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In-Kind Government Assistance and Crowd-Out of Charitable Services: Evidence from Free School Meals

Abstract

Many community organizations provide services similar to government programs, but there is limited evidence how increased government assistance affects the use of charitable services. We examine how greater access to federal nutritional aid through schoolwide free meal programs affects food bank use across the US's largest food bank network. We find that a 10% increase in free school meal access reduces food bank utilization by 0.9-1.4%, without significantly reducing the amount of charitable resources available. The reduction of food bank use is only found in areas where relatively few students qualified for government aid prior to universal meals.

JEL-Codes: H530, I000, J380.

Keywords: crowd-out, charitable donations, nutritional assistance, food banks.

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1 Introduction and Background

Many community organizations operate as an informal safety net by providing necessities such as food, housing, clothing, and financial assistance to households in need. Despite having 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 — that is, the extent to which goods provided by the government and charities are substitutes. In addition, there is little information on 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 private charitable services, using nutritional assistance programs as an example. Nutritional assistance is one of the core components of government aid and the mission 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 serve slightly different populations, but eligibility is largely restricted to low-income families with income less than 130 percent (SNAP) or 185 percent (WIC and school meals) of the federal poverty line. In terms of community resources, food banks provide food and nutritional assistance to about 40 million individuals each year (Feeding America, 2014). Food bank clients might not qualify for government assistance programs, or they may have unmet nutrition needs even with public assistance. Despite differences in eligibility, both government nutritional assistance programs and food bank services provide a similar resource.

We examine how expansions in government nutritional assistance interact with 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 their income and students whose families do not complete the application forms. Accordingly, students who were previously ineligible for government assistance gain access to free meals, and students who were already eligible for

free school meals experience no change in their access to government assistance. Importantly, eligibility 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 total amount of food distributed by 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 on charitable services for an expansion in government assistance that covers the entire country.

Our empirical approach leverages the staggered introduction of schoolwide free meal programs across counties in a generalized difference-in-differences approach where the share of students estimated to gain access to free school meals each year is similar to the "statutory parameters" approach used in much of the literature on program take-up and eligibility (Currie and Gruber, 1996). We calculate the elasticity of food bank utilization with respect to free school meal access in order to measure how the use of charitable services changes in an area after government assistance expands. Our results are threefold.

First, we find evidence of significant, albeit imperfect, substitutability between private and public nutritional resources. On average, increasing access to free school meals by 10 percent reduces food bank use by 0.87 percent. On any given school day, approximately 53 percent of free meal-eligible students receive a school meal. Accordingly, 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 1.65 percent ($\frac{0.873}{0.530}$).

Second, we find that crowd-out effect is not uniform across locations. For example, 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' income. Students in these areas are unlikely to qualify for other forms of government assistance (SNAP, Medicaid) and are more likely to only have access to charitable

services if they need nutritional assistance. In contrast, there is no significant reduction in food bank use in high-poverty areas. These patterns are consistent with the existing literature showing that the largest improvements in students' outcomes are concentrated in areas and populations where fewer students were income-eligible for free meals (Ruffini, 2022; Gordanier, Ozturk, Williams and Zhan, 2020). These patterns also reflect the fact that food banks do not impose income eligibility requirements and that their client base includes more moderate-income families who may be ineligible for government assistance. Accordingly, the charitable services may serve as the main source of assistance for families that do not qualify for government programs, so when government assistance expands to reach these families, they are able to reduce their use of community resources.

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.

Finally, we perform several robustness checks and use alternative datasets to verify that this reduction in utilization is not driven by supply side changes. We do not observe a reduction in the amount of food available for distribution, a decrease in the number of nutrition-focused charities operating in an area, and no significant changes in food bank revenue. At the same time, food banks' net income slightly increases. These results indicate that there was unmet need among individuals who did not qualify for government assistance based on income.

This paper relates to work examining the interaction between government social services, the private market, and third-party resources, and the extent to which government services crowd out private provision. Much of the existing work on crowd-out focuses on the relationship between government funding and individual contributions – that is, the amount of charitable resources available for disbursement – 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 on the point of access and potentially quality and quantity, clients may have distinct preferences for the type of food they consume 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 dimensions. In the education sector, 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 food items, 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, for example, greater 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 at 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 relying on outcome that directly measures the amount of assistance distributed to clients, which may not be fully captured on organizations' balance sheets.

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 charitable organizations covering the entire 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 their family's income formula 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). This study is the first to empirically explore the extent to which these increases in food intake are net of any reductions in intake from charitable services on a national scale.

The rest of the paper proceeds as follows. Section 2 outlines a conceptual framework, describes the expansion of free school meals under the Community Eligibility Provision, and overviews the FA network. Section 3 describes our data and empirical approach. Section 4 presents results, and Section 6 concludes.

2 Conceptual Framework

2.1 Conceptual framework and institutional setting

In this section, we outline how increased availability of school-based nutritional assistance could affect households' demand for community resources. Households consume food items of type x from grocery purchases c, government assistance g, and community resources r, each with a different price p_x. Although both government assistance and community resources are "free" in that recipients do not incur monetary costs, either form of assistance may confer a non-negative stigma or ordeal cost that varies by resource type, p_g and p_r (Byrne, Just and Barrett, 2021).[1] Demand for nutritional resources is then a function of each type of consumption's price or ordeal cost, $q(p_c, p_g, p_r)$.

Schoolwide free meal programs increase the availability of government assistance g among students who were previously not certified to receive free school meals, thereby lowering the price p_g for these students. Given the universal nature of these programs, the stigma associated with free school meals may fall among students who were previously eligible, which reduces p_g for these students as well. Therefore, both total and government-provided consumption are expected to weakly increase among all students, with larger increases for those who are newly-eligible for free meals and experience a reduction in both price and stigma costs. Across the types of food, free

[1] p_g may also be a function of charitable receipt. For example, food banks and food pantries often connect families to government programs such as SNAP (Sharma, Pekgun, Ozturk and Ahire, 2023). In our context, this relationship is unlikely, as expanded access to free meals is due to local policy changes, rather than household income shocks.

school meals will lead households to consume a greater share of their food through school meals and a smaller share from food bank and grocery purchases, as long as the cross-price elasticities are strictly positive. In the case where food items provided by food banks and school meals are perfect substitutes, the increased consumption at school will be fully offset by a reduction in food bank use.

There are several reasons to expect that even though both school meals and food banks provide similar services (food), these goods are imperfect substitutes. First, school meals follow a set menu where students have relatively limited choice on what items to consume, whereas food banks offer a more diverse array of items. Second, school meals can only be consumed by students during the school day, whereas food received through food banks commonly takes the form of grocery items that can be used to prepare meals for consumption at any time, including days outside the school year (e.g., vacations and weekends), and by any member of the household, including adults and younger children. However, the degree of substitutability between these two sources is an empirical question that has not been previously explored in the literature.

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

The school meals program is one of the oldest and largest nutritional 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 in 2018), and paid a reduced-price (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

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

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. As the CEP program became more established, participation among eligible schools has increased over time (Appendix Figure A1). In total, more than 20 percent of school-aged children attended a CEP school at the end of our sample period in 2018 (panel a), with substantial geographic variation across the country and higher participation in relatively poor areas (panel b).

