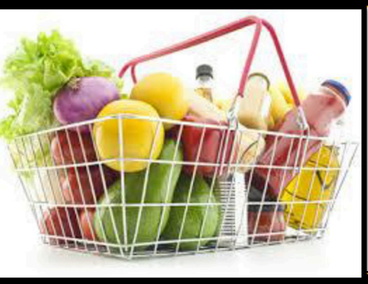


Does Shopping behavior impact Food Waste?

(Online Vs Offline grocery shopping)

Alwin Dsouza, Lauren Chenarides, Timothy Richards

Morrison School of Agribusiness, W.P. Carey School of Business, Arizona State University

Motivation

- In US, households waste around 617-661 lbs in a year (contributes 60% of total food waste) [1]
  - ✓ Households waste 150,000 tons food daily.
  - ✓ Equivalent to one-third of daily calorie consumed by average American.
- The cost of food wasted[2] per year corresponds to
  - ✓ yearly use of 30 million acre of land.
  - ✓ 4.2 trillion gallons of water
  - ✓ billions of pounds of fertilizers
- Households wasted 41% of meat, poultry and fish, 14% of dairy products, 17% of vegetables and 9% of fruits.
- Households waste almost 25% of the products purchased.
  - ✓ Inability to match the purchases with consumption habits.
  - ✓ Inability to stick to a shopping list.
  - ✓ Impulse buying
- The extent of these above behavior depends upon household's shopping mode: Offline or Online[3]

Background

- Why households waste food?
  - ✓ Confusion over date labels, Poor storage facilities, Impulse and bulk buying , Poor planning
- We focus on grocery shopping behavior across online and offline channels.

Offline shopping

- **Poor in pre-shop planning**– higher food waste
- **Less knowledge about existing inventory**[4] – less likely to use shopping lists – higher food waste
- **No restriction on basket size** – low food waste.
- **Higher psychological ownership** – lower food waste

Online shopping

- **Lower psychological ownership**[5] – few efforts spent – higher food waste
- **Purchase perishables in bulk** – convenience – higher food waste
- **Aware of past frequently purchases** – plan purchases - low food waste
- **Less influenced by price promotions** – low food waste
- **Minimum basket restrictions** – higher food waste
- **Subscription or delivery model** – high/low food waste

- Recent trends on online grocery sales:
  - ✓ constitute 20% of market by 2025
  - ✓ 43% of millennials shop grocery online in 2017
  - ✓ 2017, Amazon acquired Whole Foods
  - ✓ Increasing number of companies: Amazon Fresh, Fresh Direct, Net Grower, Walmart, Kroger, Safeway.

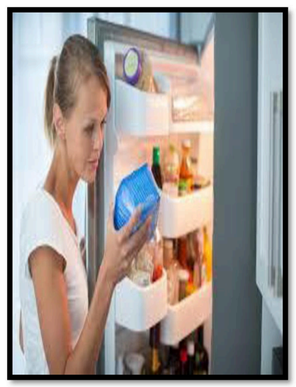
Research Objectives & Data

- Empirically calculates the magnitude of food waste across online, offline and mixed shoppers
- Intend to analyze the economic impact of food waste resulting from online, offline and mixed channels.

- **Data:**
  - ✓ Scanner data from June 2004 to 2006
  - ✓ Consider category of mainstream milk
  - ✓ Includes online and offline purchases
  - ✓ Delivery fee: $0, $4.45, $7.95, $9.95.
  - ✓ Minimum basket restrictions included
  - ✓ 929 households: 144 (online shoppers), 270 (offline shoppers), 515 (mixed – online and offline shoppers)
  - ✓ Demographic variables of households from census tracts using store location as addresses

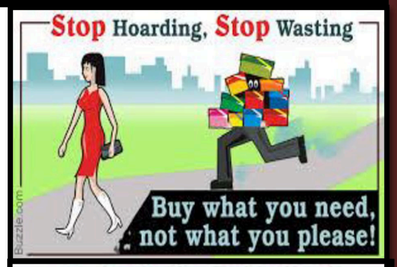
Methodology

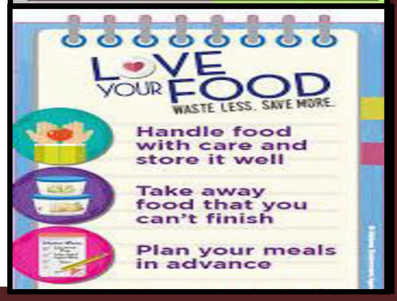
- The empirical model focuses on purchase behavior of households.
- The purchase behavior include two decisions[6] (1) When to buy? (2) How much to buy?
- The first stage captures the timing of purchase and second stage captures the purchase quantity.
- The variable of interest is the average consumption rate for a sample period for online, offline and mixed shoppers
- The avg. consumption rate is controlled for demographic attributes of households using census tracts data.
- The difference between the average consumption rate for each shopper group and observed weekly purchases approximates to the magnitude of food waste.
- This model is expected to capture the inventory behavior of households using different shopping channels.



Expected Results

- Online shoppers - follow pre-planned schedule but buy in bulk due to basket restrictions.
  - ✓ A subscription model where there is delivery fee and basket restrictions: food waste may be lower
  - ✓ A delivery model, to avoid delivery fee, shopper may buy more than required – higher food waste
- Offline shoppers - have higher food waste because of poor planning and high travel cost.
- Mixed shoppers – lowest food waste as they chose when to buy and how much to buy depending on their need and channel to use.





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