Estimating the Impact of Local Food Prices on Donations to Food Pantries

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Abstract

Though there is a large literature on the incidence of public redistributive transfers (Duggan and Scott Morton 2006; Rothstein 2010; Meckel 2020; Handbury and Moshary 2021) and the effectiveness of private food assistance programs (Coleman-Jensen et al., 2021; Gundersen and Ziliak, 2018; Weinfield et al., 2014), little empirical research exists that examines the possible channels that impact food availability through food pantries. This article provides empirical evidence for the effect of food prices on local private donations from grocery retailers. Results indicate that increases in food prices discourage donations from grocery retailers on the volume and the quality of their donated products, suggesting it will worsen local food security and decrease the dietary pattern of local food bank users. Our results have implications for the likely effect of policy reforms that would consider the source and support of local food pantries.

Keywords: Food Bank, Retail Pricing, Food Security, Food Retailing.
JEL Codes: Q11, D40, Q18

1 Introduction

Although there is a growing body of literature on food pantries, including the role of food banks and hunger relief within the food assistance landscape on hunger relief (Coleman-Jensen et al., 2021; Gundersen and Ziliak, 2018; Weinfield et al., 2014), tax valuations for donated food (Lowrey et al., 2023), the economic value of food pantry access for clients (Byrne and Just, 2022; Byrne et al., 2023), and the interaction between food pantries and food retailer profitability (Kopp and Chenarides, 2020; Lowrey et al., 2023), there is little empirical research that examines how changes in local food prices would impact retailers' donations to food pantries, including donors' decisions about the quantity and quality of their donations. This paper examines the extent to which local food prices impact the retail donations (measured with dollar values by food category) made by private retail donors to local food pantries. We seek to explore how changes in local food prices influence the total volume of food donated, the value of the food donated, and the diversity in the assortment of food donations.

Our setting highlights a potentially important but underexplored mechanism through which the local economic conditions can shape the volume and quality of private donations. Although research has assessed the effectiveness of running food pantries in local communities (e.g., XXX), barriers on their supply side have remained an open question. We test the hypothesis that the increase in food prices is negatively associated with the value of donations from grocery retailers, decreases the overall diversity of the donated products, and lowers the quality of donated food bundles in terms of healthy eating.

Food pantries serve as a secondary marketplace for rescued or recovered food, where low-income households procure food. From a policy-implication perspective, the relationship between food prices and retailer donations generates essential insights related to food security. Increases in local food prices may disincentivize a food retailer to donate to local food pantries decreases, and this outcome could be felt more harshly by food-insecure households who have already faced higher food prices at the primary food market.

We combine multiple sources of USDA data with product-specific data on food donations at the individual store level to calculate the value of food donations and measure

the relationship between local food prices and retail food donations. The data required to test our hypotheses are compiled from multiple sources: (1) An exhaustive list of food pantry locations and their retail donor suppliers; (2) USDA's Food Purchase Groups and the Monthly Food-at-Home Price Database; (3) InfoScan data, including the weekly transaction records by the store at the UPC level; (4) IRI's Consumer Network Panel, including the weekly transaction records by households at the UPC level; and, (5) Nielsen's TDLinx Store Characteristics Database, including the sales volume and stores' location.

We estimate our model using a unique data set of retailer food donations that combine food bank donations in five fresh food categories (bakery, dairy, deli, meat, and vegetables & fruits) with detailed information on both retailers' and food pantries' names and locations at the transaction level. The donation data comes from a large Feeding America-affiliated food bank located in the Southwestern region. We aggregate retailer donation data at the chain-store-week level over a period of 21 months (January 2016 – September 2017). We measure the statistical relationships between the value of private retailers' donations (measured in pounds, according to the USDA's Food Purchase Groups and the Monthly Food-at-Home Price Database) and prices of food sold at retail grocers (measured by the price index constructed by scanner data).

In the absence of systematic data on regional food prices, earlier studies constructed local food price indexes with either USDA's Thrifty Food Plan (TFP) basket or expenditure-weighted shares, utilizing the rich information in Nielsen retail scanner data. All these studies focused on analyzing the welfare of SNAP users. However, approximately 79% (Chenarides and Longo, 2020) of households that visited local food banks reported receiving SNAP benefits or receiving them in the past year. This suggests that most food bank visitors rely on SNAP to help meet their food needs, and the food price index can also be applied to food bank users.

