# An Econometric Analysis of the SNAP Online Purchasing Pilot: A Literature Review and Proposal for Novel Research

## I. The Digital Transformation of Food Assistance: An Overview of the SNAP Online Purchasing Pilot

The Supplemental Nutrition Assistance Program (SNAP) stands as the cornerstone of the United States' food security safety net, serving an average of 41.7 million participants per month in Fiscal Year (FY) 2024 with federal spending totaling nearly $100 billion.1 For decades, the program's delivery mechanism remained largely unchanged, relying on in-person transactions at authorized brick-and-mortar retail stores. However, the confluence of legislative foresight and an unprecedented public health crisis catalyzed a rapid and fundamental transformation in how these benefits are redeemed. The SNAP Online Purchasing Pilot (OPP) represents the most significant modernization of the program's operational framework since the transition from paper coupons to Electronic Benefit Transfer (EBT) cards. Understanding the origins, evolution, and large-scale implementation of this pilot is essential for evaluating its multifaceted impacts on beneficiaries, food retailers, and the broader policy landscape.

### 1.1. Legislative Origins and Initial Pilot Design

The genesis of the SNAP OPP can be traced to the Agricultural Act of 2014, more commonly known as the 2014 Farm Bill. This legislation authorized the U.S. Department of Agriculture (USDA) and its Food and Nutrition Service (FNS) to conduct and evaluate a pilot program to test the feasibility and security of allowing SNAP households to purchase groceries online.2 The primary objectives were to determine if online transactions could be processed in a manner that was safe, secure, and protected against fraud, while also exploring the potential for the program to expand food access for participants.5 This initial mandate reflected a cautious, deliberative approach to technological modernization within a major public benefits program.

Following this legislative directive, the FNS designed a small-scale, two-year test. In January 2017, the FNS announced the selection of eight retailers to participate in the initial launch: Amazon, Dash's Market, Fresh Direct, Hy-Vee, Inc., Safeway, ShopRite, Walmart Stores Inc., and Wright's Markets, Inc..6 These retailers were chosen to represent a mix of national e-commerce giants, large supermarket chains, and smaller regional grocers. The pilot was slated to operate across eight corresponding states: Alabama, Iowa, Maryland, Nebraska, New Jersey, New York, Oregon, and Washington.6 The pilot officially launched in April 2019, beginning with a limited implementation in New York State.5 This design underscored the pilot's original intent as a controlled experiment to gather data and identify operational challenges before any consideration of a broader rollout.

The policy commitment to online SNAP was solidified in the subsequent 2018 Farm Bill. Section 4001 of this act mandated the eventual nationwide implementation of online SNAP acceptance, contingent upon the successful completion of the pilot phase.3 This provision was a clear signal from Congress that online purchasing was not merely a temporary experiment but was envisioned as a permanent, integral feature of the modern SNAP program. This long-term policy vision established the importance of understanding not just the technical feasibility of the OPP, but also its potential long-run economic and social consequences, thereby laying the groundwork for future research into its impacts.8

### 1.2. The COVID-19 Pandemic as an Exogenous Shock and Catalyst for Expansion

The carefully planned, incremental rollout of the SNAP OPP was abruptly and dramatically altered by the onset of the COVID-19 pandemic in early 2020. The declaration of a public health emergency, coupled with state and local stay-at-home orders and public health guidance urging social distancing, created an immediate and acute need for remote access to essential goods, particularly groceries.9 For SNAP participants—a population that includes a high proportion of elderly individuals, people with disabilities, and households with children—in-person grocery shopping became a significant health risk.9 This external shock fundamentally changed the policy calculus, transforming the OPP from a forward-looking technological test into an urgent public health imperative.

In response to this crisis, the USDA FNS took decisive action to accelerate the pilot's expansion on an unprecedented scale. The slow, state-by-state implementation schedule was abandoned in favor of a rapid, nationwide deployment. The program's footprint grew exponentially in a matter of months. Having launched in Washington, Alabama, Oregon, and Iowa in early 2020, the pilot expanded from just a handful of states in March 2020 to 39 states (including Washington, D.C.) by June 2020.4 By the end of 2020, the pilot was operational in 47 states, and by March 2022, it was available in all states except Alaska.3

This rapid expansion, driven by the pandemic, provides a powerful opportunity for causal inference research. The initial, pre-pandemic pilot was small and selective, and a slower expansion might have been endogenous, meaning that states with certain characteristics (e.g., greater technical capacity, stronger political will, or different demographic profiles) might have chosen to adopt the program earlier than others. Such self-selection would make it difficult to disentangle the effect of the policy from the pre-existing differences between adopting and non-adopting states. The pandemic, however, functioned as a powerful exogenous shock, creating a universal and urgent public health motivation for all states to implement the program as quickly as possible. This urgency likely minimized the role of state-level unobservable characteristics in determining the precise timing of adoption. Consequently, the staggered rollout of the OPP across states between mid-2020 and early 2022 can be plausibly treated as "as-good-as-random," a key identifying assumption that strengthens the validity of quasi-experimental methods like difference-in-differences (DiD) to estimate the policy's causal effects.13

