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Economic impact assessment of public incentives to support farm-to-school food purchases

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Abstract

Farm-to-school projects have been widely supported by policy makers with funding provided at both the federal and state levels. Still, many of the outcomes of this inflow of policy and funding remain unclear. In 2018, New York State (USA) announced the 30% NY Initiative that increases school lunch reimbursements by $0.191 per meal if districts purchase at least 30% of their ingredients from New York farms. With detailed school food purchasing data from the Buffalo City School District for both before and after the Initiative started, we analyze the gross and net economic impacts of the increased local spending on the state economy through a customized input-output model. Results show net positive economic impacts of the policy, even when a negative household impact is applied to account for the cost of the initiative to taxpayers. For every dollar in additional reimbursement offered through the Initiative, economic impacts to the state increase by $1.54. However, at least 65% of the increase in local spending must represent new sales to final demand to ensure a benefit cost ratio above unity.

Key words: farm-to-school, local foods, economic impact, food policy

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Introduction

The Farm-to-School (FTS) movement in the United States can be traced back to the late 1990s, mostly as a response to health concerns over increasing amounts of processed foods served to students under tightening school food budgets. The effort has grown significantly, with the USDA Farm to School Census reporting that over 65% of School Food Authorities (SFAs) participated in FTS activities in the 2018-2019 school year (SY) (USDA, 2021a). FTS activities are also supported by the USDA Food and Nutrition Service (FNS), with activities ranging from the actual serving of locally produced foods in cafeterias to food exposure activities and agricultural education experiences (USDA 2013).

New York State (NYS) created their FTS program within the Department of Agriculture and Markets (NYSDAM) to provide financial and technical assistance that builds connections between local farms and food producers, prepares children to learn through adequate nutrition, improves health and well-being, strengthens the local economy, and builds healthy communities (NYSDAM, 2022). Over 77% of the state's SFAs participated in FTS programs in the 2018-2019 SY (USDA, 2021b). In 2018, FTS programs in the state were expanded through the No Student Goes Hungry Program (NSGH) to further address food insecurity issues in the state and incentivize schools to purchase more local foods. Part of NSGH is the 30% NY Initiative where the state increases school lunch reimbursement from 5.9 to 25 cents per meal if SFAs purchase at least 30% of their ingredients for their lunch program from New York farms.

To qualify for the enhanced reimbursement, the SFA must participate in the National School Lunch Program (NSLP) that provides free and reduced-price lunch for qualifying students and track the origins of the foods they are serving specifically for lunch. Although the

intended benefits of the program fall in line with the missions of increasing access to healthy foods and strengthening the local economy, the actual economic impacts of the policy remain unclear, particularly relative to NYS taxpayers that fund it.

We develop a customized input-output (IO) model for NYS to calculate the gross and net economic impacts of the 30% Initiative by analyzing actual changes in spending due to participation in the program. Specifically, we analyze the economic impacts of Buffalo City School District's (BCSD) food spending for the year before the initiative (2017-2018 SY), the first year schools could qualify for the initiative (2018-2019 SY), and the second year of the initiative in which schools receive the financial incentives of their previous year's qualification while meeting the goal again for the next year (2019-2020 SY). To accomplish our objective, we utilize detailed school food procurement data distinguished by local (NYS) and non-local (non-NYS) sources of origin. Our approach is unique in that we analyze the additive impact of a change in spending that results from a specific policy initiative.

Further, we develop a replicable framework that other school districts can apply in assessing the economic impacts of their own local spending efforts. Our focus on a large school district with high purchasing demands and relatively complex spending patterns is also useful in better understanding a wide variety of issues and complications in collecting, processing, and analyzing school purchasing data. Collectively our efforts create a pathway for other districts to analyze their impacts regardless of location and the FTS programs in place.

We continue with a literature summary of related FTS research and how our research contributes importantly to that body. We then describe the 30% NY Initiative in more detail and the data collection and processing efforts necessary for the analysis. The methods and empirical

results follow, and we conclude with implications of our results and directions for future research.

Literature Review

Incentives and policies affecting local food procurement can be viewed as economic development strategies through import substitution and spillover effects that improve access for farmers to new markets aiding in their growth and viability (Becot et al., 2017). Research examining incentives on school purchasing decisions found that even an incentive of $0.05 per meal reimbursement can impact local purchasing decisions (Long et al., 2021), yet the impacts of many public initiatives remain ill-explored, often due to data insufficiency (Jablonski & Schmit, 2015).

School food purchasing data are complex, often unorganized, and can come in varied forms from alternative vendors. For some school districts, itemized purchasing data may not be available unless specifically requested. Indeed, some estimates of economic impacts from FTS programs analyze hypothetical or anticipated changes in economic activity (e.g., Holland et al., 2015; Tuck et al., 2010; Haynes, 2009). Others have utilized food marketing data from example school districts to identify likely suppliers (Gunter, 2011), consider aggregate farm sales data (Kluson, 2012), or assume a change in local institutional spending to estimate economic impacts (Roche et al., 2016).

Early FTS research focus on the social impacts to stakeholders involved and the gains in knowledge obtained (Joshi et al., 2008), while others assess their efficacy as nutritional tools (Graham & Zidenberg-Cherr, 2005; Ozer, 2007). More recent attention has focused on the economic implications of FTS initiatives through a diverse array of economic development benefits based on the propensity of local food producers to spend more on labor and other

expenses per dollar of output that lead to job creation and spillover effects on local economies (Hughes & Boys, 2015; Shideler et al., 2018; Duval, et al., 2019), as well as specific benefits to farmers shifting to this market channel (Pinchot, 2014; Becot et al., 2017).

Most research assessing economic impacts of FTS programs use software called IMPLAN (Impact Analysis for PLANing), but with implementation that varies in level of detail, access to data, and model customization. Early research explores economic impacts of hypothetical changes in farm production and pricing relevant to growing FTS sales. For example, Tuck et al (2010) look at potential impacts of F2S programs in Central Minnesota by developing different pricing scenarios and exploring ways in which farmers could receive alternative prices for their products (i.e., equal price as distributor, current market price, in-between price). Although the research sheds light on the ways that different types of spending can produce different levels of impact, the lack of assessment of real purchasing data leaves ambiguity as to what the actual impacts would be of a school district's local food purchasing program.

