From Storefronts to Screens: The Impacts of Online Grocery Shopping on Public Food Assistance Users

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Abstract

Many anti-poverty programs are in-kind, and adoption of new technology can alleviate the challenges associated with redeeming benefits. This project investigates how the availability of online grocery purchasing in public food assistance programs—including SNAP—affects food access, benefit spending patterns, and program participation. Authorization to accept Electronic Benefit Transfer (EBT) payments online was disproportionately adopted by large food retailers in urban areas. Exploiting the staggered roll-out of online purchasing authorization across retailers, I estimate that online exposure led to a $16 increase in monthly online EBT spending per household. Households substitute away from in-store spending at large food retailers. Following a large drop in SNAP benefits, participants decrease online grocery spending more than dollar-for-dollar, suggesting that EBT consumers are willing to pay for convenience under higher incomes. Finally, online grocery purchasing availability increases local SNAP participation by 4 percent, primarily by increasing retention of existing participants. These results suggest that policies which reduce benefit redemption frictions can improve the effectiveness of in-kind benefit programs.

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1 Introduction

Many anti-poverty programs provide in-kind rather than cash transfers (Currie and Gahvari, 2008; Byrne et al., 2022). How in-kind transfers are delivered can affect costs and benefits for government and non-profit providers, participants, and third-party vendors. For food assistance, programs can provide food directly to households or offer vouchers for households to purchase food at authorized stores. In the U.S., the vast majority of public food assistance benefits are provided as vouchers through Electronic Benefit Transfer (EBT) card systems. In 2023, these programs provided 48 million participants more than $125 billion in voucher benefits, accounting for roughly 12 percent of national grocery expenditures.[1]

Historically, voucher payments could only be completed in-person at brick-and-mortar stores, presenting several potential costs for program participants. Low-income voucher users are more likely than higher-income populations to face transportation and mobility barriers that affect how far they travel to buy groceries (Ver Ploeg et al., 2015). Voucher users also report facing difficulty budgeting at the grocery check-out and fearing negative judgment from store cashiers and other grocery store shoppers when using their benefits (Barnes, 2021; Pukelis, Heath and Holcomb, 2024). Together, these redemption frictions could diminish the net welfare benefits of participation, affect whether some eligible households decide to enroll or re-enroll in food assistance programs, and influence how much of their benefits participants redeem.

Online grocery purchasing offers a potential remedy for some frictions associated with using voucher benefits and may increase participation in nutrition assistance programs. In this paper, I study the advent of online grocery shopping in the context of the U.S.' largest

[1]These programs include the Supplemental Nutrition Assistance Program (SNAP, formerly known as the Food Stamp Program), the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), Pandemic Electronic Benefit Transfer (Pandemic EBT or P-EBT), and Summer Electronic Benefit Transfer (Summer EBT or SUN Bucks). In Fiscal Year 2023, SNAP had 42,176,946 participants and $106,997,586,957 in benefits (FNS, 2024*a*). WIC had 6,576,000 participants and $4,425,800,000 in benefits (FNS, 2024*b*). P-EBT had $13,727,351,995 in benefits (participant count not available) (FNS, 2024*a*). Summer EBT was implemented for the first time in 2024. Total U.S. Food-At-Home expenditures were $1,068,290.50 million in 2023.

food voucher programs, including the Supplemental Nutrition Assistance Program (SNAP). To improve SNAP households' access to groceries following the COVID-19 pandemic, federal authorities accelerated authorization of retailers across the country to accept online purchases using the program's Electronic Benefit Transfer (EBT) cards, expanding from small pilots conducted in 2019. To accept voucher card payments online, each food retailer coordinated with state agencies, set up online payment technologies, and applied to federal authorities for authorization. Although the program initially affected only SNAP, online purchases with new voucher programs for school children—Pandemic EBT and Summer EBT—were later covered under the authorizations.[2] Like other online shoppers, benefit users could then either pick-up their groceries from the store or have them delivered directly to their home for a fee, subject to retailer offerings. Online purchasing for EBT was authorized as an additional way to shop for groceries; households that wished to continue shopping exclusively in-person could continue doing so, while other households could supplement or substitute in-person purchasing with online purchasing.

Beginning in 2020, the supply of online benefit payment availability grew dramatically. Figure 1(a) shows that authorization of SNAP online retailers increased steadily over time, reaching 341 retailers as of Fiscal Year 2023. I estimate that online EBT purchasing was available at 407 unique retailer chains representing nearly 46,000 (20%) of all SNAP-authorized store locations as of February 2025. Unlike other pandemic-era SNAP flexibilities that were rescinded by 2023 (Pukelis, 2024), authorizations for online purchasing have persisted and are expected to remain a permanent feature of SNAP and related food assistance programs.

Following expansions in the supply of online EBT availability, growth in consumer use of online EBT soon followed. Figure 1(a) shows that total online EBT purchases nationally grew to over $800 million dollars per month as of early 2023, accounting for 8 percent of all EBT benefit redemptions in FY 2023 (Figure 2). The online share of total grocery spending

[2]Although the online purchasing authorizations affect spending of SNAP, Pandemic EBT, and Summer EBT benefits, I often refer to the program as affecting "EBT users" for brevity. WIC was not affected by this policy. However, the modernization of WIC, including expanding online shopping availability, is ongoing as of early 2025 (https://www.fns.usda.gov/wic/modernization/improving-shopping-experience).

among EBT users is similar to the general population: online purchases accounted for 12 percent of all grocery revenue as of 2021 (FNS, 2023). Online EBT purchasing also grew on the extensive margin: Figure 1(b) shows that the share of SNAP households that ever used their benefits online grew from less than 1 percent in March 2020 to 22 percent in Fiscal Year 2023. The online utilization rate among EBT users is also comparable to the general population: a 2021 Gallup survey estimates that 23 percent of U.S. adults shopped for groceries online at least monthly.