### 1.3. Aggregate Trends in Adoption and Redemption

The rapid geographic expansion of the OPP was met with a corresponding explosion in utilization by SNAP households. The value of benefits redeemed online grew at an exponential rate throughout 2020. In February 2020, the earliest month for which comprehensive data are available, less than $3 million in SNAP benefits were redeemed online, accounting for a negligible share (less than 0.1%) of all program redemptions.4 By June 2020, as the pandemic's first wave crested and the OPP expanded, online redemptions surged to $154 million, or 1.6% of the total. This growth continued unabated through the end of the year, reaching $246 million (3.0% of total redemptions) in December 2020—an 86-fold increase in value from February.4

This trend continued to accelerate in subsequent years. In 2021, the total value of online redemptions more than quadrupled to $6.2 billion, representing 4.5% of all benefits redeemed that year.3 By the first quarter of 2022, the online share had climbed further to 5.7%, and by September 2023, monthly online redemptions had reached $737.4 million, or 8.8% of total redemptions for that month.3 This growth was not limited to the value of transactions but also reflected a broadening of the user base. The share of all SNAP households that had made at least one online purchase grew from less than 1% prior to the pandemic to 22% by FY 2023.8

It is important to note that this growth in online redemption was fueled not only by traditional SNAP benefits but also by temporary pandemic-era assistance programs. The Pandemic Electronic Benefit Transfer (P-EBT) program, which provided food benefits to families of children who would have received free or reduced-price school meals, was also redeemable online in the same manner as SNAP.4 The issuance of these additional benefits, alongside temporary Emergency Allotments (EAs) that boosted monthly SNAP payments for many households, increased the total pool of funds available for online spending and likely contributed to the rapid growth in redemption volumes.14 The integration of these various benefit streams into a single online purchasing ecosystem highlights the OPP's central role in the federal government's food security response during the pandemic.

## II. A Review of the Evidence: Impacts on Beneficiaries, Equity, and Access

The primary goal of the SNAP program is to alleviate food insecurity and improve access to a healthy diet for low-income Americans.16 The expansion of the OPP was intended to further these goals by overcoming physical and logistical barriers to food access.9 A growing body of research has begun to evaluate the extent to which the program has succeeded, revealing a complex landscape of benefits, challenges, and unintended consequences for SNAP participants.

### 2.1. Food Security and Nutritional Outcomes

The most direct and critical question regarding the OPP's efficacy is its impact on food security. The available evidence on this front is promising. A key study conducted by researchers at the USDA's Economic Research Service (ERS) leveraged the staggered state-level rollout of the OPP between April and July 2020 to estimate its causal impact on food insufficiency—a severe form of food insecurity where a household reports not having had enough to eat.10 Using data from the U.S. Census Bureau's Household Pulse Survey, the study found that the introduction of online SNAP access reduced the prevalence of food insufficiency among low-income households by 2 percentage points, an 8% reduction relative to the average rate. The study also found that this beneficial effect was even larger in states with higher COVID-19 death rates, suggesting that the program was most effective where the perceived risks of in-person shopping were greatest.10 This provides strong evidence that the OPP achieved its immediate policy goal of mitigating food hardship during a public health crisis.

While the program appears to be a success in terms of food security, its effects on nutritional quality are far more ambiguous. The transition to an online shopping environment fundamentally alters consumer behavior, with mixed results for diet quality. On the one hand, some research suggests that online grocery shopping may have nutritional benefits. By allowing for more deliberate meal planning and reducing exposure to in-store marketing cues, the online environment can help consumers avoid impulsive purchases of unhealthy items like sweets, cookies, and sugar-sweetened beverages.11 One study found that SNAP-eligible shoppers were 49% less likely to purchase sweets online, with participants explicitly stating that it helped them avoid pressure from their children to buy such items.17

However, this potential benefit is counteracted by a significant and widely documented barrier: a profound lack of trust in the quality of fresh foods selected by third-party shoppers. Multiple studies have found that SNAP participants are hesitant to purchase perishable items like fresh fruits, vegetables, meat, and seafood online because they cannot personally inspect the items for quality and freshness.17 One study found that shoppers were 70% less likely to buy fresh fruits and vegetables online compared to in-store, citing a lack of trust in hired shoppers as the primary reason.17 This introduces a critical trade-off between access and agency. The OPP improves food

*access* for individuals who face barriers to visiting a physical store, but it simultaneously diminishes their *agency* by removing their ability to directly select the highest-quality perishable goods for their families. For households on a tight budget, the risk of receiving poor-quality produce that cannot be easily returned or replaced is a significant deterrent. This may lead to a bifurcated shopping pattern, where households use online ordering for non-perishable staples while still making separate, in-person trips for fresh foods, a complexity that could have nuanced effects on overall diet quality that are not yet fully understood.