Once schools in 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 remained eligible to receive free meals and experienced no *de facto* change in their access to government nutritional resources.[4]

The split between high- and low-poverty areas is also important in the context of food bank

[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 access to 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 interpreted as changes to informal safety net resources for an expansion in government service availability.

services since the income threshold for free school meals is similar to the income requirement for other forms of government assistance. For example, SNAP requires that households have a gross monthly income 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 nutritional assistance, and food banks and other charitable sources 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 utilization 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 (FRP) distribution among all counties that would eventually adopt CEP. In the relatively low-poverty areas, fewer than 58.2 percent of students qualified for free meals prior to CEP.[5]

2.3 Community resources: Food banks

Feeding America (FA) is the largest domestic hunger-relief charity in the United States, comprising more than 70 percent of the nation's food banks. FA operates a network of 200 food banks that collects food and grocery products from donations from food retailers, manufacturers, local farmers, corporations, individuals, and federal commodities. Throughout our analysis period, FA relied on a bidding mechanism called the Choice System in which food banks were 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 both 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. This food then reaches clients either directly from food banks or through over 60,000 partner agencies (such as 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. For the purposes of this paper, the

[5] Appendix Figure A1 panel c shows the full baseline FRP distribution among counties that had any CEP participation by the 2018 school year. Conditional on CEP coverage, more students newly gained access to free school meals in low-poverty areas (panel d).

Choice System mechanism helps minimize the amount of surplus and deficits within the network so that the amount of food distributed by a local food bank matches its local demand as closely as possible.

Food banks in the FA network serve nearly all counties across the country and serve 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, incurring expenses of $2.8 billion (Feeding America, 2020).[6]

There are no income or eligibility requirements to receive food bank assistance, but clients tend to have low incomes. For example, in 2014, most food bank clients with children earned less than $15,000 a year, and most clients reported financial difficulty in purchasing food, housing, and medical care (Feeding America, 2014). By providing groceries at no cost, food banks help families cope with food insecurity and financial hardship, regardless of their eligibility or participation in government nutritional assistance programs.

3 Data and Empirical Approach

3.1 Data

3.1.1 Food bank resources

FA food bank utilization We examine food bank utilization, defined as the pounds of food distributed by each FA food bank to each county within their service area, as a measure of community resource use. The available data include quarterly information for all 200 FA food banks covering all counties for the calendar years 2010 through 2018. For the baseline analysis, we drop the third quarter in the calendar year which corresponds to the summer months when school is not in session. 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 K-12 students in the county. In the event study analysis and additional results, we also explore seasonal patterns in food bank demand.[7]

[6] In comparison, approximately 35 million individuals experienced food insecurity in 2019. Most food banks in the United States are within the FA network, and the remaining independent food banks tend to be smaller entities (Food Bank News, 2020). We attempt to capture non-FA organizations with tax data on revenues, expenditures, and the number of operating entities in order to ensure our results are not due to any changes specific to FA.

[7] Results are attenuated, although still show a significant decline in food bank utilization, when including the third quarter. This pattern is consistent with event studies showing a less marked drop in food bank use during the summer months.

FA food bank supply The measure of food bank utilization described above is an equilibrium outcome that combines consumer demand and food bank supply. The shares provided through FA's Choice System mechanism described in Section 2.3 allow food banks to "purchase" food so that they can acquire additional food to meet local demand if other donations fall short. Due to the Choice System, food bank utilization is a close proxy for consumer demand. However, in order to more fully disentangle changes in utilization that stem from demand and those from supply, we also examine whether universal meals change the amount of food that is available at food banks, measured as the quarterly pounds of food received for distribution (e.g., supply). This measure of supply includes food received from all sources — donated, purchased, and federal commodities — for calendar years 2010 through 2016. Unlike the measure of utilization, supply is reported at the food bank level and is not disaggregated across the counties a food bank serves; accordingly, this analysis (Section 4.5) is conducted at the food bank service area level.[8]

990 food bank and pantry financial resources Data on revenues, contributions, and fundraising efforts reported by non-profits provide a complementary measure of the availability of local charitable resources on the supply side. These data are provided through the Core Data files from the National Center for Charitable Statistics (NCCS), derived from 990 tax filing reports and used in much of the existing literature examining crowd-out in the non-profit sector (Andreoni and Payne, 2011, 2003; Payne, 1998). 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.[9]

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 many 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 overcome these data limitations and to maximize

[8] We limit this analysis to food banks that serve the counties in a single state or a contiguous state group and exclude the seven percent of the observations where food banks serve counties in non-neighboring states.

[9] 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 utilization data, we aggregate measures of non-profit finances to the county level. This aggregation circumvents some of the issues arising from multiple service locations since many of these headquarters operate within a county boundary (Allard and Pelletier, 2023).[10]

3.1.2 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 income is below 130 percent of the federal poverty line (children in families up to 185 percent of the poverty line qualify for reduced-price meals and pay no more than 40 cents a meal). This second source of variation – family income – reflects local economic conditions, such as the strength of the labor market, that could also affect demand for food bank services. While attendance at a school offering universal school meals is less likely to capture local economic conditions, this could also be correlated with food bank demand if students choose schools or residential location based on the availability of free meals.

Our empirical strategy therefore relies on a measure of access to free meals that is not influenced by current attendance or 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 current-year universal school meal adoption (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 base year, 2010, and year y as:

$$\%\Delta access_{sy} = \frac{CEP_{sy} * enroll_{s,2010} + (1 - CEP_{st}) * (FRP_{s,2010})}{enroll_{s,2010}} - 1 \tag{1}$$

In Equation 1, CEP_{sy} is an indicator equal to 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] Appendix Figure A1 panel a shows the share

[10] Results are robust to excluding organizations that ever had per-student annual revenue in the top five percent of all organizations (approximately $11 per student) – the organizations that are most likely to operate in multiple counties.

[11] Data on CEP adoption extends previous work in Gordon and Ruffini (2021) and Ruffini (2022). We exclude the

of students gaining access to free meals has increased substantially over time, especially in the years after the pilot period where all states became eligible to implement the program. [12]

We aggregate the school-level changes to the county level by assigning each census tract in county c to the nearest elementary, middle, and high school that is in a district that serves county c. These data are then collapsed to the county level with each tract-by-grade level observation weighted by the age-specific population from the National Cancer Institute SEER estimates.

3.1.3 Control variables

In order to isolate the effect of greater access to free school meals from other changes in the policy and educational environment, 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); each county's food desert designation from USDA Economic Research Service; and other state-level income assistance programs, including AFDC benefit levels and state Earned Income Tax Credit (EITC) parameters from the University of Kentucky Poverty Database. Finally, we examine how local food prices mediate the relationship between government and community assistance by examining differences by the average baseline meal cost in each state and year, calculated by FA for each food bank within their network in 2010.[13]

3.2 Empirical framework

As described in Section 2, CEP was introduced and adopted by schools in different school years, beginning in the 2011-12 school year. Participation was limited to pilot states in the program's first three years, with an additional 3 to 4 states eligible each year. After the national rollout in 2015, schools in all states became eligible to participate, and over time, participation among eligible schools has increased, leading to increased coverage in counties over time (Appendix Figure A1).

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.

[12] Panel b illustrates the spatial variation in new access to free meals at the end of the sample period.

