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The Impact of Regional Produce Cooperatives on the Distribution of Fresh Fruits and Vegetables in the United States

Yifan Peng, University of Illinois Urbana-Champaign, yifanp4@illinois.edu
Craig Gundersen, Baylor University, craig_gundersen@baylor.edu

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The Impact of Regional Produce Cooperatives on the Distribution of Fresh Fruits and Vegetables in the United States

Yifan Peng[1], Craig Gundersen[2]

[1] PhD student, Department of Agricultural and Consumer Economics, University of Illinois Urbana-Champaign

[2] Snee Family Endowed Chair, Baylor Collaborative on Hunger and Poverty, Baylor University

Contact: Yifan Peng (yifanp4@illinois.edu)

Background

- Central goal of U.S. food banks: to alleviate food insecurity, as federal food assistance programs alone are often insufficient
- Food banks also work to ensure that food-insecure people have access to sufficient healthy food
- Long-term hurdle to having enough **fresh fruits and vegetables (FFV)** for food-insecure people: food banks may not have consistent access to FFV from traditional model that restricted the varieties of FFV that food banks could have, particularly when they had to order each product by truckload size for transportation
- One way to overcome this is by sourcing through Feeding America's seven **regional produce cooperatives (RPCs)**, launched to serve as regional mixing centers available for food banks. RPCs help food banks acquire an increased variety and quantity of FFV at a lower cost and form a coordinated model

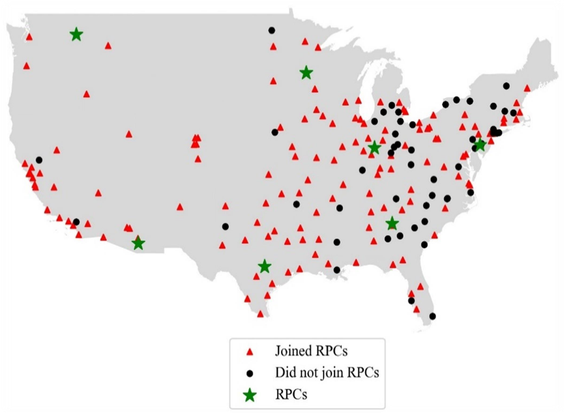

Figure 1. Layout of Food Banks and RPCs

Research Questions

We evaluate the causal impact of RPCs on FFV by answering 2 questions:

- Do RPCs increase the actual amount of FFV at food banks?
- Does the proportion of FFV with respect to the overall food at food banks increase by joining RPC?

Methods

- **Parametric Approach:** Two-way Fixed Effects (TWFE):

$$Amount\ of\ FFV_{i,t} = u_i + v_t + \beta RPC_{i,t} + \gamma \mathbf{X}_{i,t} + \epsilon_{i,t}$$

  - i denotes a food bank
  - t denotes a time (year)
  - ***Amount of FFV***$_{i,t}$: the weight of FFV that food bank i receives at time t
  - RPC = 1 if a food bank i works with at least one of the RPCs at time t, and 0 otherwise (note: treatment is "irreversible")
  - **X** is a vector of covariates (food bank–level)

$$FFV rate_{i,t} = u_i + v_t + \beta RPC_{i,t} + \gamma \mathbf{X}_{i,t} + \epsilon_{i,t}$$

  - ***FFV rate***$_{i,t}$ = amount of FFV / total amount of food

- **Semi-Parametric Approach:** Callaway and Sant 'Anna (2020) estimators (CS) with 3 types of weighting/aggregation strategies × 2 types of control group settings ("never-treated" & "not-yet-treated")

Data

- Proprietary administrative data from Feeding America: 197 food banks' pounds of foods received (account for over 80% of food banks in the U.S.) & RPCs participation records
- Google map data for the locations of 197 food banks and RPCs (adjusted by Pseudo-Mercator projection)
- Food bank–level covariates are aggregated by using county-level data from the U.S. Census Bureau—American Community Survey

Estimation Results

Table 1. The Impact of Regional Produce Cooperatives (Parametric Approach)

Outcome Variables	*Amount of FFV (million pounds)*	*FFV rate (amount of FFV / total amount of food)*
	(1)	(2)
RPC	1.4014 (0.4010) ***	0.0081 (0.0071)
Food Bank FE	Yes	Yes
Year FE	Yes	Yes
Observations	1,552	1,552
SE Clustering Level	Food Bank	Food Bank

Notes. *** p<0.01, ** p<0.05, * p<0.1. Cluster-robust standard errors are in parentheses. Covariates are not added to the regressions above.