National trends in EBT online availability and use, however, mask local variation. To describe the growth of online shopping availability across retailers and local area characteristics, I hand-collect new data on the roll-out of online EBT authorization across individual retailers and states from 2019 through 2025. I then match these data to the universe of SNAP-authorized brick-and-mortar store locations from USDA to generate geolocated information on whether and when each store offered online EBT purchasing.[3] I use the resulting dataset to, first, describe the set of stores and local area characteristics where online EBT purchasing became available and, second, to study the causal effects of online EBT availability on households.

I find that the majority of online-authorized retailers are large grocery chains, falling into federally-defined categories of supermarkets and super stores. By February 2025, nearly two-thirds of SNAP-authorized super store locations and more than half of all supermarkets accepted EBT payments online. Some online-only food retailers, including Amazon Fresh, also adopted EBT online purchase authorization. Later on, some smaller-format retailers became authorized to accept EBT benefits online, including select convenience stores, dollar stores, and drug stores. I estimate that 33 percent of SNAP-authorized combination grocery/other stores and less than 3 percent of convenience stores accepted EBT online as of early 2025. Differences in online adoption across store types are in line with EBT spending patterns; before online availability, EBT users spent more than 80 percent of their benefits

[3]This approach assumes that *all* retailer locations within a state offered online purchasing, which will overestimate online EBT availability if retailers only offer online EBT at select locations.

in-person at supermarkets and super stores (Figure 2). I separate online-adopting retailers into two categories for the remaining analyses: "large" food retailers—including supermarkets and super stores—and "small" food retailers—including combination grocery/other and convenience stores.[4]

I aggregate store-level data to the county level to describe the growth of online EBT availability over time and to determine local characteristics associated with adoption. I find that, among both large and small retailer categories, counties containing a store offering SNAP online are more urban and higher-income compared to those that do not have a SNAP online store. Counties exposed to SNAP online are more urban and higher-income even when compared to counties with a brick-and-mortar SNAP-authorized store in the corresponding category. These results suggest that larger retailers may have first joined the (non-EBT) online grocery market guided by higher-income consumers' preferences, and later sought EBT authorization for their existing food distribution networks.

Next, I study the causal effects of local online EBT availability on benefit redemption patterns and SNAP participation. An ideal experiment would randomly assign online EBT availability across SNAP-authorized stores. Instead, I use plausibly exogenous exposure to EBT online based on adoption among local retailers to identify causal effects on nearby households. Retailers sought online EBT authorization largely at the national level, with some additional variation across states, generating quasi-experimental variation in online EBT availability across locations and over time. Intuitively, households are differentially exposed to online EBT purchasing based on the retailer chains they happen to live near. I overcome potential endogeneity challenges due to strategic neighborhood choices of retailer locations by exploiting variation in retailers' adoption of online EBT over time. By comparing places that were exposed to online EBT earlier versus later in a staggered difference-in-differences design, I identify the effects of online EBT availability on redemption and participation outcomes.

[4]These finer store categories are defined by the U.S. Department of Agriculture. For examples of stores in each category, see Table A.1. For additional details on store type definitions, see Appendix B.

Using monthly state-level data from USDA on EBT benefit redemptions across store types, I find that online EBT redemptions grow steadily over time following exposure, averaging $16 per household per month following online adoption among large food retailers. As households spent more of their benefits online, they spent less on in-person trips at large food retailers, including supermarkets and super stores. I find no economically meaningful effects on benefit spending at other store types and no effects of online adoption among smaller food retailers on EBT spending across categories. These results suggest that EBT users value online purchasing availability among large—but not small—food retailers, and that households use online grocery purchases as a substitute for in-person trips to large retailers.

A large SNAP benefit decrease during the sample period also allows me to examine how EBT redemption patterns change following a sizable decrease in households' near-cash income. The staggered removal of Emergency Allotments—supplemental SNAP benefits issued in response to COVID-19—across states decreased SNAP benefits by $185 (42%), on average, resulting in a large negative shock to EBT households' near-cash income. I find that for every $1 decrease in SNAP benefits issued, online EBT redemptions decreased by $1.08. Thus, online grocery spending fits the economic definition of a "luxury" service: a service whose spending changes more than proportionally for a given change in income. I show evidence that in-store spending at supermarkets and super stores can be characterized as an economic necessity: the share of EBT benefits spent at supermarkets and super stores increases following the drop in benefit size. These results suggest that households using vouchers are willing to pay for more convenient ways to shop when they face more flexible budgets. Thus, higher SNAP benefit levels were likely a complement to online EBT availability, making online grocery purchases and associated fees more affordable for low-income consumers.

I find that exposure to EBT online purchasing increased local SNAP enrollment. Following online EBT purchasing availability, SNAP enrollment overall increased by 4 percent and SNAP applications received increased by 33 percent. Effects are driven by urban areas, pos-

sibly due to more widespread availability of grocery pick-up and delivery services compared to rural areas, as well as more widespread availability of broadband internet access. Effect sizes are also somewhat higher in late 2021 and early 2022, coinciding with a later wave of the COVID-19 pandemic. These results suggest that the ability to avoid potential disease exposure at the grocery store while using EBT benefits likely boosted SNAP participation during this period.

Finally, I estimate that at least two-thirds of the overall increase in SNAP participation can be attributed to an increase in retention of existing SNAP participants, with the remaining one-third due to new approved applicants. These results suggest that online grocery purchasing increased SNAP participation primarily by reducing redemption frictions among existing, eligible SNAP enrollees. These results highlight the importance of policies affecting benefit redemption as key determinants of program take-up, alongside policies affecting application and re-enrollment experiences. Thus, policies which reduce benefit redemption frictions can improve the effectiveness of in-kind benefit programs by increasing realized transfers to eligible, low-income households and boosting the net welfare benefits of participation among existing enrollees.