Similarly, Holland et al. (2015) explore potential economic impacts associated with a FTS initiative in South Carolina.[1] They model alternative scenarios of increases in crop production that would be expected under increased demand for local food products in schools, noting that the crop production industry in EMSI includes all crops in the state, including those often not utilized by schools (Holland et al. 2015). This highlights issues in analyzing school food purchasing scenarios with models that do not effectively disaggregate larger industry groups.

More recently, research has included actual school food purchase data but at more aggregate levels. Duval et al. (2019) adapt USDA's "Local Food Economics Toolkit" approach

[1] Holland et al. (2015) use EMSI software, not IMPLAN, but which also utilizes an IO model at its core. For more information see EMSI Labor Market Analytics & Economic Data go to https://www.economicmodeling.com/.

(Thilmany McFadden, et al. 2017) to evaluate economic impacts of alternative scenarios involving opportunity costs, resource constraints, and export substitution informed by data from the Farm to School Census and aggregate school spending through government programs aimed at increasing purchases of fruits and vegetables. Christensen et al. (2019) present a framework for evaluating the economic impacts of farm-to-school programs by combining primary and secondary data to customize an input-output model, reflecting the complex supply chains that link producers and schools, and apply it through two case studies representing Georgia and Minneapolis (MN) public schools. With data on total school food expenditures and the percentage of those total purchases expended locally, they estimate the number of farmers selling to the school and apply the totals through farm expenditure patterns curated from primary data collection.

As far as we are aware, there have not been any economic impact analyses that evaluate detailed food purchasing data by schools in the presence of local purchasing public incentives. Watson et al. (2018) obtain data on school food purchases from Sarasota County (Florida) schools over a two-year period and analyze purchasing patterns but did not estimate economic impacts of the local spending. Kluson (2012) also obtain food sales data from farms in Sarasota County to assess changes in institutional (school) sales.

30% NY Initiative:

The 30% NY Initiative (hereafter referred to as the Initiative) stipulates that any New York Food Product (NYFP) purchased and used in reimbursable meals served through the NSLP may contribute toward the 30% threshold. A NYFP is defined as a food item that is either grown, harvested, or produced in NYS; or a food item that is processed inside or outside of NYS comprising at least 51% agricultural raw materials grown, harvested, or produced in NYS, by

weight or volume (Bilinski et al., 2022). For products that are not already designated as "New York Grown and Certified," the SFA must complete paperwork documenting that the food is comprised of at least 51% NYS ingredients. Then, any NYS ingredient listed within this documentation that is also a processed product, must also either be "NY Grown and Certified" or have its own documentation.[2]

Once a SFA satisfies the Initiative's local spending threshold it receives an additional $0.191 in state reimbursement for each reimbursable lunch meal claimed in the subsequent school year. For example, if an SFA applies for additional reimbursement in August 2021, they use their purchasing data from the 2020-2021 SY to define that the 30% threshold has been met and receives the reimbursement for each lunch meal claimed in the 2021-2022 SY. Reimbursement dollars must be maintained in the SFA's nonprofit food service account and be used in the same way as the other SFA budget funds.

The Initiative is only based on the food served at lunch under the NSLP. Consequently, there is additional complexity involved in reporting by SFAs since they must distinguish the NYFPs that are served at lunch, even though breakfasts and other meals may use some of the same food products. For the purposes of this analysis, whether the SFA's spending specifically contributed to the Initiative threshold or not is technically irrelevant. We analyze all food procurement done by the SFA to see how the Initiative affected overall spending patterns. Indeed, the policy itself may influence spending within and across meal selections (e.g., spending more on local for lunch may induce more nonlocal spending in other meal categories).

[2] To obtain the NYS Grown & Certified seal, producers must meet certification criteria including that their products are grown and produced in NYS, farms participate in a third-party food safety verification program, if applicable, and the producers participate in an environmental management program. For details go to https://certified.ny.gov/get-certified.

In the first two years of the program, participation was low as schools were trying to understand the requirements and how to meet application needs. For the 2019-2020 SY, 57 SFAs were successful in qualifying for the higher reimbursement out of over 800 school districts in the state, about 7%. Within this group, small schools (i.e., less than 6,000 students) represent 95% of all qualifying SFAs and 72% had enrollments below 2,000 (Bilinski et al., 2022). Larger districts remain outliers in terms of participation likely due, in part, to location – most qualifying districts are in western and central NYS. These areas of the state are relatively more rural, have lower household incomes, and are in areas of the state with relatively more agricultural production and processing of local food products procured by SFAs.

BCSD is the second largest school district in the state and one of the poorest, with more than 86% of its students eligible for free or reduced-price lunch (USDA, 2021b). It is one of the most diverse school districts in the state demographically and the most diverse school district to qualify for the initiative thus far (Bilinski et al., 2022). It is in western NYS, an area with considerable agricultural production and food processing activity. Accordingly, it represents a district with reasonably proximate NYS food supply but with considerable food procurement demands and low-income households that may make it more difficult to meet the policy target. In lower household income school districts, more free and reduced rate meals are served through the NSLP and, subsequently, eligible for federal and state reimbursement, improving incentives for participation in the Initiative. School districts with higher household incomes have comparably lower rates of participation in lunch.

BCSD's food purchases are the highest spending of any qualifying SFA in the state, representing almost one-half of all NYS purchases made by qualifying SFAs (Bilinski et al., 2022). Total qualifying food costs reached over $5.1 million in the 2019-2020 SY, with the

lowest qualifying school district spending only $21,300. Of BCSD's total spending in that school year, over $2.1 million was spent on NYFPs.[3] Although some school districts were able to qualify for the Initiative relatively easily or even automatically due to large local dairy purchases, BCSD was not one of them. The school district had to strategically adapt their spending patterns to achieve the 30% threshold (Bilinski et al., 2022).

Data

Working with the BCSD, we accumulated detailed food purchase data for three SYs: 2017-2018, 2018-2019, and 2019-2020. The data came from both government (USDA) and private vendor sources, in varied formats (e.g., spreadsheets, wholesaler invoices), and some with handwritten notes crucial to identifying local versus non-local purchases. The data were standardized, coded as local or non-local, and margined appropriately (more on margining later). Classification by intended meal was not requested given the focus on total food procurement. The number of vendors utilized by BCSD to procure local food products as a result of the program increased over time, and some had to be contacted directly for access to more detailed purchasing data and local/non-local distinctions of products sold.