Furthermore, the digital retail environment itself is not neutral. Online grocers employ sophisticated data-driven marketing techniques, including personalized promotions, granular data profiling, and AI-powered recommendations, to influence consumer behavior.20 These tools can be used to trigger impulsive purchases and pervasively promote unhealthy, high-margin foods, potentially undermining any nutritional gains from reduced in-store impulse buys. The largely unregulated nature of this digital marketing ecosystem poses a potential risk to the nutritional well-being of SNAP participants, who may be disproportionately targeted by such practices.21

### 2.2. The Consumer Experience: Adoption, Barriers, and Perceived Value

The decision by a SNAP household to use online grocery purchasing is a complex calculation involving financial, logistical, and psychological factors. Despite the program's near-universal availability, a large majority of participants—88.5% in a FY 2022 study—still made no online redemptions, indicating that significant barriers to adoption remain.14

The primary motivators for using the service are clear and align with the program's goals. Convenience and time savings are the most frequently cited benefits, particularly for older adults, individuals with disabilities or mobility issues, and households with young children or those lacking reliable transportation.9 Another powerful, though less tangible, motivator is the avoidance of social stigma. Several studies have documented that SNAP participants value the privacy of online shopping, as it allows them to avoid the potential for negative judgment from cashiers or other shoppers when using their EBT card at a physical checkout.8

These benefits are weighed against a formidable set of barriers. The most significant are financial. While SNAP benefits cover the cost of eligible food items, they cannot be used for any associated fees, such as delivery charges, service fees, or shopper tips.3 For a household on a severely constrained budget, these out-of-pocket costs can be prohibitive. Minimum order requirements imposed by some retailers can also be a hurdle for households that prefer to make smaller, more frequent purchases.12 Beyond direct costs, structural barriers such as a lack of consistent, high-speed internet access or limited digital literacy can prevent households from using the service.24 Finally, as discussed previously, psychological barriers—namely, the lack of control over food selection and distrust in the quality of perishable items—remain a major deterrent for many potential users.18

This complex interplay of factors means that the "total cost" of online grocery shopping for a SNAP participant extends far beyond the sticker price of the food. A non-SNAP consumer might simply weigh a $10 delivery fee against the value of an hour of their time saved. A SNAP consumer, however, must weigh that same $10 fee—a direct reduction from their non-food budget for essentials like rent or utilities—against a more complex set of benefits that includes not only time savings but also the non-monetary value of avoiding potential public stigma. This multifaceted decision-making process helps to explain both the relatively low overall adoption rate and the persistent use of the service by a dedicated segment of the SNAP population for whom the unique benefits outweigh the substantial costs.

### 2.3. The Geography of Access: Urban-Rural Divides and Food Deserts

While the SNAP OPP was touted as a potential solution to the problem of "food deserts"—areas with limited access to full-service grocery stores—its implementation has revealed significant geographic inequities, particularly along the urban-rural divide.25 The program's effectiveness is entirely dependent on the willingness and ability of private retailers to offer online ordering and delivery services in a given area. The logistical and economic realities of grocery delivery mean that these services are far more prevalent and profitable in densely populated urban and suburban areas than in sparsely populated rural regions.

This has led to a stark disparity in access. An analysis based on 2018-2019 data, before the pandemic-era expansion, found a striking gap: online purchasing and delivery services were available in 94% of census tracts classified as urban food deserts, but in only 31% of those classified as rural food deserts.9 Research conducted in California during the pandemic confirmed that this disparity persisted and may have been exacerbated by the rapid rollout. The study found that SNAP OPP coverage was significantly lower in rural counties and census tracts compared to their urban counterparts, with regression results indicating that urban areas had 33-40% higher coverage.12

This geographic imbalance is a direct result of the program's market-based design. The initial rollout was dominated by large national retailers like Amazon and Walmart, whose delivery networks are most robust in major metropolitan areas.3 While the number of participating retailers has grown, the technical and financial requirements to become an authorized online SNAP vendor remain substantial, creating barriers for the small, independent grocers that often serve as the primary food source in rural communities.27

This creates a paradoxical outcome: the policy, designed to improve food access, may inadvertently widen the food access gap between urban and rural America. The very communities that stand to benefit most from a technological solution to physical distance—those in rural food deserts—are the least likely to be served by the program. This points to a potential market failure where the private-sector infrastructure upon which the OPP relies does not extend to high-need, low-density areas, highlighting a "last-mile" problem in food assistance delivery that the policy, in its current form, does not adequately address.

## III. The Retail Ecosystem Under Pressure: Market-Level Consequences of Online SNAP

The implementation of the SNAP OPP did not occur in a vacuum. It coincided with, and was accelerated by, a period of profound disruption in the American retail sector, driven by the relentless growth of e-commerce. While much of the initial research on the OPP has rightly focused on its effects on program beneficiaries, a critical and underexplored dimension of the policy is its impact on the structure and competitiveness of the local food retail market.