[13] Cost per meal is calculated as the national average cost spent on a meal by food secure persons, weighted by the cost of food in the area. Thus, a higher cost per meal could indicate a higher cost of living in the local environment, which, all else equal, is expected to increase the need for community assistance programs.

We leverage this variation across- and within- counties in a two-way fixed effects specification.

This approach combines two sources of variation: first, food bank use in a county before and after CEP adoption relative to counties where no school has adopted, and second, food bank use as CEP coverage expands within a county. The main TWFE specification takes the form:

$$y_{ct} = \beta(\%\Delta access_{sy}) + X'_{ct}\Phi + \gamma_c + \gamma_t + \varepsilon_{ct} \tag{2}$$

where y_{ct} is the outcome of interest: for a measure of food bank utilization, the (log) number of pounds per-student distributed by food banks in county c and quarter t, and for measures of food bank supply, either the (log) quarterly number of pounds per student received by a food bank in its service area or the inverse hyperbolic sine of annual fundraising, expenditures, revenue, and net income at the county level as reported in the NCCS data

$\%\Delta access_{sy}$ is the share of K-12 students in county c gaining access to free school meals due to the adoption of CEPs across schools, as defined in Equation 1. Accordingly, β provides an elasticity of food bank use with respect to free meal access and can be directly interpreted as a measure of crowd-out. We summarize the extent of crowd-out as an elasticity since a common unit of measurement is not available for school meals and food bank services.[14]

X_{ct} is a vector of time-varying student characteristics at the county level, including student racial-ethnic composition, the quarterly county unemployment rate, maximum value of cash welfare (TANF) for a 3-person family, and the presence, rate, and refundability of a state EITC. γ_c and γ_t are county and time fixed effects, respectively, accounting for time-invariant features of a county and all factors affecting all counties at the same time, such as changes in school meal nutritional requirements.

We first estimate Equation 2 pooling all counties, and then separate counties at the median of the baseline (2010 school year) share of students qualifying for free meals (58.2 percent).[15]

The standard TWFE framework has several benefits: first, the existing literature on school

[14] Food bank utilization is reported in pounds of food, and FA estimates each meal is 1.2 pounds. 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.

[15] We define halves of the baseline free meal distribution based on the share of students qualifying for free meals among ever-CEP-adopting counties. The average school in the bottom half had a baseline free meal eligibility rate of 41 percent, compared to an average of 69 percent in the top half.

meals programs relies heavily on similar approaches; therefore, this specification provides a benchmark to previous findings. 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. Third, this approach yields a readily-interpretable measure of crowd-out. Appendix Table A1 shows similar results under slight modifications to the canonical TWFE framework that eliminate comparisons between "newly-treated" counties and counties that have already been implementing CEP for several quarters by using the group-time average treated on the treated (ATT-GT) estimator in Callaway and Sant'Anna (2020). However, a shortcoming of the ATT-GT approach in our setting is that this estimator does not capture the continuous nature of CEP participation among schools within a county and does not distinguish between areas where few students attend a CEP school and those where all students have access to universal free meals.

We supplement the static TWFE approach with an event study analysis, where the continuous CEP treatment variable, $\%\Delta access_{sy}$, is replaced with a vector of indicators for each event-quarter k where $k = 0$ is the fall quarter of the first year at least 1 percent of students gained access to free meals through CEP. In order to account for the continuous nature of treatment, we then scale each event time dummy by $\%\Delta access_{sk=0}$, i.e., the share of students gaining access in the first year of CEP adoption:[16]

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

The event study framework complements the TWFE by providing additional information on two dimensions. First, it allows us to capture within-year changes to observe whether patterns differ in summer months when school is not in session. Second, it traces out treatment seasonality and other changes over time non-parametrically, offering a formal test of whether food bank utilization followed a different trajectory in the months immediately prior to CEP adoption, and illustrating whether any changes in community resources grow or diminish over time.

[16] In order to define an initial start date, we define the initial year of participation as when at least 1% of students attended a CEP school and exclude county-year observations where participation was between 0 and 1%, exclusive. Results are robust to using different thresholds of changes in access.

4 Public-Private Crowd-out in Nutrition Assistance

Table 1 shows summary statistics for counties with no CEP coverage and those with any CEP coverage (the "treated" counties in the continuous TWFE approach) on average along with by poverty status for the latter group. Areas with any CEP participation 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.

Among the subsample of counties that adopted CEP over our analysis period, low-poverty counties have higher shares of white students, lower unemployment rates, and lower amounts of food bank services distributed. In addition, 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, our measure of treatment, is substantially higher in low-poverty areas. As our main specifications include county fixed effects, level differences across counties will not affect the internal validity of the results; however, when generalizing the findings to the broader population, it is important to note that we are examining 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.

4.1 Extent of crowd-out: Elasticity of food bank utilization with respect to school meal access

Table 2 shows the main results for how greater access to government assistance affects use of community resources. Across all counties, increasing access to free school meals by 10 percent reduces food bank use by 0.87 percent (column 1). USDA estimates that approximately 53 percent of eligible students consume a free school meal, therefore, the results in column 1 imply that increasing the number of free meals served by 10 percent reduces food bank use by approximately 1.65 percent.

As discussed in Section 2, at the school level, CEP expanded access to free meals to students who did not qualify for free school meals based on their families' incomes ("low-poverty" counties) and who are unlikely to be eligible for other government programs. In contrast, students who were previously eligible to receive free meals experienced no change in access, since these students

continued to be eligible under schoolwide provision ("high-poverty" counties).[17]

In order to examine whether the changes in food bank use vary based on the share of students initially eligible for free meals, Table 2 columns 2-3 partition the counties based on the median share of students who qualified for free school meals based on their family's income at baseline in the 2010 school year. These results show that the entire reduction in food bank utilization 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 2.5 percent. These patterns indicate that crowd-out is highest in areas where relatively few students qualified for government assistance based on their family's income. They are also consistent with other work showing that benefits of schoolwide free meals, including academic achievement and disciplinary infractions, are concentrated in groups that were unlikely to previously have access to government assistance (Gordon and Ruffini, 2021; Ruffini, 2022; Schwartz and Rothbart, 2020).

As discussed in Section 2, increased access to government nutritional resources could crowd-out use of charitable services or grocery purchases. Previous work finds that CEP access reduces grocery expenditures by about 5 to 8 percent (about $100 a year) (Handbury and Moshary, 2020). The results in Table 2 imply that crowd-out beween government assistance and charitable resources is greater than the grocery price change. This responsiveness could result from at least two non-mutually exclusive responses: stigma costs associated with charitable goods (Byrne et al., 2021) or lower grocery retail prices that further reduce the demand for food bank resources.

Although food bank use responds more than retail prices to changes in government nutritional assistance, the crowd-out between universal school meals and food bank service is smaller than other work examining spending by governments and non-profit organizations. 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 we document could reflect food banks and school meals providing similar, but not identical, assistance and serving

[17]Both groups of students, however, experience reductions in stigma costs with schoolwide free meals, which is expected to increase consumption conditional on eligibility.

overlapping, but not identical, populations.

Specifically, food banks serve all members of a community, including households without children, whereas school meals can only be consumed by the 16.1 percent of the population that is school-aged children. Moreover, although some food banks offer meals through soup kitchens and congregate sites, most food bank resources are distributed to clients 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 potential source of differences is that schools and food banks serve different types of food. School meals are required by USDA to offer caloric intake within an age-specific range, limit sodium and certain fats, and provide whole grains and produce at every meal. While food banks also provide produce and whole grains, they can offer a more diverse set of options than what students may be able to access in school.