A notable challenge in coding the data for the 2017-2018 SY was that it was before the Initiative was in place and, therefore, BCSD did not categorize purchases by local versus non-local origin. In concert with BCSD, local purchases were defined retroactively by evaluating vendor and food product data and with direct contacts to vendors where necessary. Additionally, school districts have been known to stop tracking their local purchases once they cross the 30% threshold (this is true for BCSD as well). This, and the retroactive tracking of local purchases, may lead to underreporting of local purchases. In addition, BCSD shifted to virtual learning in

[3] The dollar values here are reported by Bilinski, et al. (2022) and differ from our numbers as we calculate local differently. These differences are explored more in the data and methods sections that follow.

March 2020 due to the COVID-19 pandemic and pivoted to emergency feeding under the Summer Food Service Program (SFSP) tied, in part, to a need for prepackaged, shelf-stable foods for remote delivery.[4]

School Food Spending

There are multiple sources of money SFAs use in purchasing food, generally falling into two forms of payment: federal entitlement dollars and local budget spending. Entitlement dollars are moneys provided to schools participating in the NSLP or other child nutrition programs through different federal governmental offices and programs. Schools receive entitlement funds based on their average daily participation (ADP); i.e., the average number of lunches served per day. The New York State Office of General Services (NYS OGS) helps schools in the state obtain USDA food products by tracking their ADP and allocating entitlement dollars accordingly. Allocation of entitlement funds is an important component food procurement for schools, with purchases significant enough to make up 15-20% of the lunch plate (CTFTSC, 2020).

USDA Foods is a program that supports SFAs and farmers by purchasing American grown and produced foods for use in schools. The types of foods available are limited to a list of about 30 products for which there is enough demand from schools (i.e., demand for at least one full truckload). Entitlement dollars can also be used to divert USDA Foods products to processors for additional processing (e.g., whole chickens into breaded chicken nuggets, apples into applesauce), but with restriction. In particular, the school must utilize the entire product and only order quantities for which they can utilize at least 10% of the product per month to prevent waste. These large demand constraints mean that typically only very large farms and food

[4] USDA FNS administers the SFSP at the federal level, while the New York State Education Department (NYSED) administers the program at the state level. Locally, it is operated by sponsors who apply for and are approved to operate the program.

manufacturers (which tend to lie mostly outside of NYS) can supply the needed quantities to USDA. As a result, general entitlement spending is an ineffective pathway for accessing local foods in NYS.[5]

The USDA Pilot Project for Unprocessed Fruits & Vegetables (Pilot) emerged from the 2015 U.S. Farm Bill and allows schools in participating states to use entitlement dollars for multiple vendors and designate geographic preference (GP) to purchase additional fresh fruits and vegetables (USDA, 2022a).[6] NYS is one of eight states with access to the program to provide more flexibility for schools in their purchasing options. More recently, the U.S. Department of Defense Fresh Fruit & Vegetable Program (DoD) allows schools to use entitlement dollars to buy fresh produce (USDA, 2022b). DoD is available to any school in NYS under three contract areas (i.e., southern, eastern, and western NYS).

The 2019-2020 SY was the first year in which BCSD utilized both Pilot and DoD, suggesting they may be learning how to spend these dollars more strategically to purchase local foods, even though they do not qualify under the Initiative. What is purchased with entitlement funds is likely affected by the Initiative. For example, schools may choose to use entitlement dollars to purchase only those USDA Foods that cannot feasibly be purchased locally, while allocating more of their budgeted funds (to which the Initiative applies) to local farms, processors, and wholesalers.

The second form of payment are dollars from the school food budget, funded primarily through state and federal reimbursement, paid participation, and other sources of revenue (e.g., catering). Table 1 provides an overview of food procurement costs by BCSD over the three

[5] The process to become an approved USDA Foods supplier is rigorous; only 83 processors nationally are approved through USDA Foods (Econometrica, 2019, pp. 117-118).
[6] Geographic Preference (GP) is available to schools in NYS (by law) in weighting factors beyond lowest price in a bid, USDA Foods entitlement purchases are secured through a bid process; Pilot and DoD do not require bids.

school years, by type of spending and computed local/non-local allocations. Entitlement dollars represented 22%, 19%, and 35% of total food spending across school years, respectively. The percentage of entitlement dollars in 2019-2020 SY is higher because of the shift to remote learning during the COVID-19 pandemic and an increase in purchasing with USDA Foods entitlement dollars through the SFSP. Relative to in-school offerings, less food was delivered to homes during remote instruction resulting in a decrease in total food spending that year.

Our estimated local spending percentages (Table 1) differ from those reported by BCSD for the Initiative, in part, since our data does not classify expenditures by intended meal. In qualifying for the Initiative, BCSD reported spending 30% of their school lunch budget (non-entitlement) on local foods in 2018-2019 and 41% in 2019-2020 (Bilinski et al., 2022). Our estimates for budget spending for all meals in those years are 41% and 32%, respectively. The percentages drop to 34% and 24%, respectively, when entitlement spending is included. As reported by BCSD (Bilinski et al., 2022), total lunch spending for 2018-2019 was $8.6 million, or about 50% of the total food costs shown in Table 1 ($17.0 million). Total lunch spending for 2019-2020 was $5.1 million (Bilinski et al., 2022), about 36% of the total food costs ($14.1 million).[7]

Lunch spending is a significant portion of total food procurement but ignoring other meal spending underestimates local impact and ignores any reallocation of local spending induced by the Initiative. While our estimates of local purchasing percentages decrease in the two Initiative years (2018-2019 and 2019-2020), the total dollars of local spending increase considerably from 2017-2018; i.e., by approximately $3.1 and $2.6 million, respectively. The differences suggest

[7] The large differences in spending and local procurement between 2018-2019 and 2019-2020 is due primarily to COVID-19 adjustments. A similar comparison is unavailable from BCSD for 2017-2018 since local lunch spending was not tracked by BCSD before the Initiative was in place.

shifting within the total food spending budget for local foods and for what meal. For example, funds previously spent on local food served outside of the lunch program may have shifted to purchasing different local foods appropriate for lunch and, hence, contributing to the policy target.