Table 2. The Impact of Regional Produce Cooperatives (Semi-Parametric Approach)

Outcome variable	*Amount of FFV (million pounds)*						*FFV rate (amount of FFV / total amount of food)*					
Methods	*Simple Weighting CS*		*Adjusted Weighting CS*		*Event Study (Dynamic) Aggregation CS*		*Simple Weighting CS*		*Adjusted Weighting CS*		*Event Study (Dynamic) Aggregation CS*	
Control Units	*Never-treated*	*Not-yet-treated*	*Never-treated*	*Not-yet-treated*	*Never-treated*	*Not-yet-treated*	*Never-treated*	*Not-yet-treated*	*Never-treated*	*Not-yet-treated*	*Never-treated*	*Not-yet-treated*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
RPC	1.1061 (0.3745) ***	1.0405 (0.3590) ***	0.8822 (0.3317) ***	0.8395 (0.3099) ***	1.3540 (0.4759) ***	1.3056 (0.4715) ***	0.0021 (0.0079)	0.0039 (0.0072)	0.0026 (0.0076)	0.0043 (0.0071)	0.0045 (0.0101)	0.0060 (0.0092)

Notes. *** p<0.01, ** p<0.05, * p<0.1. The bootstrapped standard errors are in parentheses (clustering at food bank level and bootstrapping for 10000 times). Covariates are not added to the regressions above.

- For *amount of FFV*, the semi-parametric estimates using "not-yet-treated" units as controls have relatively better unconditional parallel trends in pre-treatment time periods: the number of control group units increased (see **Figure 2–(a), (b)**)
- By using RPCs, the amount of FFV at food banks increased by a range of 0.84 to 1.31 million pounds (using "not-yet-treated" as controls)
- The proportion of FFV to the total amount of food (FFV rate) that food banks received did not increase due to RPCs. This ratio did increase over time across all food banks

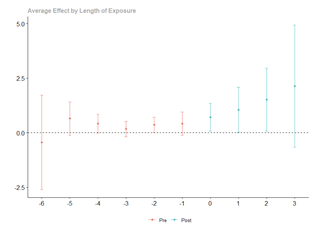

Figure 2–(a) Semi-Parametric Approach on Amount of FFV (using "never-treated" units as controls)

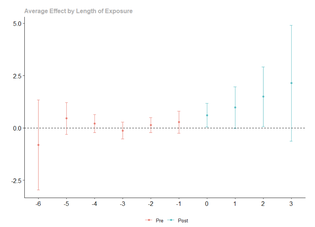

Figure 2–(b) Semi-Parametric Approach on Amount of FFV (using "not-yet-treated" units as controls)

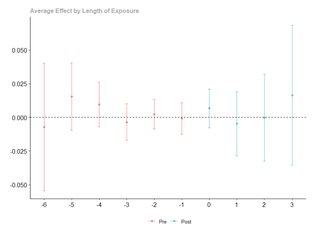

Figure 3–(a) Semi-Parametric Approach on FFV rate (using "never-treated" units as controls)

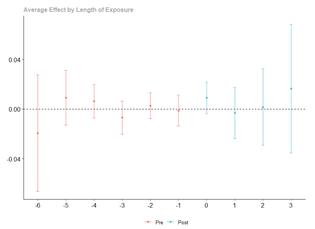

Figure 3–(b) Semi-Parametric Approach on FFV rate (using "not-yet-treated" units as controls)

Conclusion

- This research evaluated how effective implementing RPCs is for increasing food bank access to FFV, showing positive impact on the amount of FFV that food banks receive
- The results aim to contribute to the design and improvement of policies to increase the food banks' access to FFV and other types of healthy foods

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