This paper contributes to various literatures on the effects of online purchasing on consumers generally, the effects of policy changes on take-up and redemption behavior for in-kind and other means-tested programs, and the effects of remote technologies on public services more broadly. Several papers study the behavior of grocery retailers and consumers, including the take-up and effects of online grocery shopping across a broad spectrum of households. A segment of the marketing literature considers "omnichannel" strategies in which retailers engage consumers across in-store, online, and mobile platforms (Wang and Goldfarb, 2017; Wang, Malthouse and Krishnamurthi, 2015). Other papers using retailer panel data consider how the composition of grocery purchases (Harris-Lagoudakis, 2022; Chintala, Liaukonytė and Yang, 2024) and consumer behavior (Harris-Lagoudakis, 2023) differ for households between online and in-person channels. This paper complements the existing literature about

online grocery shopping by focusing on the value and effects of online purchasing availability for a large and meaningful subgroup: low-income EBT users.[5]

Other papers study policies affecting nutrition program delivery. Barnes (2021) first conceptualized redemption costs as a key feature of voucher-based public assistance programs that can affect participant experiences and policy effectiveness. For U.S. programs, several papers consider the effects of switching SNAP or WIC from paper vouchers to state-issued, debit-like benefit cards on stores and households (Currie and Grogger, 2001; Hanks et al., 2019; Meckel, 2020). One paper looks at the effects of targeted online advertisements, including one intervention emphasizing the convenience and privacy of using online SNAP retailers, on program participation and finds no effects (Rogers, 2024). In a context with lower state capacity, Banerjee et al. (2023) study the switch from in-kind food benefits to electronic vouchers in Indonesia. Other papers study the effects of other supply-side changes, including new SNAP or WIC store authorizations, disqualifications, or closings, on program take-up and benefits redeemed (Byrne et al., 2022; Ambrozek, 2021; Meckel, Rossin-Slater and Uniat, 2020). Relative to these papers, I consider a policy which alters households' sets of available stores and shopping experiences through online grocery pick-up and delivery.

Finally, this paper contributes to the literature on the impacts of online and remote technologies in public programs and service delivery more broadly. Some papers consider the effect of online tools and remote services for benefit program application or recertification, rather than service delivery (Gray, 2019; Wu and Meyer, 2023; Pukelis, 2024; Schwabish, 2012). In the context of subsidized prescription drug coverage, a few studies examine utilization rates of mail-order pharmacies and how much they may reduce pharmacy costs relative to in-person retailer alternatives (Carroll, 2014; Starc and Swanson, 2021). Others consider the effect of telehealth services in healthcare settings (Dahlstrand, 2023). This

[5]There are a few papers which consider the SNAP online purchasing program specifically. Foster et al. (2023) show the first-stage effects of online shopping availability on SNAP online purchases at the county-level in one large state. Brandt et al. (2019) describe the availability of online grocery delivery in food desert tracts. This paper contributes to this literature by collecting more detailed roll-out information of SNAP online nationally and examines effects on household redemptions and program participation.

paper adds to the literature by examining a new context where remote servicing may have large impacts on low-income households: online grocery purchasing when using in-kind food voucher benefits.

The paper proceeds as follows. Section 2 provides background on SNAP, related EBT programs, and the administration of online purchasing with EBT benefits. Section 3 provides a conceptual framework for how online purchasing availability could affect households. Section 4 details the data used in empirical analyses. Section 5 provides descriptive results on the roll-out of EBT online purchasing across time, locations, and store types. Section 6 describes the empirical strategy for estimating the effect of online availability on households. Sections 7 and 8 provide results on EBT redemptions and SNAP enrollment, respectively. Section 9 concludes.

2 Background

Allowing online purchasing with EBT affected users of several large food assistance programs, including SNAP, Pandemic EBT, and Summer EBT. In this section, I first describe each program at a high level. Then, I discuss store authorization in-person and online, which are the same across all programs.

2.1 Overview of three affected nutrition programs

SNAP overview. SNAP provides eligible low-income households with vouchers to purchase food at participating stores. Each month, more than 40 million individuals in the U.S. receives SNAP benefits (FNS, 2024*a*). In Fiscal Year 2023, the program distributed a total of $107 billion in benefits, accounting for 10 percent of all U.S. grocery expenditures. Benefits are issued to households monthly, with an average benefit per person of $188 in Fiscal Year 2024 (FNS, 2024*a*).

There are three major players in the administration of the SNAP program: the federal

government, state agencies, and food vendors. The U.S. Department of Agriculture's Food and Nutrition Service (USDA FNS) is the federal agency which oversees implementation of the SNAP program. The agency sets national standards for program implementation such as baseline eligibility standards, which states have some flexibility to modify.[6] FNS also authorizes retailers to accept SNAP benefits in-person and, separately, online. The federal government provides 100 percent of funding for SNAP benefits, and 50 percent of funding for state's administrative costs.

State agencies are in charge of administering SNAP. Agencies have some flexibility to set state-specific parameters for eligibility, namely the gross-income eligibility and asset test. States receive applications and recertification documentation and make eligibility determinations. They fund 50 percent of costs associated with administering the program. Each state has its own Electronic Benefit Transfer (EBT) system and card and issues benefits according to its own monthly disbursement schedule.

Vendors, including authorized grocery, convenience, and other food stores, receive voucher payments and provide food products to customers. Although stores are authorized by the federal government, vendors must coordinate with state agencies to be able to accept payments through each state's EBT payment system.

Pandemic EBT Overview. Pandemic Electronic Benefit Transfer (P-EBT) was a temporary federal program to provide families with children with benefits to buy food at stores when students could not receive school meals in-person due to the COVID-19 pandemic.[7] The program operated throughout the federal public health emergency declaration, from spring 2020 through summer 2023. Most states chose to participate although implementation details vary across states. P-EBT was entirely funded by the federal government,

[6]To be eligible for SNAP, a household must meet three tests: a gross income test, a net income test, and an asset test. Gross income limits are nationally set at a minimum of 130 percent of the Federal Poverty Level (FPL), but states can set this threshold as high as 200 percent. The net income limit is 100 percent of the FPL, where net income is determined by subtracting allowed deductions from gross income. Total household assets must be valued at $3,000 or less, excluding home and retirement accounts and a portion of the primary vehicle (CBPP, 2025). However, many states now waive the asset test (USDA-ERS, 2024).