Another reason why our estimates of local purchasing percentages differ from Initiative reporting relates to the way we assess and compute local dollars. As will be explained in detail below, we margin total costs for products into different industries. In different cases, this allows for more or less dollars to be allocated as local than the Initiative would count. The Initiative only considers whether products are NYFPs, it does not distinguish where portions of the total cost for wholesalers, producers, and/or transportation accrue. For example, if a NYFP is purchased from a non-local processor, the Initiative counts all dollars spent on this product as local. We, instead, margin out the processing fee as non-local and, thus, our count of local dollars on this product is lower. Alternatively, the Initiative does not allow for inclusion of any local dollars from purchases spent on non-local goods that are sold by a local wholesaler. We count the wholesale margin of these costs as local.

To explore spending shifts by food product category, Table 2 presents spending by industry and year. For ease of exposition, the Table only shows industries for which there was positive local spending.[8] Aside from spending on dairy products, the wholesale margin has the next largest portion of local spending in the first two years, and the largest portion in the last year. This makes sense as most food products are secured through wholesale distributors. In NYS, most schools provide local milk due to the state's prominent dairy industry. In all years, fluid milk was the largest food product category in terms of spending. Of the local spending in

[8] The full spending patterns are available in Krasnoff (2022, pp. 58-60)

2019-2020, larger relative reductions occurred in dairy products (down 57%) than in fruit and vegetable products (down 10%); local meat spending increased reflecting more reliable local meat supply chains during this stage of the pandemic.[9]

BCSD diversified local spending during the Initiative years. Cheese manufacturing and frozen fruit manufacturing received larger levels of local spending.[10] Further, local spending on beef products increased substantially in each of the two years of the Initiative; i.e, $946 in 2017-2018, $17,191 in 2018-2019, and $135,720 in 2019-2020.[11] Increases in local spending on fruits and vegetables were also impressive; i.e., $163,034 in 2017-2018, $376,103 in 2018-2019, and $328,092 in 2019-2020.[12] The shifts in spending illuminate the primary ways in which BCSD's spending changed to reach the policy threshold through increases in existing category local spending and expansion into new local industry products such as frozen fruits and specialty products, cheese, snack foods, and grains (Table 2).

Methods

IO models distinguish the effects of a shock by the important economic sectors of a locally defined economy (NYS in our case). Since the effects of a shock do not distribute themselves evenly throughout the economy, IO methods estimate the extent of these impacts and trace how the changes impact different sectors of the economy. The analytical strength of this methodology stems from its ability to estimate the indirect and induced economic effects stemming from the

[9] The reductions are primarily driven by the need for prepackaged, shelf stable products suitable for remote delivery.
[10] The ice cream and frozen dessert manufacturing industry in IMPLAN includes "ice cream, flavored ices, flavored sherbets, ice pops, and fruit pops." For this category, BCSD spent most of the new local dollars on "grape slush" from Welch's during the Initiative. This shows up under the ice cream and frozen dessert manufacturing industry per the NAICS-IMPLAN bridge categorization (Clouse 2023). Under the Initiative, grape slush counts as fruit.
[11] Beef product spending categories include beef cattle ranching and farming and meat processed from carcasses.
[12] Fruit and vegetable spending categories include fruit farming, vegetable and melon farming, canned fruits and vegetables manufacturing, and frozen fruits, juices, and vegetables manufacturing. The need for prepackaged, shelf-stable foods for remote delivery in 2019-2020 reduced purchases of fresh and frozen fruits and vegetables.

direct expenditures that lead to additional purchases by final users in an economy (Schmit & Boisvert, 2014).

The direct effects are the initial set of expenditures applied to the IO multipliers that represent the change or the shock that results from a policy or project. The indirect effects are the additional business-to-business purchases that take place up the supply chain within the region stemming from the initial input (i.e., the direct effect). Induced effects are values of industry activity that stem from household spending of increased labor income that result from the initial input purchases and follow-on indirect effects.

Technically, our analysis utilizes IMPLAN's Social Accounting Matrix (SAM) model, rather than an IO model. A SAM incorporates not only economic data for an economy, but social data as well, including national and household income statistics (Van Wyk et al., 2015). Accordingly, the SAM has an input-output model at its core but has additional capacity to disaggregate households, firms, and other institutions such that the impacts and multipliers based on the SAM reflect ripple effects throughout the economy with somewhat greater precision than do those based on an IO model alone (Miller & Blair, 2009, Chapter 11).[13] Although the IO/SAM model is useful in assessing short-term economic impacts, it relies on assumptions including unlimited supply, constant prices, static framework, constant returns to scale, and fixed production technologies, albeit adequate for short-term analyses.

The IMPLAN SAM analysis provides the direct, indirect, and induced effects for employment, labor income, value added, and output. Employment represents average monthly employment. Labor income sums the income earned by the employees and proprietors of non-

[13] A typical SAM provides a mapping into a functional category for households usually based on household income class. The IMPLAN SAM serves this purpose with nine household income categories; however, with a shortcoming in the SAM accounts that restricts the full evaluation of income distribution effects (Alward & Lindall, 1996).

employee firms. Value Added is comparable to Gross Domestic Product (GDP) and includes labor income, taxes on production and imports (TOPI) and other property type income (OPTI). Output represents the value of annual industry production expressed in producer prices. For manufacturers output is sales plus/minus changes in inventory. For service sectors, output equals sales. For retail and wholesale trade, it is the gross margin (not gross sales).

Vendor Data Processing

Efforts were made to obtain school purchasing data at the most granular level to define local versus non-local expenditures across industry. Vendor data includes product name, cost, and local or non-local distinctions. Distinguishing which type of funds the products were purchased with; i.e., budget versus entitlement dollars, allows us to estimate economic impacts separately from these sources.