### 3.1. E-commerce as a Competitive Shock to Brick-and-Mortar Retail

The rise of online shopping has fundamentally altered consumer behavior and posed an existential threat to many traditional brick-and-mortar businesses. This shift has led to well-documented consequences, including reduced foot traffic in physical stores, intense price competition from online vendors with lower overhead costs, and a wave of store closures often termed the "retail apocalypse".29

A landmark working paper from the National Bureau of Economic Research (NBER) provides a rigorous causal framework for understanding these impacts at a local level.31 The authors exploit the staggered rollout of Amazon's fulfillment centers across U.S. counties as a quasi-experimental shock that dramatically increased the availability and speed of e-commerce. Using a difference-in-differences design, they find that the entry of an Amazon fulfillment center had significant negative consequences for nearby traditional retail establishments. On average, sales at proximate brick-and-mortar stores decreased by 4%, and employment fell by 2.1%.

Crucially, the study revealed that these negative effects were not distributed evenly across the market. The competitive pressure from e-commerce disproportionately harmed smaller and younger businesses. The probability of a store exiting the market increased by three percentage points (a 22% increase over the baseline exit rate), with small and young stores being the most likely to close. Furthermore, the entry rate of new small stores also declined significantly, suggesting that the rise of e-commerce not only displaces existing businesses but also deters the formation of new ones.31 This research provides a powerful template for analyzing how a large-scale e-commerce expansion can reshape local market dynamics, with heterogeneous effects based on firm size and age.

### 3.2. The SNAP OPP as a Targeted E-commerce Shock

The SNAP program represents a massive, stable, and geographically dispersed revenue stream for the U.S. grocery industry. With annual benefits exceeding $99 billion, SNAP purchases are a critical component of sales for retailers ranging from national superstores to small corner markets.1 The authorization of online SNAP purchasing did not create new money, but it fundamentally altered the channels through which this substantial sum could flow. It effectively opened a new frontier for competition, allowing technologically capable retailers to capture a share of this guaranteed revenue stream through a digital channel.

The implementation of the OPP created a clear set of winners and losers in this new competitive landscape. The rollout was overwhelmingly dominated by large, national corporations. Amazon and Walmart were among the very first retailers authorized and were approved to operate in nearly every state that joined the pilot.3 They were soon followed by other large national and regional chains with sophisticated e-commerce platforms, such as Instacart (partnering with numerous grocers), ALDI, ShopRite, and Hy-Vee.6

In contrast, smaller, independent grocers—which are vital to the food ecosystem, particularly in rural and underserved urban areas—faced significant obstacles to participation. The USDA FNS has strict technical requirements for online SNAP authorization, including the implementation of a secure system for encrypted PIN entry and the ability to segregate SNAP-eligible and non-eligible items in a virtual shopping cart.28 Developing or licensing this technology represents a substantial financial and technical burden for small businesses that often operate on thin margins.22

This dynamic sets the stage for a critical and thus far unanswered research question. The SNAP OPP can be conceptualized as a government-facilitated competitive shock, targeted at a specific consumer segment, that systematically favors large, technologically advanced retailers over their smaller, independent competitors. While existing research has focused on the demand-side effects (i.e., the impacts on SNAP beneficiaries), the supply-side consequences—the policy's effect on the composition and structure of the local food retail market—remain a crucial blind spot. The NBER fulfillment center study provides a clear precedent that such shocks can lead to increased exit and reduced entry of small businesses. It is highly plausible that the OPP, by redirecting a significant and reliable revenue source towards a few large online players, could have similar anticompetitive effects within the SNAP retail market. Investigating this possibility is a novel and policy-relevant avenue for future research.

## IV. The Researcher's Toolkit: A Critical Assessment of Data and Methods for Causal Inference

Conducting a rigorous causal analysis of the SNAP OPP's market-level impacts requires a sophisticated approach to both data assembly and econometric methodology. The staggered, state-by-state rollout of the policy provides the necessary variation for a quasi-experimental design, but harnessing this variation requires meticulous data construction and the application of modern statistical techniques.

### 4.1. Constructing the Treatment Variable: The Staggered Rollout Timeline

The cornerstone of any causal analysis of the OPP is a precise, granular measure of when the "treatment"—the availability of online SNAP purchasing—was introduced in each geographic unit. This is not a simple task, as the policy was implemented in a complex, multi-layered fashion, staggered first by state and then, within each state, by individual retailer. A researcher must therefore construct a detailed timeline from a wide array of fragmented sources.

The process begins with high-level federal announcements. USDA and FNS press releases and archived web pages provide the official dates when states were approved to join the pilot and when the first retailers went live.3 This provides the initial framework of the rollout. However, these federal sources often lack the specific launch dates for subsequent retailers that joined the program within a state.

To achieve greater precision, this federal data must be supplemented with information from state agencies and the retailers themselves. State human services departments often issued their own press releases announcing the launch of online SNAP with specific partners, such as those from New Jersey and Massachusetts.34 Similarly, retailers like ALDI and Instacart announced their state-by-state expansion through corporate press releases and news articles.33 Finally, a systematic search of news archives is a validated econometric technique for pinpointing the timing of policy implementation, and can be used to fill in any remaining gaps.38 The process of piecing together these disparate sources is a significant data collection effort in its own right, but it is an indispensable prerequisite for the analysis. The following table represents a partial reconstruction of this timeline based on the available materials, illustrating the type of data that must be compiled.