[7]https://www.fns.usda.gov/snap/state-guidance-coronavirus-pandemic-ebt-pebt

including benefits and reimbursements for administrative costs to states, Local Educational Agencies (e.g., school districts), and third parties. Generally, low-income students and students attending schools that offered free lunch to all students were eligible for P-EBT.[8] P-EBT benefits could be redeemed anywhere where SNAP benefits were accepted.

P-EBT was a large increase in benefits for food issued to families with children, including to many families not already receiving SNAP. In school year 2022-23, the maximum P-EBT benefit size per child per month was $147.[9] P-EBT benefits issued totaled $13.7 billion in Fiscal Year 2023, equivalent to 12.8 percent of SNAP benefits for the same period (FNS, 2024*a*). Data from USDA suggests P-EBT reached a maximum of nearly 16 million children in August 2021.[10] Figure A.1 shows total P-EBT benefits issued and enrollment nationally over time, compared to SNAP. P-EBT issuance peaked during the the summer months, since most schools were out of session and not serving meals. Existing research shows that P-EBT reduced food hardship, lifted millions children out of hunger, and improved maternal mental health (Bauer et al., 2020; Bauer, Ruffini and Schanzenbach, 2024).

Summer EBT Overview. Summer EBT, also known as SUN Bucks, is a new, permanent federal program providing benefits to low-income families with children to buy food at stores during the summer months when school is not in session. The program fills a previous gap in nutrition assistance over the summer months among students eligible for free and reduced-

[8]Students in three categories were eligible for benefits. First, school-age children eligible for free or reduced price school meals with the National Student Lunch Program or School Breakfast Program (NSLP/SBP) could receive P-EBT benefits. This includes students whose household income was below 185 percent of the Federal Poverty Level or who were already receiving SNAP. Second, students who attended a school that typically provided free meals to all students under certain federal provisions (e.g. the Community Eligibility Provision) were eligible to receive benefits for days not attending school due to temporary school closures or COVID-19 related absences. Third, some children already receiving SNAP under the age of six attending covered child care facilities could also receive P-EBT benefits.

[9]Students missing fewer in-person days received less depending on a state-determined benefit schedule. P-EBT benefit sizes depended on the number of in-person school days missed and the daily federal reimbursement rate for school meals. In school year 2022-23, the daily reimbursement totaled $8.18 per day per student in the contiguous 48 states. Alaska and Hawaii's rates were slightly higher. A student qualifying for an entire month (typically 18 school days) therefore received the maximum of $147 in benefits per month.

[10]Note that data on participants are difficult to interpret because they reflect the number of children issued benefits in a given month, but states often issue benefits for multiple months at a time. For example, children issued benefits in June for the months of March and April will show up in June participant counts only (FNS, 2024*a*).

priced school meals.[11] Although USDA already provided some funding for school meals served on-site through the Summer Food Service Program (also known as SUN Meals), the program only reached an estimated five percent of children (Brown, 2024). Therefore, Summer EBT significantly expands the availability of nutrition benefits for school-age children over the summer months.

Summer EBT began in the summer of 2024 for states that elected to participate. In 2024, 37 states, DC, all U.S. territories, and two Native American tribes participated. In 2025, 38 states, DC, all U.S. territories, and five Native American tribes plan to participate.[12] Families in participating states receive $120 per eligible school-age child for the 2024 and 2025 summers.[13] Based on the number of estimated eligible children in participating states, Summer EBT's estimated benefit total for 2024 equaled $2.8 billion dollars. Summer EBT benefits can be used at all locations where SNAP is accepted and expire within four months of being issued.

2.2 The Retailer Perspective: Store authorization to accept EBT

In-person EBT purchase authorization Vendors, including grocery stores and convenience stores, receive payments through EBT cards and provide food products to customers. If a store is authorized to accept SNAP benefits, then it can also accept Pandemic EBT and Summer EBT payments.

A retailer must incur several costs to become SNAP-authorized and accept EBT benefit payments in-store. Stores may need to invest in Point-of-Sale (POS) devices that accept EBT payments, apply for authorization with federal authorities, and later renew authorization. In-store authorization is based on requirements to stock specific categories and amounts of

[11] Similar to P-EBT's implementation, children eligible for Summer EBT include those living in household meeting income limits and those already participating in other benefits programs like SNAP and TANF. Children are eligible if their household income is less than 185 percent of the Federal Poverty Level—equivalent to the income threshold for reduced priced school meals.

[12] Tennessee participated in 2024 but will not in 2025. Alabama and Utah are newly participating in 2025 (https://frac.org/summer-ebt/families).

[13] Households in American Samoa, Commonwealth of Northern Mariana Islands, Guam, Hawai'i, and Puerto Rico received $177 per eligible child in 2024.

staple foods.[14] In less common cases, a store may be authorized if it is needed to ensure sufficient food access in an area and is close to meeting the stocking requirements. To apply, retailers must fill out an application and participate in a store visit by an FNS representative. Large retailers with ten or more stores can apply for authorization across many stores at once. Re-authorization must occur every five years or if a store's ownership changes. There is no monetary fee for a retailer to apply for SNAP authorization.

USDA classifies SNAP-authorized food retailers into several different store types listed in Table A.1. Key categories of retailer types include super stores and supermarkets. Other key categories include combination grocery / other stores—which include dollar stores and pharmacy stores—and convenience stores. Recent literature discusses the rapid growth of dollar stores in recent years and their potentially mixed effects on food access (Chenarides et al., 2021*b*; Chenarides, Çakır and Richards, 2024). Additional information on store types is in Appendix B.