Product purchases were mapped to appropriate IMPLAN industry codes. To facilitate this mapping, we utilize the NAICS/IMPLAN crosswalk (Clouse 2023).[14] The total cost of each item is divided into its margined components depending on vendor firm type (farm, processor, or wholesaler) to properly allocate costs and local percentages. Raw (e.g., apples, eggs) and minimally processed foods (e.g., apple slices, chopped raw vegetables) were margined to applicable farm industry and other processed products (e.g., cheese, lunch meat) to applicable manufacturing industry. These two margins make up the "producer value" of the margin, the price received by the producer for the goods or services sold. Since most items purchased by

[14] The North American Industry Classification System (NAICS) is the standard used by the Federal statistical agencies to classify business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. IMPLAN industries are based on NAICS codes but represent differing levels of NAICS code rollups. Generally speaking, manufacturing industries are at the 4-5 digit NAICS detail; whereas, agriculture and services are at the 3-4 digit NAICS detail.

BCSD were purchased through wholesalers (i.e., food distributors), the total product cost is further margined through wholesale and transport margins.[15]

For most raw and minimally processed items, industry codes were easily mapped to the appropriate farm industry in IMPLAN (e.g., apples to fruit farming). However, some processed food products were not readily identifiable within the NAICS code and IMPLAN industry descriptions, requiring judgement on the best fit.[16] For each product purchased from a wholesale vendor, IMPLAN Commodity Margins were applied to allocate the cost among wholesale, producer (farm or processor), and the transport margins.[17]

Each margined component is assigned a local purchasing percentage (LPP) that indicates the portion of that cost component that occurs locally. For the wholesale margin, this was either 0% or 100% depending on if the wholesaler was located outside or inside NYS, respectively. For items purchased from a local (NYS) wholesaler but the item itself was not grown or produced in NYS, the wholesale margin component is captured as local, but not the cost of goods sold. The producer margin LPP is based on the value of raw products (farm) or ingredients (processor) that were local; if no detailed information is provided, IMPLAN's default LPP for that product is used.

In cases where additional information about the local or non-local nature of product is known, industry production functions were edited to accommodate the additional detail (e.g., adjust milk input LPP to 100% for cheese that is documented as using only NYS milk; adjust all LPP food inputs in the spending pattern to 57% for an eggroll documented as using 57% NYS

[15] We use the wholesale margin for IMPLAN industry 398: Wholesale services – Grocery and related product wholesalers.
[16] Margining processes on specific food products decisions are detailed in Krasnoff (2022, pp. 61-63).
[17] For coding purposes, and practicality for most food purchases, the transport margin is restricted to the truck transportation services industry in IMPLAN (417). Specifically, once the wholesale and producer margins were allocated, the residual was assigned to IMPLAN industry 417.

ingredients). Some NYS processed food products sold by local processors were stipulated with a particular percentage of some local ingredients (e.g., processed hot dogs with 51% local meat inputs). In this case, 100% of the processor margin is coded as local and the allocation of local spending among inputs within the processor spending pattern adjusted accordingly (e.g., 51% LPP for meat inputs).

The LPP of the transport margin is determined based on the origin of food product (farm or processor): 100% if local or the default LPP if non-local (approximately 55%). Intuitively, this makes sense since, even for non-local food products, some local transportation is needed for delivery.

Entitlement Data Processing

Food product purchases from entitlement spending were more complicated, requiring alternative coding for inclusion in the model. Items ordered from USDA Foods can only be traced to their most recent origin using State of Origin (SOO) reports posted by the FNS (USDA, 2020). The origin represents where the product was processed and packaged and may not fully represent where the products were grown or raised. SOO reports list the value of products procured by state in the respective fiscal year. If NYS appeared in the SOO reporting for a commodity, the dollar value in NYS is divided by the total dollars spent on the commodity to estimate the LPP. Although schools cannot distinguish where their delivery of this commodity is coming from on the SOO list specifically, the computed percentage as the LPP for these items is a reasonable approximation. Notably, only eggs and apples contained any NYS purchases.

USDA Processed Foods invoice data are related to the USDA Foods list when products from the latter are purchased and routed for further processing prior to delivery to. In this case, vendors are matched across the two lists and costs on each are additive entitlement purchases. In

other words, USDA Foods costs represent the producer value and the USDA Processed Foods costs represent the additional processing costs paid. Costs were coded separately to account for situations where the final product delivered was attributed to a different industry than the initial USDA Food product (e.g., USDA food as raw whole chickens diverted for further processing as processed poultry products).

Model Construction

For input into the customized NYS IO/SAM model, local spending was aggregated across vendors by year, industry code, and local/non-local spending allocation. Entitlement and budget spending were modeled separately. Since IMPLAN model years are based on calendar years (January through December) rather than school years (July through June), we apply the ending calendar year in IMPLAN for each school year; e.g., 2018-2019 SY spending is applied to the 2019 model year in IMPLAN.

Our primary focus is on how BCSD's changes in local spending induced by the Initiative changed economic impact to the state economy. However, the structure of the economy is also changing across years due to various market forces. The complete change in impact to the NYS economy accounts for both changes; however, it is useful to consider the incidence of the change accruing from the two components. Full Impact scenarios represent gross economic impacts of (direct) food procurement spending by the BCSD and the existing structure of the NYS economy. In the Spending Only scenarios, spending by year follows from the Full Impact scenarios, but impacts are estimated based on the 2018 NYS economy alone. By holding constant the overall structural economy across years and comparing the results to the full impact scenario, we identify the incidence of changes in impact from spending allocations and economy-wide structural changes.

We also compare the change in gross economic impact from 2017-2018 to 2018-2019 with the negative impact of a tax effect on NYS households based on the cost of the extra reimbursement through the Initiative. Put differently, if the Initiative is funded through an increase in the NYS budget by residents through income taxes, there is less income available to be spent by those taxpayers privately for other purposes. Alternatively, if funding for the Initiative represents a reallocation of previously budgeted expenditures, the negative impact would follow from lower funding to the prior use. For clarity and ease of exposition, we chose the former.

The added reimbursement cost is estimated by multiplying BCSD's ADP for 2018-2019 (29,146 meals per day) by the increased reimbursement through the Initiative ($0.191/meal) times the number of school days (180), or just over $1 million ($1,002,039). Although the reimbursement qualified for in one year is released to the district the following year as they continue to serve lunches through the NSLP, we attribute the cost as a negative household income change in the qualifying year.[18] The actual amount received in the 2019-2020 SY was less than this amount as BCSD pivoted to emergency feeding in March 2020 under the SFSP. Even so, we include the full potential tax effect to provide a more conservative measure of net economic impact. Negative impacts through the household income change were only explored for the 2018-2019 qualifying year since it preceded the COVID-19 pandemic and the restructuring of school operations due to it in 2019-2020 and 2020-2021.