**Table 1: Partial Reconstruction of the Staggered Rollout of SNAP Online Purchasing by State and Major Retailer (2019-2021)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| State | Initial FNS Pilot Launch | Amazon Launch | Walmart Launch | ALDI (via Instacart) Launch |
| **New York** | April 2019 6 | April 2019 5 | May 2020 (Upstate) 5 | Dec 2020 33 |
| **Washington** | Jan 2020 4 | Jan 2020 40 | May 2020 3 | Dec 2020 33 |
| **Alabama** | March 2020 6 | April 2020 40 | April 2020 3 | Dec 2020 33 |
| **Iowa** | March 2020 6 | April 2020 40 | April 2020 3 | Dec 2020 33 |
| **Oregon** | March 2020 6 | April 2020 40 | April 2020 3 | Data Not Available |
| **Nebraska** | April 2020 6 | April 2020 40 | April 2020 3 | Dec 2020 33 |
| **Florida** | April 2020 40 | April 2020 40 | April 2020 3 | Dec 2020 41 |
| **California** | April 2020 40 | April 2020 40 | April 2020 3 | Dec 2020 41 |
| **New Jersey** | May 2020 36 | May 2020 36 | May 2020 36 | Dec 2020 33 |
| **Connecticut** | June 2020 34 | June 2020 34 | June 2020 34 | Dec 2020 33 |
| **Massachusetts** | May 2020 35 | May 2020 35 | May 2020 35 | Dec 2020 33 |
| **Ohio** | June 2020 42 | June 2020 42 | June 2020 42 | Dec 2020 33 |
| **Texas** | May 2020 3 | May 2020 40 | May 2020 3 | Dec 2020 41 |
| **Indiana** | May 2020 37 | May 2020 37 | May 2020 37 | Dec 2020 37 |
| **Montana** | April 2022 43 | April 2022 43 | April 2022 43 | Data Not Available |

*Note: This table is illustrative and represents a starting point. A complete research project would require a comprehensive effort to verify these dates and fill in the missing data for all 50 states and all major participating retailers.*

### 4.2. Primary Public Datasets for Analysis

A credible analysis of the OPP's market-level impacts requires merging the treatment timeline with several publicly available administrative and survey datasets. Fortunately, the U.S. federal statistical system provides a wealth of high-quality data suitable for this purpose.

The primary source for outcome variables is the **USDA FNS SNAP Retailer Locator Historical Data**.44 This remarkable dataset contains a historical record of every retail location that has been authorized to accept SNAP benefits at any point since 2004. Crucially, it includes the store's name, full address (which can be geocoded to the county level), a store type classification (e.g., supermarket, convenience store), and the start and end dates of its SNAP authorization.44 This dataset makes it possible to construct a monthly panel at the county level, tracking the number of active stores, the entry of new stores (new authorization dates), and the exit of existing stores (end of authorization dates) over a long period. The store type classification can be further refined and standardized using the North American Industry Classification System (NAICS) codes, where code 445110 designates supermarkets and other grocery stores, and 445120 designates convenience stores.46

To control for confounding factors that could also affect retail market dynamics, this outcome data must be merged with several other county-level datasets. The **Bureau of Labor Statistics (BLS) Local Area Unemployment Statistics (LAUS)** program provides monthly, county-level data on the labor force and unemployment rate, which serve as a high-frequency measure of local economic conditions.49 For demographic and socioeconomic controls, the

**U.S. Census Bureau's American Community Survey (ACS)** provides annual estimates of county-level characteristics such as poverty rates, median income, internet access, and vehicle ownership.52 While the ACS is annual, the

**Small Area Income and Poverty Estimates (SAIPE)** program provides more timely model-based estimates of poverty and income that are released with less of a lag.55 To control for the scale of the SNAP program itself, the

**USDA ERS SNAP Data System** provides county-level data on the number of participants and total benefits issued, though these are typically available on an annual or fiscal year basis.57 Finally, to characterize the pre-existing food environment, the

**USDA ERS Food Access Research Atlas** provides census-tract-level data on measures like distance to the nearest supermarket, which can be aggregated to the county level.26

**Table 2: Key Public Datasets for SNAP Online Purchasing Research**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Dataset Name | Source Agency | Geographic Level | Temporal Frequency | Key Variables | Access Link |
| **SNAP Retailer Locator Data** | USDA Food and Nutrition Service (FNS) | Store-level (address) | Updated periodically | Store Name, Address, Store Type, Authorization Start/End Dates | [Link](https://www.fns.usda.gov/snap/retailer-locator/data) 44 |
| **Local Area Unemployment Statistics (LAUS)** | Bureau of Labor Statistics (BLS) | County | Monthly | Labor Force, Employment, Unemployment Rate | [Link](https://www.bls.gov/lau/) 60 |
| **American Community Survey (ACS)** | U.S. Census Bureau | County, Census Tract | 1-year & 5-year Annual Estimates | Poverty Rate, Median Income, Internet Access, Vehicle Ownership | [Link](https://data.census.gov/) 54 |
| **Small Area Income and Poverty Estimates (SAIPE)** | U.S. Census Bureau | County, School District | Annual | Poverty Estimates, Median Household Income | [Link](https://www.census.gov/programs-surveys/saipe.html) 56 |
| **SNAP Data System** | USDA Economic Research Service (ERS) | County, State | Annual / Fiscal Year | SNAP Participant Counts, Total Annual Benefits | [Link](https://www.ers.usda.gov/data-products/supplemental-nutrition-assistance-program-snap-data-system/) 57 |
| **Food Access Research Atlas** | USDA Economic Research Service (ERS) | Census Tract | Periodic Updates | Low-Income/Low-Access Tracts, Distance to Supermarket | [Link](https://www.ers.usda.gov/data-products/food-access-research-atlas/) 58 |