SNAP authorization requirements likely present larger costs for smaller retailers and stores compared to large food retailers. Food stocking requirements are presumably more costly for smaller stores, who may receive less frequent deliveries, have limited refrigerated space, or for whom it is more costly to carry a large variety of products. One study finds low compliance rates of small food stores in response to new local food stocking requirements (Laska et al., 2019). Larger retailers can also take advantage of economics of scale and authorize multiple stores at once. Finally, frequent changes to store ownership among smaller stores means more frequent renewal of authorization and associated paperwork.

Different retailer types have different potential benefits of obtaining SNAP authorization. Participants regularly spend over 80 percent of their benefits at large retailers classified as supermarkets and super stores (see Figure 2), so these stores have more potential revenue to gain from becoming SNAP-authorized compared to smaller sized retailers. In practice, SNAP-authorization rates are very high among large retailers like supermarkets and super

[14] https://www.fns.usda.gov/snap/retailer/eligible In general, restaurants cannot accept EBT benefits.

stores and lower among smaller retailers.[15]

2.2.1 Online EBT purchase authorization

Authorization for stores to accept EBT purchases online is separate from authorization for in-store purchases. The 2014 Farm Bill mandated a pilot to test the feasibility of allowing retail food stores to accept SNAP benefits online. USDA originally implemented the first SNAP online purchasing pilot in 2019 (Mendelson et al., 2023). In response to the pandemic, USDA accelerated authorization of retailers for online purchasing, significantly expanding its availability across states and retailers. The federal government invested $5 million in the December 2020 COVID-19 Economic Relief Bill and $25 million in the March 2021 American Rescue Plan to help with the rollout of SNAP online purchasing. USDA later announced additional funds to further expand online shopping availability among small, independent retailers and direct marketing farmers.[16]

To accept EBT payments online, a retailer must incur upfront, fixed costs in updating payment and online shopping technologies and seeking administrative approval. Each retailer needs to invest in technology, coordinate with their state agency, and apply to the federal government for authorization to accept EBT payments online. Therefore, authorization was largely completed at the retailer-state level. Vendor authorization for online purchasing requires that a store first meet in-person food stocking requirements and also requires that the store has a website with sufficient capabilities to facilitate purchases using EBT. For example, online platforms must ensure that only eligible foods can be purchased with EBT benefits, allow for a separate payment method to be used for non-EBT eligible items and delivery fees, and allow EBT customers to choose the amount of benefits that they will

[15]Figure A.2 approximates the share of different store categories that are SNAP-authorized by comparing national store counts from USDA's SNAP retailer data to those from County Business Patterns. These analyses suggest that virtually all supermarkets and superstores are authorized to accept SNAP. Meanwhile, a majority but not all specialty food stores like bakeries are SNAP-authorized.

[16]https://www.fns.usda.gov/news-item/fns-0016.22; https://www.fns.usda.gov/blog/modernizing-snap-transactions-local-farmers

use for each purchase.[17] Once authorized, a store can accept payments for food items from SNAP, P-EBT, and Summer EBT participants online.

Most retailers accepting online purchases supply goods through existing in-person stores. For example, Walmart.com grocery purchases are supplied by physical Walmart locations. A limited number of online-only retailers supply goods from remote distribution centers (e.g. Thrive Market). If a retailer does not run its own pick-up or delivery service, it can contract with an eCommerce platform authorized to provide delivery services for SNAP recipients. Table A.2 lists authorized eCommerce platforms, including Instacart and Doordash. An eCommerce platform can partner with multiple retailers. In this case, both the eCommerce platform and the retailer must be authorized by FNS to accept purchases online.

Like in-store SNAP-authorization, the costs and benefits of online SNAP authorization likely varies across small, large, and online-only retailers. Smaller retailers not already meeting in-store SNAP stocking requirements are unlikely to seek online SNAP authorization. Those already meeting stocking requirements may find the costs of developing an online purchasing platform prohibitive. Larger retailers fulfilling orders from existing stores will need to either invest in their own web platform to accept EBT benefits online or contract with an eCommerce platform. They may also need to accommodate increases in online orders by shifting existing staff hours from fulfilling in-store to online purchases, adding staff to fulfill online orders, or allocating space to process online orders within the store. Online-only food retailers would likely need to invest in infrastructure to meet SNAP's food stocking requirements, including warehouses and delivery vehicles with refrigeration capabilities for perishable items. These requirements may present large and potentially prohibitive costs for retailers to offer online EBT in rural areas or other areas with a sufficiently low volume of online orders. Overall, retailers which already invested in infrastructure to accept non-EBT orders online or EBT benefits in-store would face smaller additional setup costs to permitting EBT online purchasing.

[17] https://www.fns.usda.gov/snap/retailer-requirements-provide-online-purchasing

3 Conceptual framework: the benefits and costs of online grocery shopping for EBT consumers

In this section, I discuss the benefits and costs of completing EBT purchases online versus in-store for participating low-income consumers. Allowing online purchasing is expected to decrease the costs of using EBT benefits through five mechanisms: COVID-19 avoidance, time convenience, travel convenience, ease of budgeting while shopping with EBT, and decreased stigma. These benefits may be dampened by three key costs: the idiosyncrasies of shopping online for food, facing higher average prices online, and pick-up and delivery fees.

3.1 In-person EBT purchasing

EBT benefits are typically redeemed in-person at an authorized food retailer's store. To redeem their benefits, households are issued one or more state-specific EBT cards, which look and act like debit cards.[18] To make a purchase, a participant must swipe their card and enter a Personal Identification Number (PIN).[19] Any balance exceeding the benefits available on the EBT card or ineligible items must be paid for using another form of payment. Ineligible items include paper goods, cleaning supplies, alcohol, tobacco, and hot, prepared foods.[20]

Some participants report that transactions using an EBT card take longer than transactions with a typical debit or credit card, with several possible reasons (Heath, Holcomb and Pukelis, 2022). First, trying to budget in real time may increase transaction times in the grocery checkout line for EBT users. SNAP households are expected to spend about 30 percent of their net income on food, but households typically do not earmark cash for food beyond their SNAP allotment (Edin et al., 2013). Anecdotally, some individuals take extra time at the register to sort items to purchase in order to limit their food purchases

[18] Figure A.3 shows images of SNAP, P-EBT, and S-EBT cards.