Empirical Results

The direct effects in the model are local food spending totals by the BCSD; they effectively represent the first round of indirect effects of food procurement through entitlement and budget

[18] IMPLAN has nine household income categories that vary in their spending patterns. For convenience, we apply the full negative shock to the middle-income household spending pattern of $30,000-$40,000 as an average effect.

funds. That spending in an IO/SAM framework stimulates additional indirect and induced effects to satisfy procurement demands.

Full Impact Scenario

The Full Impact scenario results are presented in Table 3. For ease of exposition, and since local spending by BCSD is transparent under the output metric, we focus the discussion of results to this metric. In 2017-2018, $4.8 million of local (direct) spending generated an additional $3.5 million and $1.7 million in indirect and induced effects, respectively, for a total impact of $10.0 million in NYS. This implies that for every $1.00 in local spending by BCSD, another $1.10 is generated through backward linkages and labor income spending from the direct and indirect industry effects; i.e., an output multiplier of 2.10.

In 2018-2019, direct and total impacts rose to $5.7 million and $12.0 million, respectively, an increase of approximately 20%. Given a negligible change in student enrollments, it makes sense that the direct effects increase under the initiative due to the shift to more local spending.[19] A comparable relative change in total impact is evidenced by the same output multiplier in 2018-2019 (at least to two decimal points). While the primary allocation of food procurement dollars to more local fruits, vegetables, and meat products occurred because of the policy, overall multiplier effects remain driven by continued large purchases of local dairy products (Table 2).

Lower local spending in 2019-2020 is driven by the COVID-19 induced pivot to remote food delivery programs and relatively more entitlement spending through the SFSP. The relatively lower multiplier effects in NYS for fruits, vegetable, and meat production and

[19] Student enrollments were 38,243 in 2017-2018, 38,351 in 2018-2019, and 38,390 in 2019-2020.

processing than dairy (Schmit 2021) contribute to the (small) reduction in the BCSD spending multiplier to 1.97.

While not shown, the top six industry indirect effects in each year accrue to dairy production, wholesale trade, finance and insurance, real estate and rental, transportation and warehousing, and professional services and management; in 2018-2019 they represent 65% of all indirect effects. The top 60% of induced effects follow naturally from major household spending categories: finance and insurance, real estate and rental, health and social services, and retail trade.[20]

Full Impact scenario results by year and type of spending are shown in Table 4. Given the nature of the products purchased through each funding source, it is expected that the multipliers are higher for budget spending than for entitlement spending. In the years that BCSD utilized special entitlement programs (i.e., USDA Pilot in 2017-2018, and USDA Pilot and USDA DoD in 2019-2020) impacts and multiplier effects are higher. This makes sense given that these special entitlement programs intentionally focus on purchases of more local fresh fruits and vegetables and demonstrate opportunities for growth in local spending (and impact) relative to traditional entitlement pathways.

Spending Change Only Scenario Results

Economic impacts across years assuming the structure of the NYS economy is held fixed at 2018 levels are shown in Table 5. The change in total output impact from 2017-2018 to 2018-2019 is approximately 19.4%, slightly less than the 19.7% change in the full impact scenario. Put differently, the total output impact for the spending only scenario in 2018-2019 is 0.3% less ($11.96 million) than the full impact scenario ($11.99 million). While small, this suggests that

[20] A detailed breakdown of all indirect and induced effects by industry and year are available in Krasnoff (2022, pp. 39-41).

changes in the overall economy in 2019 complemented and are additive to the shift purely in local spending by BCSD. In other words, more localized linkages developed in the industries where BCSD spending occurred and/or the industries backward linked to those industries (i.e., from indirect and induced industry effects), albeit only modestly.

The opposite result occurred in 2020 – the first COVID-19 year. Holding the overall structural economy constant at 2018 levels, total impacts dropped 43.4% from the previous year. This compares with a decrease of 45.4% in the full impact scenario. In this case, changes in the overall economy restricted the degree of local transactions (i.e., lower local backward linkages) from the year prior resulting in even larger reductions beyond the pure drop-in-spending effect. Given major supply chain disruptions in many sectors of the economy induced by COVID-19, the result makes intuitive sense considering the range of industries effected via the indirect and induced effects. The differences in multipliers across scenarios tell an equivalent story.

Cost Impact of 30% NY Initiative

As discussed above, we consider the financial reimbursement to qualifying school districts as a cost to NYS taxpayers. Considering the additional reimbursement cost of $1.00 million as a negative household income change implies a total impact of -$1.28 million when the additional induced effects are factored in for 2018-2019.

Conclusions and Implications

The 30% Initiative was put in place in NYS in 2018 to incentivize local food procurement by public schools and strengthen local economies in NYS. As a result of the program, we observe clear shifts in food spending categories that suggest changes in what and where foods were purchased and for what meal. Before the Initiative, impacts of BCSD's spending came mostly from dairy (i.e., fluid milk). After participating in the Initiative, diversification of industries

occurred in overall spending (i.e., more local beef and fruits and vegetables) and within existing industries (i.e., more cheese, grains, and frozen fruit products). While fluid milk product purchases still generate a large share of total impact under the Initiative, higher spending on fruits and vegetables generated relatively higher gains in employment (jobs) impact.

Additionally, the analysis yielded interesting results on the difference in impacts between entitlement and regular budget spending revealing fundamental differences in the way that these different types of spending move through their respective supply chains. Economic multipliers for budget spending are higher than for entitlement spending, attributed primarily to the nature of the products available for purchase. Nonetheless, multiplier effects increase through utilization of special entitlement programs (USDA DoD and USDA Pilot), revealing opportunities for growth in local impact through these additional programs.

Of primary interest is whether the costs of the 30% Initiative are more or less than the actual benefits achieved, interpreted here as the change in economic impact from local food procurement. Through a detailed evaluation of changes in BCSD's total food procurement spending before and during the Initiative, the benefits appear to outweigh the costs. Specifically, the increase in total economic impact from 2017-2018 to 2018-2019 of BCSD's local food spending was $1.97 million; the cost of the Initiative to NYS taxpayers was $1.28 million. For every dollar in additional reimbursement offered through the Initiative, economic impacts to the state increase by $1.54.