Our first option is to utilize the Thrifty Food Plan (TFP), a meticulously designed dietary framework comprising 29 food categories at different weights and a nutritionally sound diet achievable at a minimal expense (Carlson et al., 2007). The TFP is a pivotal reference point for establishing the maximum benefit levels mandated by legislation within the Supplemental Nutrition Assistance Program (SNAP). Using the TFP as a foundation, Bronchetti et

al. (2019) employed SNAP purchasing power to investigate its causal impact on child health outcomes, finding a 10 percent increase in SNAP purchasing power increases the likelihood a child had a check-up in the past year by 8.1 percent. Gregory and Coleman-Jensen (2013) explored the relationship between SNAP purchasing power and food insecurity. Most recently, Li and Çakır (2023) found a 10% increase in SNAP purchasing power corresponds to a 0.9 percentage point rise in the SNAP caseload per capita, indicating the expansion of program participation.

Different from the TFP categories, Hastings and Washington (2010) construct an index of expenditures on SNAP-eligible products in a given store and week using expenditure-weighted shares with the Nielsen retail scanner panel, finding prices for foods purchased by SNAP-using households vary pro-cyclically with demand, and their decreased food expenditure by the end of the months is primarily due to quantity change, not quality change. Following a similar method, Goldin, Homonoff, and Meckel (2022) studied retailer responses, finding that retailers do not adjust prices based on these predictable demand patterns.

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We contribute to the literature in three ways. The present study makes a unique contribution to research on food bank services, as it focuses on the source of grocery items in food banks and the role of food prices in determining the food available to food pantry visitors.
* to here

2 Background

In addition to public food assistance programs (i.e., SNAP, WIC, and NSLP), food pantries play a vital role in delivering private food aid to individuals facing food insecurity through the distribution of complimentary groceries. Frequently, these food items are procured from food banks, which serve as central hubs for gathering both donated and purchased food, subsequently allocating it to agency partners for further distribution.

Most research on food banks has predominantly examined the broader context of food assistance programs, assessing their efficacy in addressing food insecurity and their potential impact on enhancing weight management for clients.

Firouz et al. (2021) present a novel modeling perspective on the food-bank donation allocation problem under equity and efficiency performance measures. On the donors' side, Lowrey et al.(2023) explain the existence of food banks as an essential mechanism to the food-retailing function, permitting food retailers to price-discriminate between high-valuation consumers who visit their stores and low-valuation consumers who do not. Additionally, Hudak et al. (2020) reviewed US federal policies that impact food and beverage donations to food banks and assessed whether policies encourage healthy food donations.

3 Data Description

3.1 Food Donation Data

Our core data come from a large Feeding America-affiliated food bank located in the Southwestern region. The data are comprised of three key datasets. The primary dataset is "point-of-donation" data that tracks food pantry inventory data from food retailer donors, collected through MealConnect. MealConnect is a digital receipting platform developed by Feeding America, designed to connect food donors, such as grocery stores, with local food pantries to redistribute surplus food (Feeding America 2023). This dataset contains detailed information on donations received by each food pantry, categorized by the date and volume of the donations, the description of donated products, and the food pantry's ID and names. Each donation record is associated with a unique transaction ID. The second dataset includes a list of the recipient food pantries (also referred to as agencies), and a set of attributes that describes their hours of operation, location, and relative demand (measured by how many visitors each agency expects annually). The third dataset provides detailed information on local donors (grocery retailers), including the stores' names, locations (including stores' street addresses and city/county postal codes), and the list of agencies that receive donations directly from them. Each retail donor is assigned a unique ID. A table summarizing donors by their retail chain and location (county) is reported in Table 1.

[Insert Table 1 here]

Combined, these three datasets provide an exhaustive record of donations made by retail donors to agencies that serve households across 21 counties in the Southwestern region of

the U.S. from January 2016 to September 2017.

With the records on donated food products by categories, we generalize the donated products according to the Food Purchase Groups (FPGs) defined by USDA's Monthly Food-at-Home Price Database (MFAHP). Food Purchase Groups (FPGs) are a classification system used by the Economic Research Service (ERS) to group foods based on their nutritional content and intended use. The Monthly Food-at-Home Price Database is a collection of retail food prices for specific items purchased for home consumption. Each record represents a unique product code (UPC or random-weight code) in the InfoScan and IRI data. The Food Code Mapping process involves mapping detailed scanner data product codes to the ERS Food Purchase Groups (EFPGs) to group products for use in policy-relevant analyses.

3.2 IRI and InfoScan Data

InfoScan data encompasses a wide range of information related to consumer purchasing behavior, product sales, and market dynamics. InfoScan data is collected from various sources, including retail point-of-sale systems, and it provides detailed insights into product sales, pricing trends, promotional activities, and market share.

One of the key strengths of InfoScan data is its extensive coverage across multiple product categories, allowing researchers and analysts to examine various consumer packaged goods (CPG) industry sectors. The data includes information on various products, from grocery items to household goods, beverages, and personal care products.