[19] A fictional depiction of redemption of SNAP benefits at a grocery store is shown in Netflix's show *Maid*: https://www.youtube.com/watch?v=jJH5KhfTmTM

[20] Hot prepared foods are considered SNAP-eligible items for individuals experiencing homelessness and when nearby areas experience a natural disaster and receive an associated program operations waiver.

using only their EBT benefits, especially if they are uncertain about their remaining benefit balance. Second, EBT users typically use at least two methods of payment for each trip: an EBT card and one other form of payment for EBT-ineligible items. Depending on the state, some households could have multiple cards loaded with benefits from different programs, including SNAP, P-EBT or S-EBT, and WIC. Paying with multiple EBT cards may further lengthen in-person transaction times and increase the potential for participants to anticipate or experience stigma at the grocery store.[21]

3.2 Five reasons EBT uses may value online shopping

COVID-19 avoidance - Availability and take-up of online shopping among the general population increased rapidly in response to the COVID-19 pandemic as individuals sought to avoid exposure to the virus (Chenarides et al., 2021*a*; Conlin et al., 2024). Indeed, the EBT online roll-out was intended to allow voucher users to redeem their benefits for groceries while substantially reducing the risk of contracting COVID-19.[22] Based on Google Trends data, interest in SNAP online appears to have peaked at the onset of the COVID-19 pandemic. Figure A.4 shows that search terms associated with SNAP online shopping ("ebt online", "amazon ebt", and "instacart ebt") sharply increased at the beginning of the pandemic. The prevalence of these search terms also remained elevated relative to the pre-pandemic period. Meanwhile, search terms associated with SNAP more broadly ("snap online" and "snap apply") also peaked early in the pandemic but decreased more quickly to near-pre-pandemic levels. These data suggest that demand for online grocery shopping with SNAP remained present even after the end of the public health emergency associated with COVID-19.

[21] In an interview, one participant described the experience of using both a SNAP and a P-EBT card: "We all got ready and went to the grocery store...When we get to the cashier, $300 was gone so I pull out the EBT card and immediately my face got hot, and I had to pull out the other EBT card. At that moment what I felt like was to be totally reliant on food stamps. And how shameful to think that, if I do not have money for this, I will have to put stuff back which is also embarrassing. Now, I know that the cashier does not care, the little old lady with the Coach bag behind you is staring at you, and the bagger is staring at you, and immediately I thought, 'Man, I do not miss being on food stamps.' " (Carper, 2022, p. 84, 93)

[22] https://www.usda.gov/media/press-releases/2020/04/08/arizona-and-california-added-innovative-snap-online-pilot-program

Time convenience - For all shoppers, online shopping offers several convenience benefits. Shopping online may lessen the time spent on grocery shopping. Online grocery shopping is also more flexible than in-person shopping: selecting groceries items and making purchases on one's phone or computer can be done during off-hours, while doing other activities (such as waiting for public transit), and broken up over time. This flexibility may be especially valuable for shoppers with care-taking responsibilities. Traditionally, women have taken on grocery shopping responsibilities for their households, and time-use data corroborates that women are more likely than men to grocery shop (Saphores and Xu, 2021).[23] Thus, women may be more likely than men to value and use online grocery purchasing options.

Travel convenience - Online shopping with delivery also decreases travel costs for consumers typically in exchange for a delivery fee.[24] Figure A.5 shows that, on average, households travel 3.8 miles to their primary grocery store, and they do not shop at the grocery store closest to their residence (Ver Ploeg et al., 2015). Avoiding regular trips to the grocery store may be especially important for SNAP participants facing transportation and mobility barriers, which are more common among low-income compared to high-income populations. According to a survey conducted in 2012-13, 66 percent of SNAP participants use their own vehicle to purchase groceries, compared to 88 percent of the general population (Ver Ploeg et al., 2015). For the remaining SNAP participants, 21 percent use someone else's car or ride with someone else, and 13 percent walk, bike, or take public transit or a shuttle (Ver Ploeg et al., 2015). Thus, mobility barriers are especially important for approximately one-third of SNAP households, and online shopping may help improve food access for these groups.

[23] Like other home technology advancements, online grocery shopping may ease time and effort to complete the regular household task of grocery shopping and facilitate women to join the workforce (Coen-Pirani, León and Lugauer, 2010; Greenwood, Seshadri and Yorukoglu, 2005).

[24] Whether overall travel, including travel completed by delivery drivers, and associated environmental costs decrease or increase is unclear and likely depends on the local setting. In more suburban and rural settings where individual car trips to and from the grocery store are replaced by more consolidated delivery routes, increases in online grocery delivery may decrease total travel costs. If, instead, grocery delivery replaces trips that individuals would otherwise make on foot in urban locations, total travel and environmental costs may increase.

Particularly for households that would otherwise walk, bike, or use public transit to grocery shop, online shopping is likely to expand availability grocery store options and potentially affect shopping behavior. Figure A.5 shows that, compared to households with their own vehicle, households who do not shop with their own vehicle do not travel as far to grocery shop (Ver Ploeg et al., 2015): households who walk, bike, or take public transit do not shop more than 0.9 miles away from home, on average. Meanwhile, 33.6 percent of SNAP recipients lived more than 1 mile from a sizeable grocery store (Rhone, Williams and Dicken, 2022). For households with limited food access, the availability of online shopping with delivery can provide additional grocery store options which could improve access to a wider variety of foods such as fresh produce and lower grocery prices. Moreover, the ability to shop online could affect the content, quantity, and frequency of grocery purchases for these households, since they would not be limited by what they can carry home. A prior study shows that living in a food desert increases the probability of facing food insufficiency among older adults not owning a vehicle (Fitzpatrick, Greenhalgh-Stanley and Ver Ploeg, 2016). Therefore, online EBT purchasing availability may plausibly improve food sufficiency and security among those with mobility barriers.