### 4.3. Methodological Considerations for a Staggered Rollout

The staggered timing of the OPP's implementation makes a difference-in-differences (DiD) research design the most appropriate method for causal inference. However, the specific nature of this rollout—with different groups of counties being treated at many different points in time—requires the use of modern DiD estimators that have been developed in the last several years to address significant biases present in traditional approaches.

For many years, the standard approach for analyzing such staggered designs was a two-way fixed effects (TWFE) regression, which includes fixed effects for both the unit of observation (e.g., county) and the time period (e.g., month-year). However, a recent wave of econometric research has demonstrated that when treatment effects are heterogeneous—meaning the effect of the policy differs for early-adopting versus late-adopting groups—the TWFE estimator can be severely biased.61 The estimator becomes a weighted average of all possible 2x2 DiD comparisons in the data, but some of these comparisons are invalid and can receive negative weights. Specifically, the TWFE model can end up using early-treated units as controls for later-treated units, a comparison that does not have a causal interpretation and can lead to estimates that are misleading in magnitude and even incorrect in sign.61 Given the high likelihood that the impact of the OPP varied across states that adopted it at different stages of the pandemic and with different retail landscapes, relying on a traditional TWFE model for this analysis would be a critical methodological error.

Fortunately, this literature has also produced a new generation of robust estimators designed specifically for this setting. These "modern DiD" methods explicitly avoid the problematic comparisons that bias the TWFE model. Two of the most prominent and widely used approaches are:

1. **Callaway and Sant'Anna (2021)**: This method, implemented in the did package in R and the csdid command in Stata, takes a "bottom-up" approach.64 It first estimates the average treatment effect on the treated (ATT) for each specific treatment cohort (e.g., counties that got the OPP in May 2020) at each specific time period. Crucially, it does so by using a clean control group, composed of either units that are never treated or units that have not yet been treated as of that time period. These granular group-time average treatment effects (ATT(g,t)) can then be aggregated in various ways to produce overall ATT estimates or, most usefully, to generate dynamic event study plots that trace out the policy's effect over time relative to its implementation.67
2. **Sun and Abraham (2021)**: This approach, implemented in the eventstudyinteract command in Stata and the sunab() function within the fixest package in R, directly addresses the bias in event study specifications.68 It estimates a fully interacted model, allowing the effect of being  
   *k* periods from treatment to differ for each treatment cohort. It then computes an "interaction-weighted" estimator by averaging these cohort-specific dynamic effects, using the share of each cohort in the sample at that specific event time as the weight.68 This procedure purges the estimates of the contamination from already-treated units being used as controls and recovers an unbiased estimate of the average dynamic treatment effect.

The choice between these methods is often a matter of preference and specific research question, as they are designed to solve the same underlying problem. For a dissertation-level project, applying one of these modern estimators is not merely a best practice; it is essential for the credibility and validity of the causal claims.

## V. Recommended Research Project: The Impact of Online SNAP Expansion on Local Retail Market Structure

Based on the comprehensive review of the existing literature, available data, and appropriate methodologies, the most novel, feasible, and impactful research project for a semester-long paper or dissertation chapter would be a causal analysis of the supply-side effects of the SNAP OPP. This project directly addresses a critical gap in the literature and leverages the unique features of the policy's rollout and publicly available data to provide policy-relevant insights.

### 5.1. Research Question and Contribution

The proposed project is guided by a central research question and a set of secondary questions designed to explore heterogeneous effects:

* **Primary Research Question**: How did the staggered introduction of the SNAP Online Purchasing Pilot affect the survival (exit), entry, and composition of the brick-and-mortar SNAP retailer market at the county level?
* **Secondary Research Questions**:
  1. Did these effects differ by store type? Specifically, was there a differential impact on large supermarkets and superstores (NAICS 445110) versus smaller grocery stores and convenience stores (NAICS 445120)?
  2. Were the impacts heterogeneous across different types of counties? For example, were effects more pronounced in urban versus rural counties, or in counties with higher baseline rates of poverty, food insecurity, or pre-existing market concentration?

This research would make several significant contributions. First, it would be among the first studies to provide rigorous, causal estimates of the supply-side consequences of this major federal policy innovation. While most research has focused on the demand side (beneficiaries), this project examines the policy's impact on the market itself. Second, it would contribute to the broader economic literature on the disruptive effects of e-commerce on traditional retail, using a novel government-facilitated policy as a natural experiment. Finally, the findings would have direct policy relevance, informing discussions about competition in the grocery industry and the potential for federal programs to inadvertently favor large corporations over small, independent businesses, which are often crucial for food access in underserved communities.