Researchers and analysts can leverage InfoScan data to gain valuable insights into market trends, consumer preferences, and brand performance. By examining sales patterns and market share dynamics, they can identify growth opportunities, evaluate the effectiveness of marketing strategies, and make informed business decisions. Additionally, InfoScan data enables researchers to study the impact of pricing strategies, promotional campaigns, and product innovation on consumer behavior and market outcomes.

Moreover, InfoScan data facilitates comparisons and benchmarking across different brands, retailers, and geographic regions. The data can be analyzed at various levels of granularity, from national market trends to specific store-level insights. This allows for comprehensive market analysis and gives stakeholders a detailed understanding of their market position and

potential competitive advantages.

InfoScan data is a trusted and widely used resource in the industry, providing reliable and actionable insights for manufacturers, retailers, marketers, and policymakers. Its rich and detailed information on consumer purchasing behavior and market dynamics make it an indispensable tool for understanding the complex landscape of the CPG industry and driving informed decision-making.

4 Indentification Strategy

4.1 Price Impact on Donated Quantity

To study the impact of food price changes on the value of retail donations, we establish a closed-form, linear fixed effects model:

$$\log(\text{ Donation\_Value }_{sw}) = \beta_0 + \beta_1 \log(P_{rjwmy}) + \eta C_{jm} + \delta_j + \varphi_w + \gamma_m + \tau_y + \xi_s + \varepsilon_{sw} \quad (1)$$

where Donation_Value $_{sw}$ is the retail "value" of food donations made by store s in a week w, P_{rjwmy} is a price index at the retail-chain level (where $s \subseteq r$), and C_{jm} is a vector of county-level covariates that may impact the economic conditions in county j and month m. We also include a set of fixed effects to control for time-invariant mean differences in donation values across county (δ_j), week (φ_w), month (γ_m), and store (ξ_s). We expect higher food prices to indicate the opportunity cost of donations is higher; thus, fewer donations (calculated in US dollars) will be expected from the above analysis.

Donation value. Using two primary datasets, we calculate the value of retail food donations (Donation_Value $_{sw}$). Our food donation data contains an exhaustive list of food pantry locations, serving 21 counties, and a daily log of retail food donations, in pounds, from Jan 2016-Sep 2017. Food donations are classified according to the USDA Food Purchase Groups (Tier 1-Tier 3) and linked with the Monthly Food-at-Home Price Database (MFAHPD). Donation "value" is then calculated as the product of the donation volume (in pounds) and the monthly FAH price index for each respective food category.

Food price index. Our variable of interest, P_{rjwmy}, is an index that represents the weighted average food price at retail chain r, in county j, during week w, of month m, in

year y. Because this paper's central theme is measuring the value of retail food donations, we are most concerned about benefit-receiving households, as they are more likely to be food pantry patrons. In other words, the demand for food-at-home acquisitions among benefit-receiving households is more likely to be shared among food retailers and food pantries (Chenarides and Longo, 2021). Therefore, we follow Hastings and Washington (2010) to construct a weighted price index, where ω_k is the share of expenditures on product k made by benefit-receiving households. We normalize the expenditure shares to sum one in each retail chain-month and denote the normalized expenditure shares by $\widetilde{\omega}_{krmy}$ for retail chain r, calendar month m, and year y.We then follow Goldin, Homonoff, and Meckel (2022) to create an expenditure-weighted index of log prices for each retail chain-week using the following equation:

$$\log\left(P_{rjwmy}\right) = \sum_{k} \widetilde{\omega}_{krmy} \log\left(P_{krwmy}\right) \tag{2}$$

where P_{krwmy} denotes the unit price for product k sold in retail chain r in calendar week w, calendar month m, and year y. The IRI Consumer Network Panel is used to construct the expenditure weights and the product-level price indexes.

County-week control variables. The vector C_{jm} includes the median rent of an apartment, the average rate of commercial electricity, and the state minimum wage. The minimum wage impacts both labor costs and product demand, especially in low-income neighborhoods (Leung, 2021).

Market concentration. To control for competition among retailers, we use the TDLinx Store Characteristics Data to construct various measures of market concentration, including HHI and market density scores. These indications will reflect retail agglomeration effects that could influence a store's donation volume (Kopp and Chenarides, 2020).

4.2 Price Impact on Donated Quality

5 Results

6 Discussions

6.1 Retailers' Decision Process on Donation

Retailers may consider the following two issues before deciding on the volume and type of food products donated to local food banks.

1. The Tax Deduction Incentives

Central Question: How to calculate the basic value of the donated product, or how to calculate the markup of grocery retailers?