By our IO model application, local spending represents new sales to final demand; i.e., the value of goods produced and sold to final users during the year for consumption. Put differently, the increase in local spending is assumed to be generated from industry expansion in the producing sectors to satisfy that new demand. However, producers (farmers or processors)

selling to BCSD (directly or indirectly through a wholesaler), may alternatively reallocate sales from pre-existing local market channels (e.g., a farmer selling at farmers markets) to schools. In this case, but for changes in the net margin on those sales, there would be no additional impact (i.e., there are no new sales to final demand). Without knowing actual producer changes in response to the increase in local food procurement demand, the net benefit of the Initiative at BCSD ($0.69 million) can be considered an upward bound. As an approximation, at least 65% of the increase in local spending by BCSD must represent new sales to final demand (1.28/1.97). Some reallocation of local market sales is expected, the 65% new sales threshold is, perhaps, reasonable.

The change in economic impact is not only the result of increased spending, but also to overall changes in the structural economy (i.e., the full nature of backward industry linkages in the state). While 2019 was shown to be modestly more conducive to local food linkages relative to 2018, lower multiplier effects of BCSD's food spending in 2020 reflect the challenges faced by local businesses during the pandemic. With only a one-year comparison, small differences were expected; however, a major structural change in the economy in 2020 presented larger adjustments and is a useful highlight of food supply chain problems that occurred at the start of the pandemic.

This work was hampered by the effect of spending changes necessary during COVID-19 in the 2019-2020 school year. Ultimately, more understanding of the shifts in spending and changes in economic impacts could be understood through inclusion of data for additional years of participation in the Initiative that are not affected by an international pandemic. Additionally, future work evaluating the impact of this policy would be improved by a better accounting of local spending on the part of SFAs. Ensuring that SFAs track local and non-local spending

through the entirety of the school year will provide a more accurate representation of impact, although limiting qualifications to only budget spending for lunch seems an unnecessary burden of the policy and ignores potential shifts in local spending within and among sources of funds.

Overall, the results portray positive net economic impacts from BCSD's participation in the Initiative; while the largest qualifying SFA in the state thus far, evaluating spending changes by other qualifying SFAs, particularly those with more limited changes in spending for qualification, would provide a more informed overall assessment of the full costs and benefits of the program to the state. Nonetheless, the results have important implications and insights for FTS policy makers and SFAs surrounding this and other local food purchasing incentives. Our efforts also provide a needed pathway for other districts and interested parties to begin analyzing their impacts irrespective of location and the specific FTS policy/program in question.

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Table 1. Food spending of Buffalo City School District, by school year and source of funds.

	2017-2018		2018-2019		2019-2020	
	Local	Non-local	Local	Non-local	Local	Non-local
Source	**$**	**$**	**$**	**$**	**$**	**$**
Entitlement Funds						
USDA Foods	14,971	2,681,789	22,999	3,174,620	4,415	4,161,770
Pilot Project	96,997	102,315	0	0	295,012	251,349
DoD Program	0	0	0	0	101,716	145,935
Total	111,968	2,784,104	22,999	3,174,620	401,143	4,559,054
Aggregate Total	2,896,071		3,197,618		4,960,197	
% Local	4%		1%		8%	
School Food Budget Funds						
Budget	4,646,691	5,404,348	5,688,273	8,160,543	2,925,449	6,244,502
Aggregate Total	10,051,038		13,848,816		9,169,951	
% Local	46%		41%		32%	
Total Food Spending						
Total	4,758,658	8,188,451	5,711,272	11,335,162	3,326,591	10,803,556
Aggregate Total	12,947,109		17,046,434		14,130,147	
% Local	37%		34%		24%	

Source: Buffalo City School District and Author local/nonlocal calculations.
Note: 2019-2020 SY reflects less in-person school days due to COVID-19 and a shift in spending through the federal Summer Food Service Program (SFSP) during the virtual learning portion of the school year.
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Table 2. Local spending on food procurement by Buffalo City School District, by industry and year.

Rank	Industry	$ Total	$ Local	% Local
	2017-2018			
1	Fluid milk manufacturing	2,550,190	2,308,427	90.5
2	Wholesaler margin (grocery & related products)	3,687,704	2,127,010	57.7
3	Fruit farming	611,026	154,472	25.3
4	Truck transportation	191,651	128,628	67.1
5	Vegetable & melon farming	349,649	32,584	9.3
6	Canned fruits & vegetables manufacturing	707,921	2,638	0.4
7	Frozen fruits, juices, & vegetables manufacturing	308,217	2,340	0.8
8	All other food manufacturing	449,121	1,544	0.3
9	Beef cattle ranching & farming	559	559	100.0
10	Meat processed from carcasses	731,379	387	0.1
11	Greenhouse, nursery, & floriculture	2,432	71	2.9
	2018-2019			
1	Fluid milk manufacturing	2,745,378	2,538,805	92.5
2	Wholesaler margin (grocery & related products)	4,953,606	2,325,290	46.9
3	Fruit farming	452,040	245,788	54.4
4	Ice cream and frozen dessert manufacturing	232,706	204,225	87.8
5	Truck transportation	229,311	160,760	70.1
6	Cheese manufacturing	305,132	62,631	20.5
7	Vegetable & melon farming	230,851	59,983	26.0
8	Canned fruits & vegetables manufacturing	1,176,416	48,312	4.1
9	Frozen specialties manufacturing	596,637	18,367	3.1
10	Meat processed from carcasses	772,152	13,680	1.8
11	Frozen fruits, juices, & vegetables manufacturing	530,281	12,020	2.3
12	Other snack food manufacturing	232,916	10,550	4.5
13	All other food manufacturing	696,155	4,402	0.6
14	Beef cattle ranching & farming	3,511	3,511	100.0
15	Grain farming	2,871	2,628	91.5
16	All other crop farming	324	273	84.4
17	Poultry & egg production	460,881	47	0.0
	2019-2020			
1	Wholesaler margin (grocery & related products)	3,557,019	1,430,432	40.2
2	Fluid milk manufacturing	1,082,205	1,025,388	94.7
3	Truck transportation	186,818	125,575	67.2
4	Fruit farming	396,654	106,352	26.8
5	Canned fruits & vegetables manufacturing	1,002,878	105,928	10.6
6	Meat processed from carcasses	888,208	100,648	11.3
7	Vegetable & melon farming	282,673	95,703	33.9
8	Ice cream & frozen dessert manufacturing	95,449	87,485	91.7
9	Cheese manufacturing	548,765	72,978	13.3
10	Other snack food manufacturing	192,938	57,010	29.5
11	Beef cattle ranching & farming	35,072	35,072	100.0
12	Frozen specialties manufacturing	830,720	33,403	4.0
13	Grain farming	22,964	21,455	93.4
14	Frozen fruits, juices, & vegetables manufacturing	344,974	20,109	5.8
15	All other food manufacturing	694,377	4,415	0.6