### 5.2. Proposed Analytical Framework

The analysis will be conducted using a panel dataset constructed at the county-by-month level, covering the period from approximately January 2018 to December 2024 to allow for sufficient pre- and post-treatment periods.

* **Unit of Analysis**: County-month.
* **Outcome Variables (Yct​)**: These will be constructed from the SNAP Retailer Locator historical data.44
  + ln(Total\_Stores\_ct): The natural logarithm of the total number of active SNAP-authorized retailers in county *c* at time *t*.
  + Exit\_Rate\_ct: The number of stores that exited (had their authorization end) in county *c* at time *t*, as a share of total active stores in the previous period.
  + Entry\_Rate\_ct: The number of new stores that entered (received a new authorization) in county *c* at time *t*.
  + These variables will be constructed for all stores and, for the secondary analysis, disaggregated by store type (e.g., ln(Small\_Stores\_ct)).
* **Treatment Variable (OPPct​)**: A binary indicator variable constructed from the timeline developed in Section 4.1. It will be defined as:
  + OPPct​=1 if online SNAP purchasing was available from at least one major national retailer (e.g., Amazon, Walmart, or Instacart) to residents of county *c* in month *t*.
  + OPPct​=0 otherwise.  
    The "treatment date" for each county will be the first month this condition is met.
* **Econometric Model**: The primary specification will be a difference-in-differences model estimated using the Callaway and Sant'Anna (2021) estimator.64 The conceptual model identifies the Average Treatment Effect on the Treated for cohort  
  g (counties first treated in period g) at time t:  
    
  ATT(g,t)=E  
    
  where Yt​(g) is the potential outcome for a unit in cohort g at time t if it is treated, and Yt​(0) is the potential outcome if it is not treated. This is estimated by comparing the change in outcomes over time for the treated cohort to the change in outcomes for a clean control group (not-yet-treated units). The model will be specified as follows:
  + **Dependent Variable**: One of the outcome variables defined above (e.g., Exit\_Rate\_ct).
  + **Treatment Specification**: The model will be defined by the county identifier, the month-year time variable, and the cohort variable (the date of first treatment for each county).
  + **Controls**: The estimation will incorporate county fixed effects (implicitly) and control for time-varying county characteristics (Xct​), including the monthly unemployment rate and annual demographic data from the ACS/SAIPE. The csdid and did packages can accommodate time-varying controls.
* **Primary Output**: The main result will be an event study plot. This plot will display the estimated dynamic treatment effects (and their 95% confidence intervals) for each period relative to the policy's implementation (e.g., t-3, t-2, t-1, t=0, t+1, t+2,...). A key diagnostic will be to examine the "pre-trends." The estimated effects for the periods *before* the policy's implementation should be statistically indistinguishable from zero. A flat, zero pre-trend would provide strong evidence supporting the parallel trends assumption, which is the core identifying assumption of the DiD model. A significant post-treatment effect would be interpreted as the causal impact of the OPP on the retail market outcome.

### 5.3. Data Integration Plan

The research project can be executed through a clear, sequential data management and analysis plan:

1. **Construct Rollout Timeline**: Perform the meticulous work of compiling the state- and retailer-specific launch dates from all available sources (USDA, state, and retailer press releases; news archives) to create the master timeline described in Section 4.1.6
2. **Process Retailer Data**: Download the historical SNAP Retailer Locator dataset.44 Clean and process the data, geocoding each store to its FIPS county code. Create a store-level panel and collapse it to a county-by-month panel, generating the outcome variables (store counts, entry, exit) for each month in the study period. Classify stores by type using the provided information and supplement with NAICS codes where possible.46
3. **Create Treatment Variable**: Merge the master rollout timeline with the county-month panel. For each county and month, create the binary treatment indicator, OPPct​.
4. **Merge Control Variables**: Download and clean the county-level control data from LAUS (monthly unemployment), ACS/SAIPE (annual poverty, income, demographics), and the Food Access Research Atlas (baseline food environment).49 Merge these datasets with the main county-month panel, ensuring correct temporal alignment (e.g., applying annual ACS data to all 12 months of that year).
5. **Final Analysis and Interpretation**: Using the final, merged panel dataset, estimate the Callaway and Sant'Anna DiD model in R or Stata. Generate event study plots for the primary and secondary outcome variables. Analyze the results, paying close attention to the pre-trends for validation and interpreting the magnitude and statistical significance of the post-treatment effects. Conduct heterogeneity analysis by running the model on subsamples (e.g., urban vs. rural counties) to answer the secondary research questions.

