Food Assistance Program Design: Cushioning Price and Availability Shocks for Participants

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ABSTRACT

There are two main types of US food assistance programs: fixed value (e.g. SNAP, WIC CVB) and fixed quantity (e.g. WIC, NSBP, NSLP). Theory predicts that participants in fixed value programs are more insulated from shocks to food availability, while fixed quantity programs insulate participants from food price shocks. We examine these changes in the context of COVID-19

QUESTIONS

1. How does the design of food assistance programs affect participants' benefit adequacy in the face of price and availability changes?
2. In the face of price and availability changes during COVID-19, how did the adequacy of fixed value and fixed quantity programs change?

HOW DOES BENEFIT ADEQUACY CHANGE WITH SHOCKS AND PROGRAM DESIGN?

Figure 1: Price shock

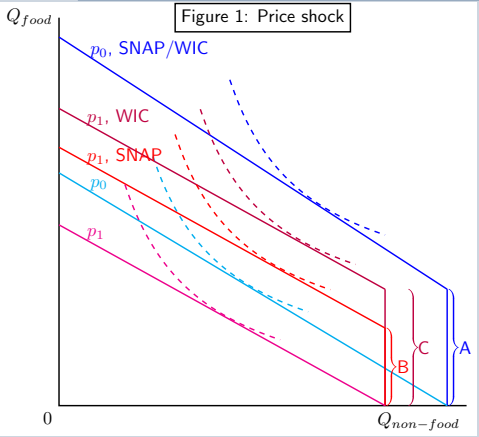
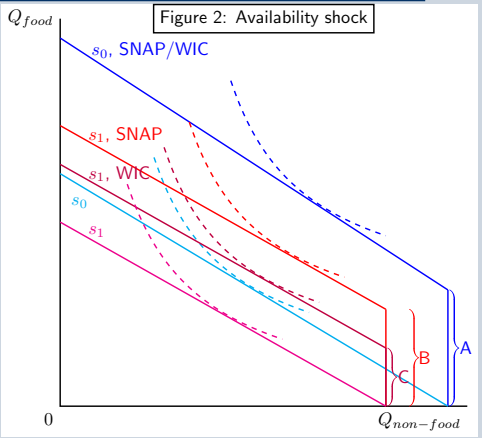


Figure 2: Availability shock



PRICE SHOCK:

A common shock faced by food assistance participants is an increase in food prices (and the price of non-food goods). The diagram above demonstrates how the effective budget constraint faced by consumers changes with price changes by the individuals program participation status. The cyan and magenta solid lines represent the budget constraint of a consumer that receives no food assistance at the initial price level p_0 and the higher price level p_1, respectively. The cyan and magenta dashed lines represent the indifference curves consumers can obtain at p_0 and p_1 without food assistance.

FIXED VALUE PROGRAM (E.G. SNAP):

At initial prices p_0, I assume for simplicity that prices are such that SNAP and WIC benefits provide participants with an equivalent amount of food *A* so that consumers receiving these benefits face the effective budget constraint in dark blue, reaching the dashed blue indifference curve. After an increase in food prices of *X*%, SNAP benefits provide *A/(1+X) = B* food for participants (since this price increase is entirely passed along to participants).

FIXED QUANTITY PROGRAM (E.G. WIC):

The increase in food prices does not change the quantity of food that WIC participants obtain with their benefits, so that benefits after the price change *C* are the same as before (*A*).

AVAILABILITY SHOCK:

Consumers may also face a decrease in the availability of food on shelves. While this shock does not directly affect prices, prices for available substitutes may be higher and consumers may need to spend more of their budget on transportation to find available goods, causing an effective increase in price. The diagram above demonstrates the change in effective budget when facing availability constraints by program participation status.

FIXED VALUE PROGRAM (E.G. SNAP):

At initial supply levels s_0 I assume that prices and supply are such that SNAP and WIC benefits provide an equivalent amount of food to participants. After supply decreases to s_1, SNAP participants' effective benefits decrease (the difference between *B* and *A*), since these benefits are subject to effective price increases from higher priced substitutes. SNAP benefits are protected from transportation cost changes and allow participants to freely substitute.