Identifying EBT-eligible items and budgeting - Online shopping may offer particular advantages for EBT users' shopping experiences. First, customers can more easily identify EBT-eligible items online since many retailers mark them on their web pages (see Figure A.6), but typically not in stores. At many retailer websites, shoppers can filter products by EBT-eligibility. Second, shopping online is more convenient for participants who like to budget based on their EBT balance. Many shoppers using EBT cards take extra time at the in-store grocery check-out line to sort items to buy based on their remaining EBT balance.[25] By shopping with an online shopping cart instead of a physical one, EBT users can more flexibly budget with respect to their remaining benefits balance. Third, online compared to in-store platforms may be easier for consumers to use multiple methods of

[25] A prior paper shows that SNAP participants' purchasing behavior is consistent with a model of mental accounting (Hastings and Shapiro, 2018).

payment, including multiple EBT cards. Figure A.7 shows a screenshot of a purchase using two methods of payment: an EBT card and a debit card for EBT-ineligible items.

Avoiding stigma - Finally, shopping online may help EBT users avoid (the fear of) being stigmatized while shopping at the grocery store. When shopping in-person, some SNAP participants in interviews and surveys have reported concerns about feeling "embarassed" or "ashamed" for using SNAP benefits.[26] Some SNAP participants also report that these internal concerns sometimes materialize when cashiers or other customers in the checkout line give "sideways glances", are "routinely rude", or make "snide comments" toward SNAP participants. Common comments include disapproval of the types of food SNAP participants buy, suggestions that participants should look for work, or other comments of disapproval of those using government benefits. Several SNAP participants say they try to hide their EBT card and swipe it quickly in the checkout line so that others cannot tell that they use SNAP benefits. Others report using self-checkout lanes to minimize interactions with others when using their benefits.

Still, an individual's SNAP status is likely observable at the grocery store. Pukelis, Heath and Holcomb (2024) reports that 88 percent of current and former SNAP participants think that grocery store cashiers definitely or probably know they use EBT, and 35 percent think that other shoppers know. Furthermore, 28 percent and 58 percent believe that they would be judged negatively by cashiers and other store shoppers, respectively, for using SNAP. Since most EBT users expect to be judged negatively at the grocery store if their participation status were revealed, they may turn to online shopping to avoid social visibility.

3.3 Costs of online shopping for consumers

Despite its potential benefits, shopping online for groceries comes with costs, including the particular challenges of shopping for food online, the cost of pick-up and delivery fees, and higher prices of goods online versus offline.

[26] See Appendix C for quotes and additional details about such concerns.

Fundamental differences between online and in-store shopping - Shopping for groceries online is a fundamentally different experience than shopping in-store, which may present costs for consumers. Some papers consider how the composition of grocery purchases differs between online and in-person channels within households using retailer panel data (Harris-Lagoudakis, 2022, 2023; Chintala, Liaukonytė and Yang, 2024). These papers generally find that, when shopping online relative to in-store, households make fewer impulse purchases such as candy, buy less fresh produce, make more repeat purchases, spend more on bulk purchases such as laundry detergent, and make larger purchases overall. Many of these findings can explained by the online food environment, in which consumers are not exposed to check-out aisles with candy, cannot touch and select produce items, can easily fill their online carts with previously purchased items, and, with delivery, do not have to carry items home. Consumers may also end up purchasing items they normally would not choose since retailers often substitute out-of-stock items with similar items. Unsatisfactory item substitution with online orders and avoiding certain items in online purchases may be costly for consumers. Product selection may also differ across online and offline channels.[27] These costs may lead consumers to complement some online purchases with in-store purchases, or to avoid shopping online altogether.

Pick-up fees, delivery fees, and cart minimums - When an individual purchases their groceries online, they often have the option to select store pick-up or delivery based on store availability. Consumers pay for the convenience of online shopping through pick-up and delivery fees. Any pick-up and delivery fees are not EBT-eligible, so EBT users must pay for them out-of-pocket.[28] Table A.3 shows descriptive statistics of grocery pick-up and

[27] Across U.S. and foreign food and non-food retailers, Cavallo (2017) finds that 76 percent of products sampled offline were also found online.

[28] Although there is currently no source of funding to subsidize delivery fees in SNAP, a 2023 Federal Proposed Rule for WIC requested comments on "whether State agencies should have the option to pay for fees associated with online shopping in a retail food delivery system with either (1) non-Federal funding at State agency discretion and/or (2) Federal funding in situations where it is deemed necessary to meet special needs (e.g., participant access or other needs as identified by the State agency)" https://www.federalregister.gov/d/2023-02484/p-106. At least one WIC online pilot program plans to use state funding to subsidize delivery fees https://www.wicshopplus.org/projects/new-jersey-delivery-planning.

delivery fees at the store level for a selected sample of retailers.[29] These data suggest that all SNAP-authorized online retailers offer pick-up and 85 percent offer delivery. Most retailers list only minimum, but not maximum, delivery fees. The median (minimum) delivery fee across stores was $3.99 and the mean was $6.26, while the median pick-up fee was $0 and the mean was $1.02.[30] Retailers often list a minimum cart purchase for pick-up or delivery: the median cart minimum across stores was $35. About one quarter of online-authorized stores also offered EBT users $0 fees for a limited number of online purchases. Finally, half of stores in the sample partnered with Instacart as their eCommerce partner.

Cart minimums and fixed fees for online orders may incentivize households to make larger, less frequent grocery purchases. Figure A.8 shows that, on average, transactions at Internet Retailers were larger than transactions at super stores or supermarkets ($75.29 versus $57.76 or $47.53) in 2023.