### 5.4. Key Foundational Papers for This Project

To ground this research in the relevant academic literature, a thorough reading of the following foundational papers is recommended:

1. **On the Impact of E-commerce on Retail**:
   * Dolfen, P., Einav, L., Klenow, P. J., Klopack, B., & Levin, J. D. (2023). The Effect of E-Commerce on the Retail Sector and its Employees. *Management Science*. (Referenced in 31). This paper is essential for understanding the theoretical mechanisms through which e-commerce affects brick-and-mortar retail and provides a state-of-the-art empirical strategy that serves as a model for the proposed project.
2. **On Modern Difference-in-Differences Methodology**:
   * Callaway, B., & Sant'Anna, P. H. (2021). Difference-in-differences with multiple time periods. *Journal of Econometrics*, 225(2), 200-230. (Referenced in 64). This is the primary methodological paper underpinning the proposed analysis. A deep understanding of its assumptions and estimation procedure is critical.
   * Sun, L., & Abraham, S. (2021). Estimating dynamic treatment effects in event studies with heterogeneous treatment effects. *Journal of Econometrics*, 225(2), 175-199. (Referenced in 68). This paper provides the leading alternative approach to Callaway and Sant'Anna and is important for a comprehensive understanding of the methodological issues.
3. **On SNAP Online Purchasing Context**:
   * Moran, A., Headrick, G., & Khandpur, N. (2021). *Promoting Equitable Expansion of the SNAP Online Purchasing Pilot*. Healthy Eating Research. (Referenced in 27). This policy brief provides crucial context on the implementation challenges, equity concerns, and retailer-side barriers of the OPP, which will be invaluable for interpreting the quantitative results of the proposed study.
   * Pukelis, K. (2024). *Online SNAP: The Digitalization of Food Assistance*. Working Paper. (Referenced in 8). This recent working paper provides an excellent overview of the OPP's rollout and initial impacts, and its hand-collected data on retailer adoption could serve as a valuable cross-reference for the data construction phase.

By pursuing this research agenda, a graduate student can make a novel and significant contribution to the fields of public policy and economics, leveraging publicly available data and cutting-edge econometric methods to shed new light on the unintended market-level consequences of a major social program's digital transformation. The project is ambitious but highly feasible within the scope of a dissertation, with clear, well-defined steps and a strong foundation in the existing literature.

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SNAP’s Online Shift on Delivery Platforms: National Effects on Access, Diet Quality, and Welfare

Abstract

Under the federal online SNAP framework, multiple delivery channels (e.g., Instacart, DoorDash, Shipt, Amazon/Walmart) rolled out EBT acceptance on staggered timelines. Platform frictions—delivery fees, order thresholds, merchant mix, and the “no hot prepared foods” constraint—may alter purchasing and diet quality among vulnerable households. We build a nationwide county×month panel and exploit staggered go-lives via stacked event studies/modern staggered DID, embed an Atkinson-weighted welfare evaluation, and run policy simulations (fee subsidies, healthy-basket incentives, digital-access support) to report “food-insecurity cases averted per dollar” and efficiency–equity frontiers.

Research Questions

1. Access/Coverage: Do multi-platform go-lives raise online redemption and penetration, and how does this vary by urbanicity and broadband/device access?
2. Basket/Health: Do online channels increase the healthy-basket share, especially at the lower tail of the distribution?
3. Prices/Frictions: How strongly do delivery fees, service charges, and order thresholds (ineligible for SNAP) suppress uptake, and how do these differ by platform?
4. Welfare/Equity: What are the net Atkinson-weighted welfare gains and who benefits most?
5. Policy Simulation: What are the cost-effectiveness and equity impacts of fee subsidies, healthy incentives, and digital-access programs—nationally vs. targeted to vulnerable counties?

Data & Measurement

A. National aggregates (main identification)

* SNAP online redemptions (state/county×month) from FNS/state agencies (FOIA as needed).
* Platform coverage & go-live dates (county×month) from merchant/coverage pages and announcements; construct platform-specific treatment and intensity (merchants per capita or deliverable-address share).
* Digital access: ACS 5-year internet/devices; FCC broadband.
* Controls: unemployment, poverty, ERS food deserts, price indices.
* Food insecurity: CPS-FSS (state-level; small-area estimation/Bayesian smoothing to counties).

B. Deepening/validation

* Fee/threshold data via front-end scraping or third-party vendors.
* Healthy-basket mapping using USDA FNDDS/Branded Food DB when SKU/department shares are available; otherwise use department/merchant-type proxies.
* Platform/third-party microdata (if obtainable) for mechanism calibration—not required for identification.

Identification

* Stacked event study / modern staggered DID with county and month FEs, state trends, pre-trend checks; platform-specific effects estimated and compared/aggregated.
* DDD contrasting areas with grocer e-commerce but no third-party delivery yet to isolate platform-specific frictions.
* Robustness: treatment intensity variants, placebo timings, spillover controls for border/commuting counties; cluster-robust SEs.
* Potential instruments (sensitivity): logistics node legacy, national retail partner rollout cadence, broadband build-out timing.

Welfare & Policy Simulation

* Atkinson welfare
* Cost-effectiveness: map policy levers to effective price/access shifts, apply elasticities, and report cases averted per $ (and per $1M).
* Targeting: broadband-poor counties, high-insecurity counties, or dual-vulnerability targeting; draw efficiency–equity frontiers.

**DATA**

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