The Formula for calculating the enhanced tax deduction can be found here:

https://chlpi.org/wp-content/uploads/2013/12/Food-Donation-Fed-Tax-Guide-for-Pub-2.pdf

2. The Inventory Cost and the Disposal Costs

We need to find a method to proxy inventory costs if these food products were not donated. Tim Richards seems to have several articles discussing this issue. For example,

Lowrey, J., Richards, T. J., & Hamilton, S. F. (2020). Food Bank Donations and Retail Pricing. Available at SSRN 3743633.

7 Conclusions and Implications

This article estimates county-level food prices and investigates their correlation with retailers' donations to local food banks. We construct a regional TFP price index with point-of-sale scanner data to estimate monthly donations from January 2016 to September 2017. Our methods are novel to the literature on food index and account for essential weighting biases such as product heterogeneity, variety, expenditure, and outlet biases that are overlooked in prior studies.

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Figure 1: Counties within Study Area

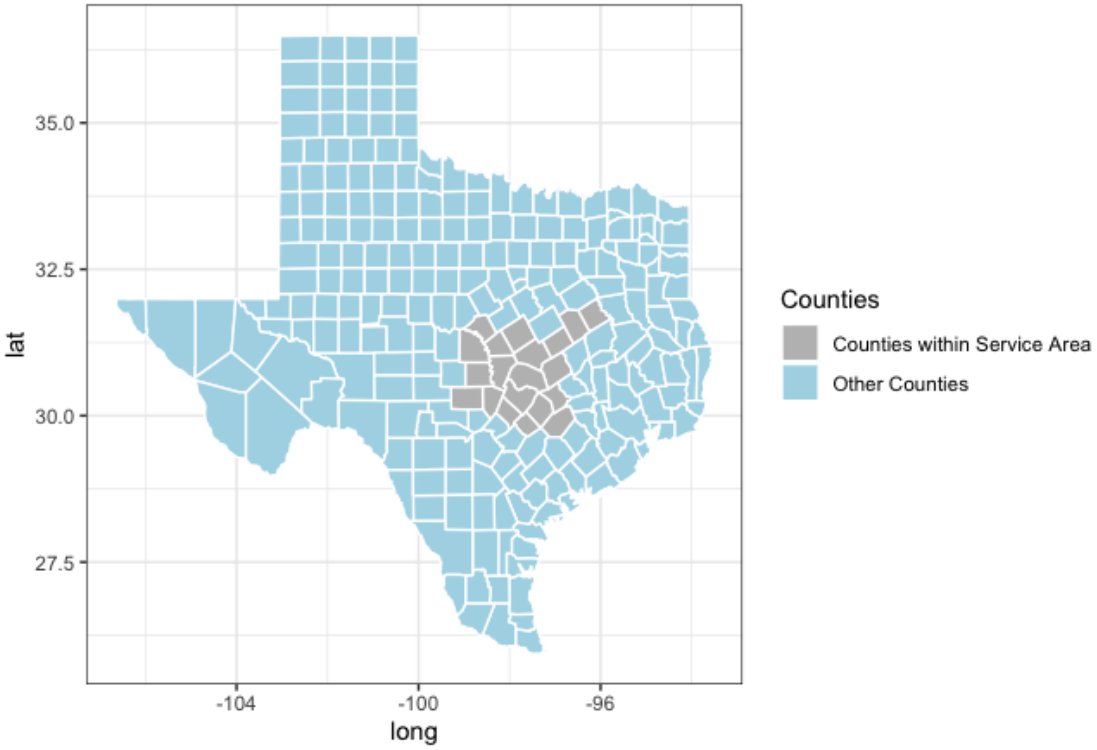

Table 1. Food Retailer Donors in the Service Area

Retail Chain	# of Transactions	Volume Donated (in Pounds)
Conventional Grocery Stores		
H-E-B Food Stores	38420	5323837
Randall's	5992	554872
Sprouts Farmers Markets	4702	343116
Trader Joe's	2550	288097
Whole Foods Market	1769	165026
Aldi Inc.	1042	82995
Performance Food Group	42	112486
Total	54517	6870429
Bakeries		
Starbucks Corporation	7846	51860
Flowers Baking Co.	113	17318
Pepperidge Farm, Inc.	50	14501
Panera Bread Company	21	1168
Total	8030	71747
Mass Merchandise		
Walmart Stores, Inc.	32945	8723229
Target	10993	849595
Amazon	214	61308
Total	44152	9634202
Wholesales Club		
Sam's Club	4647	1760868
Costco Wholesale Corporation	1340	175356
Total	5987	1936224
Others		
Coca-Cola Enterprises Inc.	28	386696
Cargill, Inc.	27	89055
Pepsi Bottling Group	7	27063
IKEA North America Services	2	448
Hilton Worldwide	1	900
Total	65	504162

Appendices

Some Appendix