4.2 Crowd-out dynamics: Changes in food bank utilization and CEP over time

The interaction between government and community resources may vary over the calendar year or change as counties gain additional experience administering universal meal programs. In the context of the school meals program, even where summer feeding programs are available, take-up of free meals is lower in the summer months when school is not in session (Nord and Romig, 2006). In addition, the timing of families' responses might not be immediate. On one hand, free school meals might affect food bank usage with a lag if several months of free meals are required to change use patterns. On the other hand, if households know their children will receive free meals in the future, they might change their food bank utilization before the school year begins.

Appendix Figure A3 presents raw data on trends in food bank use in counties that first implemented CEP in a given year (reaching at least 5 percent of students) and counties that did not implement CEP during our sample period. To ease comparability across the series, we normalize each subgroup's food bank utilization to equal 100 in the year before the "treated" counties adopted CEP. These figures show that food bank utilization generally trended similar between the two groups of counties in the years immediately prior to implementation, but counties reduced utilization once CEP was in place. While suggestive, these patterns echo the findings in Table 2.

Figure 1 explores these dynamics and seasonal patterns more formally with an TWFE-based

event study analysis as in Equation 3, where each event time coefficient is scaled by the share of students gaining access to free school meals the first year a county implemented CEP.[18] The top panel shows the quarterly change in food bank utilization; the bottom panel aggregates the school year quarters (e.g., Q4 through the following Q2) in a semi-annual measure. These two versions are complementary: the first highlights seasonal changes in food bank utilization throughout the year, whereas the second is better suited to examining longer-term effects, including whether schoolwide meal provision coincides with other changes in food bank utilization.

These figures highlight three results. First, there are no significant short- or long-run pre-treatment trends. Second, after CEP adoption, we see large decreases in food bank use for relatively low-poverty areas and no significant change for counties with relatively high free meal access prior to CEP. The magnitude of these results is similar to the TWFE estimates in Table 2. Third, although there is a decrease in food bank utilization throughout the first calendar year of CEP implementation, the decline is less pronounced in the very first months of the program and during the summer months when school is not in session.

Overall, both the results in Table 2 and Figure 3 are consistent with previous research findings that the benefits of schoolwide free meals programs are concentrated among populations that were unlikely to receive free meals prior to schoolwide provision (Gordon and Ruffini, 2021; Ruffini, 2022; Schwartz and Rothbart, 2020).

4.3 Crowd-out and location characteristics

Besides the local poverty rate and economic conditions, the crowd-out between government and community nutritional 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 (e.g., a "food desert") or if the price of food is high, the value of in-kind nutritional assistance from either the government or charitable organizations is expected to be higher than in areas where grocery options

[18] We define the first year of CEP implementation as the first year in which the share of students with access to free school meals increased at least 1 percent relative to the base year and omit all county-year observations that had a change in access between 0 and 1 percent, exclusive (about 2.5 percent of county-quarter observations). Appendix Figure A4 shows that results are nearly identical using an alternative threshold of 5 percent gain in free meal access.

are readily available or inexpensive. Crowd-out is expected to be lower in high-cost/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 utilization is largely driven by non-food desert areas and areas where the cost of food is relatively low. 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 areas tend to have more non-profit organizations than rural or suburban locations (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 5 and 6 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/ethnic diversity (e.g. Hungerman (2009)). In this model, when charitable giving is driven by altruistic preferences, areas with greater diversity have lower levels of charitable services and are less prone to crowd-out when government services expand.[19] Consistent with frameworks where greater diversity leads to less crowd out, columns 4 and 5 show that significant crowd-out is only found in areas with low 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 aggregate averages or findings from single case-studies to other contexts.

4.4 Robustness

Table 2 shows that greater access to government resources reduces use of charitable services, particularly in areas where few students qualified for government aid based on their family income.

[19] Our set-up slightly differs from the individual donor viewpoint in Hungerman (2009) as our measure of food bank utilization depends on both donations (since food banks can only distribute the food they have available) and how clients use charitable services.Section 4.5 directly considers the supply side of charitable services.

The TWFE approach leverages two sources of variation stemming from the staggered implementation of CEP: changes in access to free meals when schools in an area first implement universal school meals, and changes in access as universal meals become more widely adopted by additional schools over time. Recent econometrics work points out that in such cases of staggered adoption, TWFE approaches can lead to biased estimates of both the average treatment effect on the treated and the "dose-response" treatment effect in continuous treatment settings if the effect of the policy change varies across places or over time (Callaway and Sant'Anna, 2020; Callaway, Goodman-Bacon and Sant'Anna, 2021; Goodman-Bacon, 2021). To address this potential concern, Appendix Table A1 panel b implements the group-time average treatment on the treated (ATT-GT) estimator in Callaway and Sant'Anna (2020) where the treatment measure is discretized to be the first year in which at least 1 (5) percent of students gained access to school meals in the odd (even) numbered columns. Panel a provides TWFE results under an identical binary treatment for comparison. This discretization presents an important trade-off: Although the ATT-GT estimator addresses one source of bias in TWFE, it relies on a discrete treatment measure that does not capture the rich variation in the TWFE from different shares of students gaining access to free meals in different counties at different times (e.g.: the treatment "dose").

Similar to the main estimates, we continue to observe a reduction in food bank use when access to free school meals is expanded. In order to aid comparison with the continuous treatment results in Table 2, the row "Implied elasticity" scales the binary treatment by the average change in access and shows that a 10 percent increase in free school meal access reduces food bank use 1.22 (ATT-GT) to 1.95 (TWFE) percent overall. Again, this overall reduction is driven by crowd-out in low-poverty counties and there is no significant change in food bank use in high-poverty counties. In the low-poverty counties, a 10 percent increase in free meal access reduces food bank use by 1.65 to 2.68 percent, slightly higher than the main effects in Table 2.

Appendix Table A2 further show that our main results are robust to slight modifications of the TWFE framework, respectively: including summer months (column 2) and omitting state level policy controls (column 3). Weighing county by student enrollment generates somewhat larger effects overall and less-precisely estimated effects among the lowest baseline poverty quartile (column 4).

4.5 Disentangling demand and supply

FA, like most charitable organizations, receives much of its resources from donations from individuals and corporations. There are many possible reasons for charitable giving, including altruism, "warm glow," or social motivations (Andreoni, 1990; Glazer and Konrad, 1996; Ribar and Wilhelm, 2002; Roberts, 1984). If individuals are motivated by 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 will be less than 100 percent.

Our primary measure of food bank utilization – the (log) per-student number of pounds distributed by food banks – is an equilibrium measure that captures forces that affect demand for food bank services, including the extent to which clients wish to consume food bank services, as well as elements that capture supply, such as available donations. In our setting, it is likely that this measure of utilization is more closely related to demand than supply than is the case in other markets. Specifically, the Choice System mechanism in which FA food banks can bid on food within the network and food banks' ability to purchase food helps food banks meet excess demand, and intra-network transfers help local banks to redistribute any excess supply to areas with greater need. In combination, these features of the FA network allow food banks to target supply to meet demand as closely as possible. Although food bank utilization provides a useful indication of changes in charitable services from the perspective of food bank *clients*, it does not provide information on how donations to charitable organizations respond to increases in government aid.

