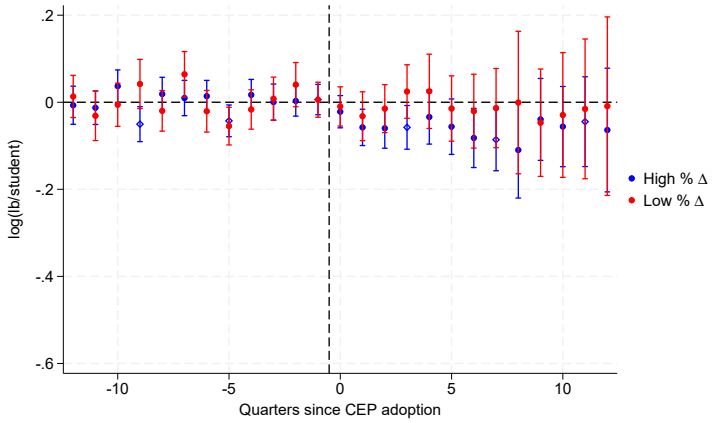
(a) Quarterly change in food bank use, all counties



(b) Quarterly change in food bank use, low-poverty counties



(c) Quarterly change in food bank use, high-poverty counties



Notes: Figure shows event study of food bank use under the ATT-GT approach in Callaway and Sant'Anna (2020) and Callaway et al. (2024b) where event time is defined relative to the first quarter at least 1 percent of students attended a CEP school. Blue markers denote average treatment effects for counties where the share of students gaining access was larger than the national median across all CEP schools in the first year of treatment (11.2%). Red markers denote ATE for counties with a smaller share of students gaining access. Hollow diamonds denote the 3rd quarter of each calendar year. Vertical bars denote 95 percent confidence intervals, clustered by county.

Appendix Table A1: Food bank use and free school meals: Robustness

	(1)	(2)	(3)	(4)	(5)	(6)
	Base specification	Include summer months	No policy controls	Enrollment weighted	2010-2016	Controls: Never-treated counties > 500 mi
Panel a: All counties						
% Δ access	-0.0865**	-0.0791**	-0.0875**	-0.1208*	-0.1176**	-0.1032***
	(0.0364)	(0.0344)	(0.0366)	(0.0678)	(0.0472)	(0.0242)
Panel b: Low-poverty counties						
% Δ access	-0.1427***	-0.1275***	-0.1482***	-0.1162	-0.1857***	-0.1243***
	(0.0477)	(0.0433)	(0.0480)	(0.0826)	(0.0672)	(0.0337)
Panel c: High-poverty counties						
% Δ access	0.0487	0.0429	0.0689	-0.0183	0.0084	-0.0820**
	(0.0582)	(0.0572)	(0.0586)	(0.0999)	(0.0677)	(0.0350)
Includes summer months		X				
Student Weights				X		
Policy controls	X	X		X	X	X

Notes: Dependent variable is the natural log of food distributed through FA food banks in pounds per school-aged child. Column 1 is the base specification from the TWFE approach in Table 2. Column 2 includes the third quarter of the calendar year (summer months); column 3 excludes controls for student racial and ethnic composition, county unemployment rates, and generosity of state-level income assistance programs. Column 4 weighs each county by the number of school-aged children in the 2009-10 school year. Column 5 limits the sample to school years 2010-2016. Column 6 implements a stacked-DD approach where for each county the control group is limited to counties with no CEP participation by 2018 that are at least 100 miles away. All specifications include controls for student racial and ethnic composition, county unemployment rates, and generosity of state-level income assistance programs, and columns 1-5 include county and year-quarter fixed effects; column 6 includes time-by-group and county-by-group fixed effects. Robust standard errors clustered by county (columns 1-5) or county-group (column 6). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.