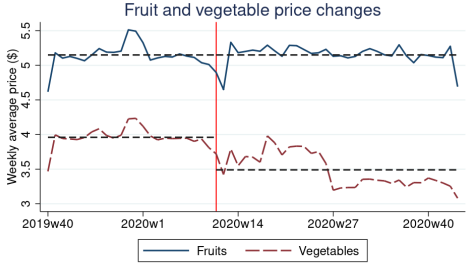
FIXED QUANTITY PROGRAM (E.G. WIC):

The decrease in availability will reduce the effective amount of WIC benefits available to participants, although it's not clear by how much. WIC benefits will be insulated from the effect of changes in prices for available substitutes. Depending on how many remaining products are WIC eligible, the effective remaining WIC benefit could range from *A* to 0. *C* demonstrates an intermediate case.

HOW DID BENEFIT ADEQUACY CHANGE DURING COVID-19?

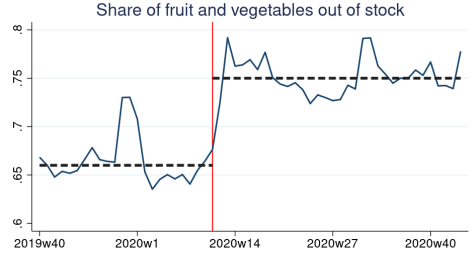
To examine the magnitude of these effects during COVID-19, we use scraped grocery store online shopping price data from PriceStats from October 2019 to the end of September 2020. PriceStats scrapes data from 7 major retailers daily. The scraping algorithm inputs a Boston area ZIP code for retailers that have a presence in Boston and the ZIP code of the retailer's headquarters for retailers that do not sell in the Boston area. Each observation includes the date, the name of the retailer, the price of the good before any promotional discounts or sales, the price after sales and discounts, as well as text information about the item. Text information includes a description of the item, the item's size (e.g. counts, ounces, gallons), the URL the information was obtained from, and the department in which the item is listed. PriceStats predicts the broad shopping category of the item using the scraped information, classifying it into e.g. fruits, vegetables, dairy, meat and then assigning a confidence level to the predicted category. Our data includes all items predicted to be either fruits or vegetables. For the analysis below, we exclude any item with a predicted confidence less than 95%.

Fruit and vegetable price changes



Average price by product ID by week.
Red line shows week of March 11-20, 2020.
Average price of items classified as fruit before the week of March 11, 2020 is 5.15.
Average price of items classified as fruit after the week of March 11, 2020 is 5.15.
Average price of items classified as vegetables before the week of March 11, 2020 is 3.96.
Average price of items classified as vegetables after the week of March 11, 2020 is 3.49.

Share of fruit and vegetables out of stock



Out of stock computed as missing price for product ID on a day.
Red line shows week of March 11-20, 2020.
Average share of products out of stock before the week of March 11, 2020 is .66.
Average share of products out of stock after the week of March 11, 2020 is .75.

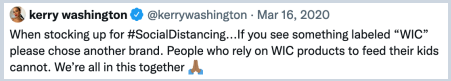
The figure above shows how prices for items classified as fruits and vegetables in the Price Stats data change in the periods before and after major lockdowns and hoarding behaviors started in the US in mid-March 2020. The price data suggest that fixed value food assistance benefits likely retained their purchasing power during COVID-19.

On average, items classified as fruits by PriceStats did not change price over our sample. This is plausibly consistent with data from USDA ERS' Food Price Outlook that showed that fresh fruit prices fell by 0.8% in 2020 while processed fruits and vegetables increased 3.5%.

Items classified as vegetables by PriceStats decreased in price over our sample by 11.8%. This does not seem plausible as a reflection of overall vegetable price data given data from ERS and BLS that both demonstrate increases in vegetable prices – fresh or processed - during 2020. Potential data concerns in our sample include changing composition and misclassification into the vegetable category. As the figure above right on out of stock shows, more items in the Price Stats data are not observed each week on average after March 2020. If more expensive items are not being observed in the data, we could observe falling prices that do not reflect the price of a basket. Alternately, lower-cost items being misclassified into the vegetable category more frequently during the sample could distort the price signal. We will work to understand the data and construct a better measure of prices.

The figure above shows the share of items classified as fruits or vegetables by PriceStats for which no price exists in the week. We consider these items to be out of stock, as a consumer on the website in the area could not purchase the item. Some of these missing prices may be attributable to a failure of the scraping mechanism. We assume that the scraping mechanism is equally likely to fail on any day.

The data show a substantial increase in the share of items out of stock. This suggests that fixed quantity food assistance benefits such as WIC food instruments may have become less protective for participants on the program during COVID-19. The degree to which these benefits became less adequate for participants depends on how many stocked out items are WIC eligible and how many other WIC authorized substitutes are available at the time of the stockout. We will work to estimate these effects.



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