In this section, we empirically evaluate how donations and the availability of resources change in response to expansions in government programs in order to characterize whether food bank giving is motivated by pure altruism or motivations related to warm glow. We focus on the amount of food available at FA food banks, as well as the number of organizations, revenue, and net income reported on 990 forms from all food assistance non-profit organizations.[20]

First, focusing on the amount of food FA food banks have available for distribution, Table 4 column 1 shows that greater access to free school meals does not reduce the amount of food received by food banks. For the full sample, we can rule out a reduction larger than -2.1 percent with 95 percent confidence under a 10 percent expansion in free school meal access.[21]

[20] Section 3.1.1 describes the data used for this analysis.

[21] While we observe a marginally significant reduction in the amount of food available in high-poverty areas, we

Columns 2-5 present other measures of the amount of charitable services available for a broader set of food assistance organizations than FA food banks. These data are derived from 990 forms that organizations file with the IRS in order to establish tax-exempt status and include the number of food service organizations per capita operating in a county (column 2), and the county-level total revenue (column 3), expenses (column 4), and profits (column 5) across all food assistance organizations that operate in a county. Column 2 shows no significant change in the number of organizations operating in an area. Columns 3 and 4 show insignificant decreases in both total revenue and total expenses, with the point estimate for expenses exceeding the revenue reduction.

While we cannot rule out sizable reductions in revenue, the 95 percent confidence interval can rule out crowd-out of more than 23 percent (low-poverty counties) to 45 percent (high-poverty counties), indicating a substantial role for giving motivations that are not solely driven by altruism. Taken at face-value, the small point estimates suggest a 10 percent expansion in free school meals reduces revenue for charitable organizations by 0.03 percent in low-poverty counties, about three times larger than giving to K-12 education budgets (Meer and Tajali, 2023), but smaller than donations to international relief organizations (Ribar and Wilhelm, 2002) or a general panel of charities (Andreoni and Payne, 2011).

Finally, net income does not significantly decrease (column 5), and instead marginally increases in the full-county sample and in low-poverty counties. Altogether, these results indicate that the reduction in food bank use is not solely due to lower availability of charitable services and donors to food service charities are influenced for reasons beyond pure altruism.

5 Marginal Benefit of Public Funds

Estimates of crowd-out provide a measure of the responsiveness of the informal safety net to increases in government assistance programs. These calculations, however, do not account for potentially different costs of providing services through the government versus charitable organizations. To shed light on the cost efficiency of government provision through schoolwide free meals, we perform a back-of-the-envelope calculation in the spirit of a partial marginal benefit of public funds analysis in Hendren and Sprung-Keyser (2020) by comparing increases in federal outlays to

do not observe a reduction in food bank use in those areas (Table 2).

savings to FA stemming from schoolwide free meals.

We first calculate the share of students gaining access to free meals at the district level. Using data from the Common Core of Data Financial Survey (F-33) on revenues and expenditures by category and level of government for each school district each year, we estimate a district-level version of Equation 2 over our main analysis period where the dependent variable is now the log of per-pupil federal nutritional spending. Results from this analysis indicate that a 10 percent increase in access to free meals increases federal spending on school meals by 10.06 percent. In fiscal year 2018, the federal government spent approximately $18.2 billion on school lunches and breakfasts, so a ten percent increase in access to free meals would increase costs to the federal government by $2.0 billion.

In 2018, FA spent $2.8 billion on food procurement (which includes the fungible value of food donations) and total program operation (Feeding America, 2018). Assuming that each pound of food disbursed by FA has an equal cost, a 10 percent increase in access to free school meals would reduce FA's costs by $252 million. Therefore, the savings to FA offsets approximately 12.6 percent of the additional federal outlays.

We emphasize that this type of calculation only considers the direct costs of school-based nutritional assistance and does not account for differential quality in the food served in schools and through food banks. It does not, for example, include other potential benefits that are difficult to monetize such as reduced stigma (Gutierrez, 2020), nor does it include longer-term benefits to students in the form of improved academic performance or fewer suspensions (Gordanier et al., 2020; Gordon and Ruffini, 2021; Hecht et al., 2020; Ruffini, 2022). In addition, it assumes there is no excess demand for food bank services and that schools and food banks provide food of a similar nutritional value. To the extent that expansions in the formal safety net provide ancillary benefits or free up food bank resources for other clients, these estimates provide a lower-bound of the net benefits of such an expansion.[22]

[22] Accounting for quality could either decrease or increase the net benefits, depending on the relative nutritional quality of 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 ("foods to encourage" – including produce, whole grains, lean proteins, and low-fat dairy products). In 2018, 70 percent of donations were categorized as "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.

6 Conclusion

This paper shows that increased access to in-kind government resources reduces use of charitable services, even in settings where government and charitable assistance do not provide identical services. 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 is no crowd-out 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 areas where fewer students previously qualified for free meals (Ruffini, 2022), and the results from earlier studies lend further credence to our results. Since charitable services are often the only form of nutritional assistance available to these families, the reduced food bank utilization in low-poverty areas after universal free meal provision is consistent with the government safety net not covering all those in need of assistance.

Our findings of crowd-out are unique in several respects. First, we leverage variation in use of charitable services, in addition to revenues and expenditures, for a large organization serving the entire country. In doing so, we provide new evidence on how the extent of crowd-out varies with local social and economic characteristics.

The setting we examine — in-kind nutritional assistance — also exemplifies a case where the services provided by the government and charitable organizations are similar, but not identical. Other instances where the government and charitable organizations offer different forms of assistance are common, and include temporary housing, employment assistance, or transportation. That we find smaller crowd-out in nutritional assistance than previous work has found in response to monetary resources (cash assistance or government grants) highlights that in settings where the public and private safety nets provide slightly different resources (prepared on-site meals versus grocery items) to partially overlapping populations (students versus all individuals in an area), 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).

The results that we document are also important in their own right, given the substantial

government and non-profit resources dedicated to nutritional assistance, even before the dramatic increase in food bank use during and after the coronavirus pandemic (Feeding America, 2021). In particular, our findings suggest that greater access to school-based nutritional assistance, such as through recent statewide efforts to expand universal free meals or the recently-adopted Summer EBT program, could offset some of the increased demand faced by charitable organizations.

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Table 1: Summary statistics

	No CEP	Any CEP		
		All	Low-poverty counties	High-poverty counties
Share Black	0.057	0.197	0.106	0.289
Share Hispanic	0.125	0.141	0.126	0.157
Share White	0.755	0.586	0.698	0.474
Unemployment Rate	4.218	5.672	5.147	6.196
TANF amt (3 people household)	409.5	363.2	411.0	315.6
Any state EITC	0.524	0.382	0.465	0.300
State EITC refundable	0.423	0.290	0.351	0.229
FA pounds distributed per student	21.28	26.40	22.71	30.06
Baseline FRL (2010)	0.428	0.587	0.465	0.710
Share Urban Areas	0.355	0.391	0.474	0.310
Share in Food Deserts	0.216	0.320	0.288	0.352
Share in High Food Cost Areas	0.458	0.440	0.352	0.526

Notes: All variables are reported as county level averages for school years 2015-2018. "TANF amt (3 people household)" is the maximum TANF benefit for a 3-person household. "Any state EITC" and "State EITC refundable" equals one if the state has a state or refundable state EITC. "Baseline FRL (2010)" is the share of students eligible to receive free or reduced-price meals in the 2009-10 school year. "Share in food desserts' is the share of counties where at least 33 percent of the population lives more than 0.5 mi from a grocery store (10 mi in rural areas), aggregated at the county level". "Share High Food Cost" is the share of counties in high food cost areas in the 2010 school year. "Share Urban Areas" indicates share of students in urban areas.