Source: Buffalo City School District and local calculations by authors. Includes categories with positive local spending only. Industries reflect IMPLAN categorization. 2019-2020 SY reflects less in-person school days (124 instead of 180) and a shift in spending through the Summer Food Service Program (SFSP) during the virtual learning portion of the school year.

Table 3. Full economic impacts of local food spending by the Buffalo City School District, by school year

Impact	Employment (jobs)	Labor Income ($)	Value Added ($)	Output ($)
2017-2018				
Direct	17.74	1,246,917	1,711,110	4,758,658
Indirect	14.85	1,077,448	1,639,180	3,538,862
Induced	9.86	636,324	1,119,003	1,716,941
Total	42.45	2,960,690	4,469,294	10,014,461
Multiplier	2.39	2.37	2.61	2.10
2018-2019				
Direct	23.15	1,488,403	2,087,775	5,711,272
Indirect	17.19	1,201,115	1,979,248	4,267,274
Induced	11.10	737,282	1,320,914	2,009,599
Total	51.45	3,426,800	5,387,937	11,988,145
Multiplier	2.22	2.30	2.58	2.10
2019-2020				
Direct	13.09	894,442	1,329,683	3,326,591
Indirect	8.95	686,749	1,045,536	2,145,037
Induced	5.80	410,933	712,177	1,073,102
Total	27.84	1,992,125	3,087,396	6,544,730
Multiplier	2.13	2.23	2.32	1.97

Source: Buffalo City School District, local calculations by authors, and IMPLAN.
Note: 2019-2020 SY reflects less in-person school days and a shift in spending through the federal Summer Food Service Program (SFSP) during the virtual learning portion of the school year.

Table 4. Full economic impacts of local food spending by the Buffalo City School District, by school year and source of spending

Impact	Employment (jobs)	Labor Income ($)	Value Added ($)	Output ($)
2017-2018 Entitlement				
Direct	0.94	42,105	61,185	111,967
Indirect	0.28	21,161	30,637	49,048
Induced	0.27	17,361	30,524	46,834
Total	1.48	80,627	122,346	207,849
Multiplier	1.57	1.91	2.00	1.86
2017-2018 Budget				
Direct	16.8	1,204,813	1,649,925	4,646,691
Indirect	14.57	1,056,286	1,608,543	3,489,814
Induced	9.59	618,963	1,088,479	1,670,107
Total	40.96	2,880,063	4,346,948	9,806,612
Multiplier	2.44	2.39	2.63	2.11
2018-2019 Entitlement				
Direct	0.37	7,520	19,222	22,999
Indirect	0.01	801	1,250	2,206
Induced	0.03	2,288	4,099	6,235
Total	0.42	10,609	24,571	31,441
Multiplier	1.14	1.41	1.28	1.37
2018-2019 Budget				
Direct	22.78	1,480,883	2,068,552	5,688,273
Indirect	17.18	1,200,314	1,977,998	4,265,067
Induced	11.07	734,994	1,316,815	2,003,364
Total	51.03	3,416,191	5,363,366	11,956,704
Multipliers	2.24	2.31	2.59	2.10
2019-2020 Entitlement				
Direct	2.62	156,564	231,277	401,143
Indirect	0.89	74,295	109,025	168,079
Induced	0.85	59,992	103,971	156,663
Total	4.36	290,852	444,272	725,885
Multipliers	1.66	1.86	1.92	1.81
2019-2020 Budget Spending Only				
Direct	10.46	737,878	1,098,406	2,925,449
Indirect	8.06	612,454	936,511	1,976,958
Induced	4.96	350,941	608,206	916,439
Total	23.48	1,701,273	2,643,123	5,818,845
Multipliers	2.24	2.31	2.41	1.99

Source: Buffalo City School District, local calculations by authors, and IMPLAN.
Note: 2019-2020 SY reflects less in-person school days and a shift in spending through the federal Summer Food Service Program (SFSP) during the virtual learning portion of the school year.

Table 5. Economic impacts of local food spending by the Buffalo City School District, by school year using 2018 structural economy.

Impact	Employment (jobs)	Labor Income ($)	Value Added ($)	Output ($)
		2017-2018		
Direct	17.74	1,246,917	1,711,110	4,758,658
Indirect	14.85	1,077,448	1,639,180	3,538,862
Induced	9.86	636,324	1,119,003	1,716,941
Total	42.45	2,960,690	4,469,294	10,014,461
Multipliers	2.39	2.37	2.61	2.10
		2018-2019		
Direct	21.92	1,461,645	2,013,169	5,711,272
Indirect	17.47	1,273,922	1,935,620	4,222,738
Induced	11.46	749,310	1,317,108	2,021,101
Total	50.85	3,484,878	5,265,898	11,955,111
Multipliers	2.32	2.38	2.62	2.09
		2019-2020		
Direct	13.64	891,739	1,232,424	3,326,591
Indirect	9.67	714,490	1,080,104	2,257,639
Induced	6.65	440,309	773,610	1,187,217
Total	29.96	2,046,538	3,086,138	6,771,448
Multipliers	2.20	2.29	2.50	2.04

Source: Buffalo City School District, local calculations by authors, and IMPLAN.
Note: 2019-2020 SY reflects less in-person school days and a shift in spending through the federal Summer Food Service Program (SFSP) during the virtual learning portion of the school year.