Table 2: Elasticity of food bank use with respect to free school meals

	(1) All	(2) Low poverty	(3) High poverty
% Δ access	-0.0873	-0.1401	0.1008
	(0.0365)	(0.0405)	(0.0691)
Observations	78464	55413	22886
DV mean	2.6494	2.5460	2.8993
Average % Δ access	0.2317	0.2136	0.2547

Notes: Dependent variable is the natural log of food distributed through FA food banks in pounds per K-12 student. Column 1 includes all counties; columns 2-3 split the sample by halves of the share of students certified to receive free meals in the 2009-10 school year. "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. All specifications include county and year-quarter fixed effects. Robust standard errors clustered by county.

Table 3: Elasticity of food bank use with respect to free school meals, by local characteristics

	(1)	(2)	(3)	(4)	(5)
	Food desert	High baseline meal cost	Urban	% black students (2010)	% white students (2010)
% Δ access	-0.1034	-0.1581	-0.0276	-0.0931	0.0615
	(0.0488)	(0.0419)	(0.0495)	(0.0408)	(0.0975)
% 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 (% Δ access) + (% Δ access X char)	0.6587	0.7181	0.0028	0.7636	0.0012
Policy controls	X	X	X	X	X

Notes: Dependent variable is the natural log of food distributed through FA food banks in pounds per K-12 student. 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 (%Δ access) + (% Δ access$Xchar$) denotes the p-value from a hypothesis test that the coefficients on %Δ accessand% $\Delta access * (char) = 0$. All specifications include county and year-quarter fixed effects. Robust standard errors clustered by county.

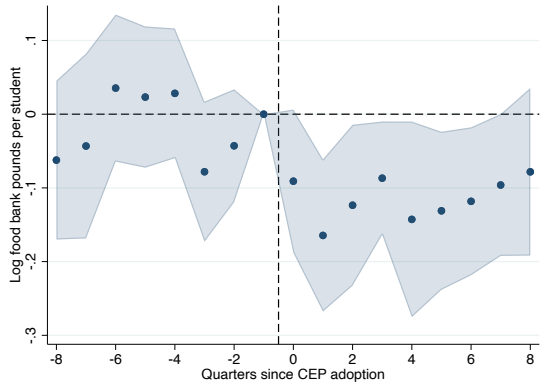
Table 4: Effect of free meals on food bank resources and organizations' financial status

	(1)	(2)	(3)	(4)	(5)
	Log(lbs. received/ student)	**# of org'ns/ student (X1000)**	**IHS(Revenue/ student)**	**IHS(Expenses/ student)**	**IHS(Net income/ student)**
			Panel a: All counties		
% Δ access	0.2327	0.0005	-0.0211	-0.1071	0.2509
	(0.2254)	(0.0026)	(0.0947)	(0.1028)	(0.1309)
Observations	2543	7937	7937	7937	7937
DV mean	2.4729	0.0411	16.9624	16.0855	0.8769
Average % Δ access	0.0426	0.1812	0.1812	0.1812	0.1812
			Panel b: Low-poverty counties		
% Δ access	0.3855	-0.0012	-0.0035	-0.1033	0.2746
	(0.3097)	(0.0027)	(0.1138)	(0.1261)	(0.1562)
Observations	1439	6247	6247	6247	6247
DV mean	2.4503	0.0411	17.5343	16.5921	0.9422
Average % Δ access	0.0426	0.1640	0.1640	0.1640	0.1640
			Panel c: High-poverty counties		
% Δ access	-0.5293	0.0084	-0.0078	-0.0291	0.0450
	(0.2775)	(0.0051)	(0.1761)	(0.1696)	(0.2462)
Observations	1067	1678	1678	1678	1678
DV mean	2.4829	0.0407	14.8892	14.2521	0.6371
Average % Δ access	0.0437	0.2243	0.2243	0.2243	0.2243
Specification	OLS	OLS	OLS	OLS	OLS
Sample	FA food banks	K	K	K	K
Data	FA	990	990	990	990

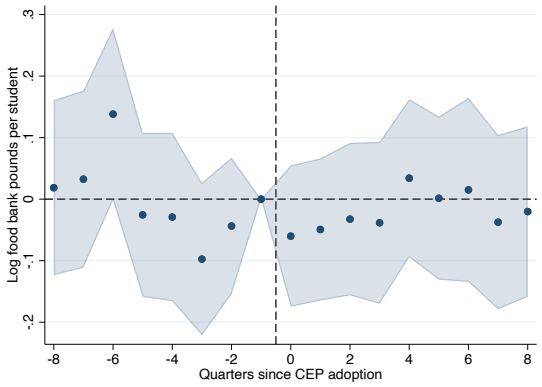
Notes: Dependent variable is the natural log of food received by FA food banks in pounds per K-12 student estimated at the food bank service area (column 1); the number of food assistance organizations in a county filing a 990 form (column 2); the (inverse hyperbolic sine) of food assistance organizations' per-student revenue (column 3), reported expenses (column 4), or net income (column 5) among organizations that file a 990 form. Panel a includes all counties; panels b-c split the sample by halves of the share of students certified to receive free meals in the 2009-10 school year. All specifications include controls for student racial and ethnic composition, county unemployment rates, and generosity of state-level income assistance programs. Column 1 includes service area fixed effects, columns 2-5 include county fixed effects. All specifications include year-time fixed effects. Robust standard errors clustered by the geographical level.

Figure 1: Event study: Food bank utilization and CEP

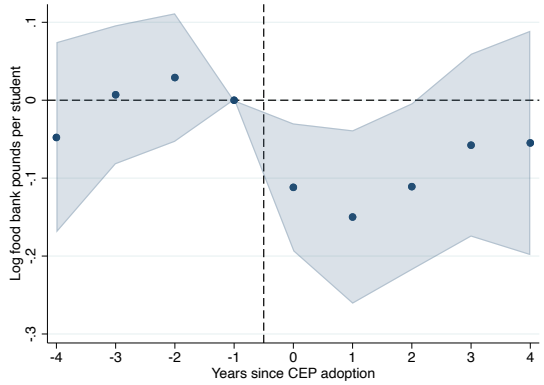
(a) Quarterly change in food bank utilization, low-poverty counties



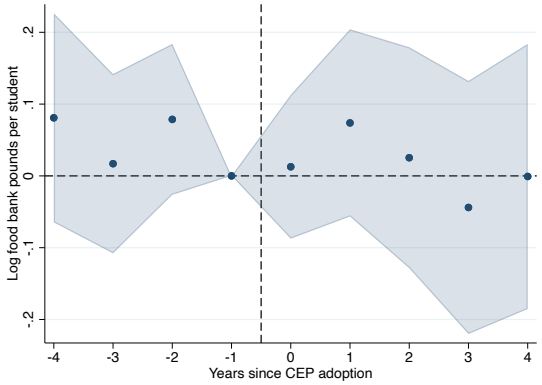
(b) Quarterly change in food bank utilization, high poverty counties



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



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

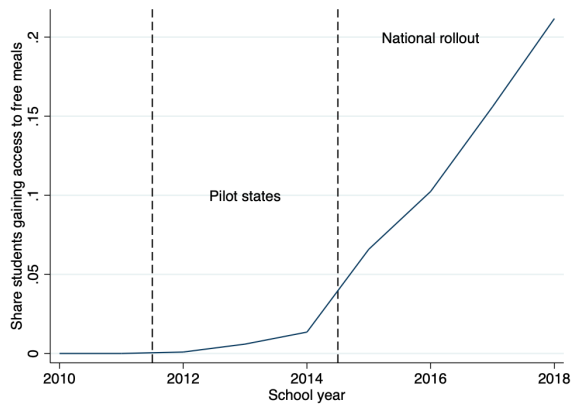


Notes: Figure shows event study of food bank utilization relative to the first quarter (panels a-b) or year (panels c-d) a county had an increase in food bank utilization of at least 1%. Each estimate is scaled by the share of students gaining access to free school meals in the first year the county 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.

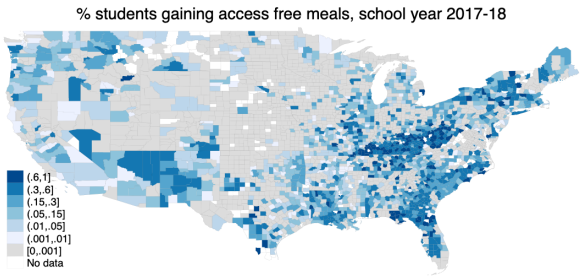
A Additional analyses

Figure A1: CEP eligibility and timing

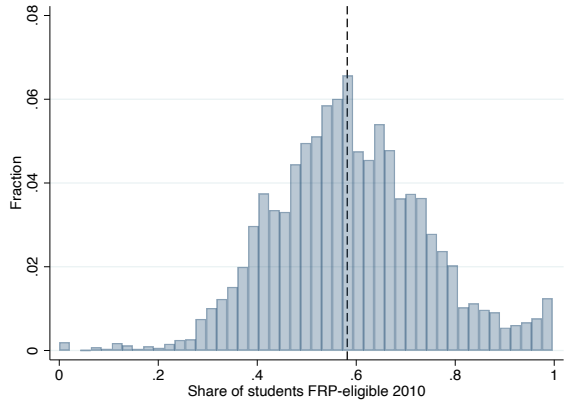
(a) Timing and CEP participation



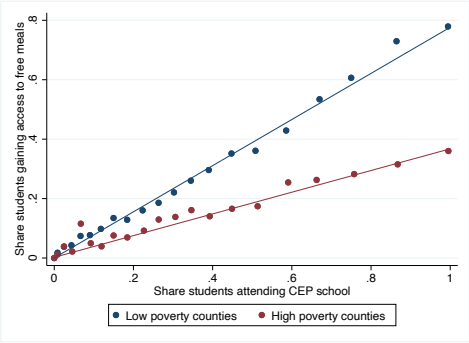
(b) Geographic variation in CEP participation



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

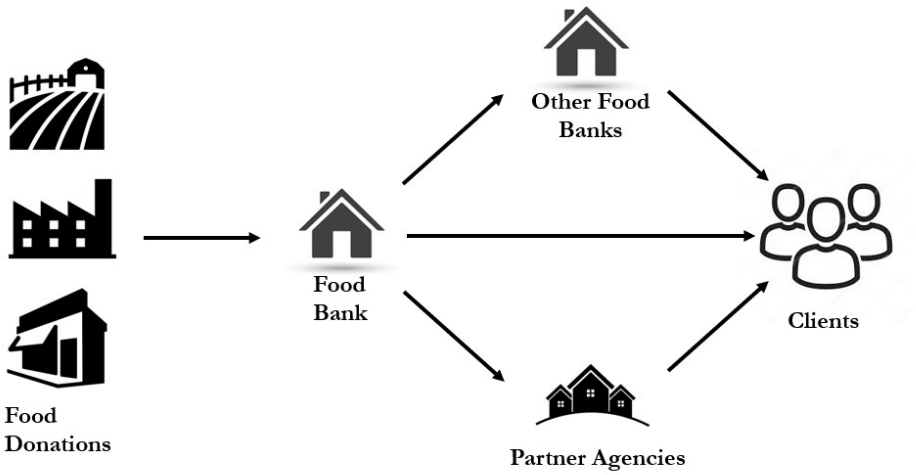


(d) Share of students gaining access to free meals, by share of students attending CEP school



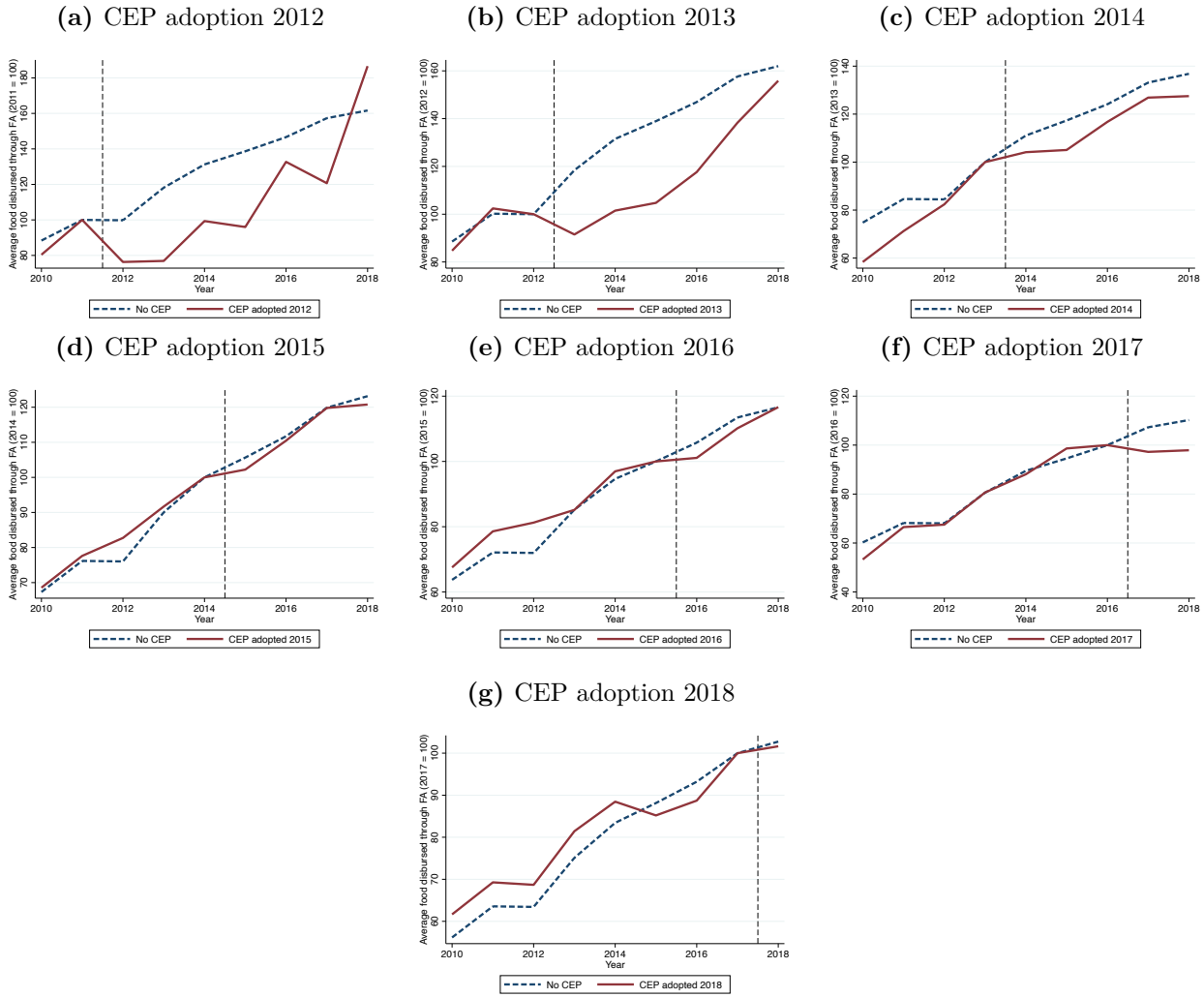
Notes: Panel (a) shows the fraction of public school students attending a CEP school by the spring semester of the academic year. Panel (b) shows the fraction of students in each county who had gained access to free school meals by the 2017-18 school year. Panel (c) shows the share of students qualifying for free-or-reduced price meals among counties with any CEP participation by the 2017-18 school year. Data from CCD and FRAC. 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.

Figure A2: Flows of nutritional assistance in Feeding America network



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

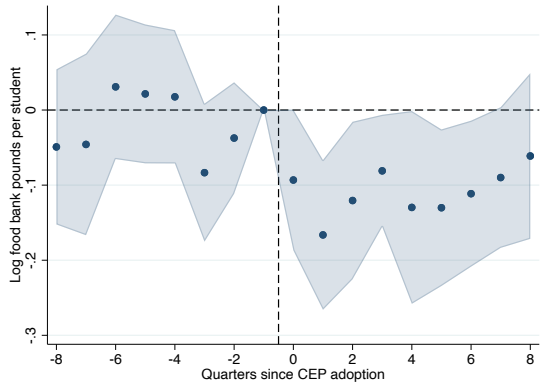
Figure A3: Raw trends: Food bank utilization and CEP adoption in low-poverty counties



Notes Figure shows average pounds of food distributed by FA food banks among counties with no CEP adoption (blue line) or CEP adoption 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.

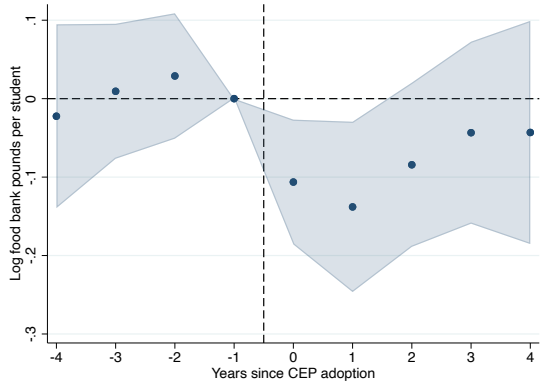
Figure A4: Event study: Food bank utilization and CEP, counties with at least 5% access gain

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

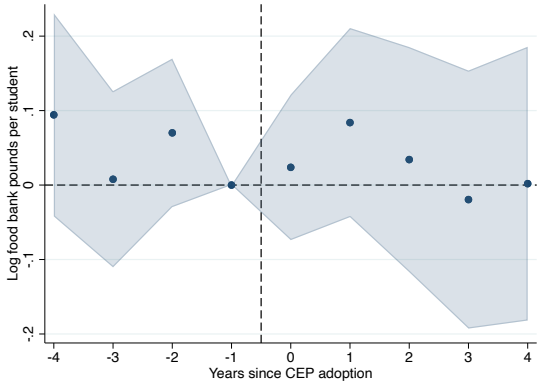


(b) Quarterly change in food bank utilization, high poverty counties

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



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



Notes: Figure shows event study of food bank utilization relative to the first quarter (panels a-b) or year (panels c-d) a county had an increase in food bank utilization of at least 5%. 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 Table A1: Food bank utilization: Alternative TWFE approaches

	(1)	(2)	(3)	(4)	(5)	(6)
	All counties		**Low poverty counties**		**High poverty counties**	
Panel a: Binary TWFE						
% Δ access	-0.0500	-0.0568	-0.0655	-0.0724	0.0092	0.0150
	(0.0135)	(0.0144)	(0.0172)	(0.0185)	(0.0230)	(0.0244)
Implied elasticity	-0.1947	-0.1847	-0.2681	-0.2443	0.0339	0.0488
Observations	78464	76982	54869	53412	22627	21780
Average% Δ access	0.2568	0.3076	0.2443	0.2963	0.2712	0.3074
Panel b: ATT-GT (Callaway and Sant'Anna 2020)						
% Δ access	-0.0334	-0.0368	-0.0466	-0.0489	0.0089	0.0050
	(0.0123)	(0.0135)	(0.0146)	(0.0160)	(0.0231)	(0.0245)
Implied elasticity	-0.1301	-0.1220	-0.1905	-0.1650	0.0328	0.0163
Observations	59697	59425	44257	44094	15127	15021
Average % Δ access	0.2568	0.3017	0.2446	0.2963	0.2713	0.3075
Participation threshold	1%	5%	1%	5%	1%	5%

Notes: Dependent variable is the natural log of food distributed through FA food banks in pounds per K-12 student. Panel a includes all counties; panels b-c split the sample by halves of the share of students certified to receive free meals in the 2009-10 school year. In each specification, the treatment variable is defined as an indicator equal to 1 the first year at least 1 (odd-numbered columns) or 5 (event-numbered columns) percent of students gained access to free school meals. "Implied elasticity" scales the binary treatment by average CEP coverage for an average treatment effect consistent with the results in Table 2. ATT-GT is the average group-time estimator in Callaway and Sant'Anna (2020). "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. All specifications include county and year-quarter fixed effects. Robust standard errors clustered by county.

Appendix Table A2: Effect of CEP on Food Distributed by Food Banks: Robustness

	(1)	(2)	(3)	(4)
	Base specification	Include summer months	No policy controls	Enrollment weighted
Panel a: All counties				
% Δ access	-0.0873	-0.0799	-0.0875	-0.1263
	(0.0365)	(0.0344)	(0.0366)	(0.0672)
Panel b: Counties baseline bottom half FRP				
% Δ access	-0.1401	-0.1244	-0.1420	-0.1259
	(0.0405)	(0.0375)	(0.0407)	(0.0782)
Panel c: Counties baseline top half FRP				
% Δ access	0.1008	0.0865	0.1148	0.0248
	(0.0691)	(0.0655)	(0.0689)	(0.1152)
Includes summer months		X		
Student Weights				X
Policy controls	X	X		X

Notes: Dependent variable is the natural log of food distributed through FA food banks in pounds per K-12 student. 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 size of K-12 enrollment in the 2009-10 school year. Column 5 limits the sample to counties for which the IV approach is computed. All specifications include county and year-quarter fixed effects. Robust standard errors clustered by county.