On the one hand, these statistics confirm that cart minimums and out-of-pocket costs for delivery and pick-up fees are non-negligible, and may be particularly prohibitive for EBT users facing fees above minimum levels. On the other hand, other evidence suggests that SNAP users may be willing to pay these fees to access large retailers like supermarkets and super stores. Taylor and Villas-Boas (2016) estimate that SNAP households are willing to pay about $5 per week to have a supermarket or superstore one mile closer to their residence: more than the average non-SNAP household. Thus, many EBT users may be willing to pay for online grocery delivery fees or subscriptions for the convenience of delivery services.

Online prices may be higher - Aside from pick-up and delivery fees, online consumers may pay higher prices for goods compared to in-store outlets. The evidence on whether

[29]Fee information was collected from the Providers phone application: an app that allows EBT users to track their balances by logging into their state's systems. The sample may over-represent retailers who would like to appeal to low-income consumers or larger retailers who can invest resources into partnerships. I merge this retailer-level information to store-level data on SNAP-authorized retailers who adopted SNAP online.

[30]Exactly how delivery fees vary across cart size and distance remains unclear. Some retailers offer lower fees as cart size increases. Delivery fees are also expected to increase as a resident's distance from the store increases, conditional on falling within a store's delivery radius. As a point of comparison, FNS estimates that the average online purchase made in 2024 would incur an average of $9.59 in delivery and service fees (https://www.federalregister.gov/d/2023-02484/p-217).

online grocery prices are higher than offline prices is mixed. One multi-country study using data from 2014-2016 finds that among 10 food retailers, 52 percent had identical online and offline prices, 32 percent had higher online prices, and the remaining 15 percent had higher offline prices (Cavallo, 2017). Conditional on having an online markup, prices were 3 percent higher, but overall average prices were only 1 percent higher online versus offline. A more recent study finds that, within retailer and zipcode, Amazon's online grocery prices were higher than their offline prices, but Walmart's online grocery prices were *lower* than their in-store prices (Aparicio, Metzman and Rigobon, 2024). They also find that price dispersion is larger in online versus offline channels due to (1) more frequent price changes, (2) variation in price by delivery zipcode, and (3) larger price differences across rival sellers.

These findings suggest that whether an EBT user will face higher or lower prices with online grocery shopping is ambiguous. On the one hand, frequent price changes may make retailers more responsive to local benefit disbursement cycles, raising prices when EBT users are more likely to shop (Hastings and Washington, 2010). On the other hand, price discrimination based on delivery zipcode may *lower* prices for EBT users residing in lower-income neighborhoods, relative to more uniform in-store prices (DellaVigna and Gentzkow, 2019). More generally, larger price dispersion may allow low-income, price-sensitive consumers to take advantage of available lower online prices relative to in-store channels. A key determining factor is the set of online and offline retailers available to a given consumer based on her location.

4 Data

I describe the data used in the main analyses. Additional details on data collection and on supplementary data can be found in Appendix D.

4.1 Defining exposure to online EBT purchasing

A household's exposure to online shopping depends on three factors: (1) which stores they live close to, (2) if those retail chains implemented online purchasing with SNAP, and (3) if a household spends most of its benefits at those store types. I use these factors to guide defining exposure to online EBT purchasing at the county-level.

Rollout of online purchasing authorization across retailers I hand-collect information on the roll-out of EBT online purchasing authorization at the retailer-state-month level from USDA's website. For example, one observation indicates that in Massachusetts, Walmart became authorized to accept EBT purchases online in May 2020. These data contain the universe of all retailers that adopt EBT purchasing online. Once stores are authorized to accept online EBT purchases, the vast majority do so in perpetuity.[31] Therefore, I focus only on entries—and not exits—of retailers into the EBT online market.

Retailers with physical, "brick-and-mortar" locations To define exposure to online shopping at the local level, I use the universe of brick-and-mortar, SNAP-authorized food retailer stores from USDA's Historical SNAP Retailer Locator Data.[32] For each SNAP-authorized store location, these data contain retailer name, address, geolocation, store type, and start and end dates of authorization to accept EBT benefits. I merge these data with the online roll-out data using state and retailer name. Appendix D provides more information on the matching procedure, which requires fuzzy string matching on retailer name. Observations from the retailer location data matched to the rollout data are marked as offering EBT online shopping, while unmatched observations are marked as not offering EBT online shopping. Generally, this assumes that if a retailer is listed as offering EBT online purchasing, then it offers it at all locations.[33] I fix the set of SNAP-authorized stores as of March 2020 to

[31] Only 21 state-retailers authorized for EBT online, or 1.56 percent, had their online authorization revoked during the study period.

[32] https://www.fns.usda.gov/snap/retailer-locator

[33] This may overstate the true presence of online EBT availability, particularly grocery delivery services, if adoption is not actually uniform across all the retailer's store locations. Occasionally, the roll-out data

avoid capturing endogenous entry or exit of stores in response to online shopping availability. The resulting merged data indicates, for every retailer with a physical, "brick-and-mortar" location authorized to accept EBT in-store, whether or not the store was also authorized to accept online EBT purchases each month through February 2025. These data allow me to define availability of EBT online across store types and geography.

Online-only food retailers Amazon is expected to capture a large share of the online grocery market,[34] but without a large presence of brick-and-mortar stores, its local availability is not captured by the rollout-store matched data. To more completely capture the set of online grocery options that EBT users face, I web scrape Amazon Fresh (and Whole Foods) delivery availability for every U.S. ZIP Code Tabulation Area (ZCTA) as of June-July 2023. To define exposure at the county-level over time, I crosswalk ZCTA's to county codes and merge to the online EBT roll-out dates for Amazon.

Later in the sample period, additional number of online-only retailers, including Thrive Market and Dashmart, also become EBT authorized. Unfortunately, I do not know where these retailers can deliver groceries, so these retailers are not captured in the online exposure measures.

4.2 Outcome data

STARS EBT redemption data To understand the effect of online EBT availability on EBT purchases, I use data from the U.S. Department of Agriculture, Food and Nutrition Service's Store Tracking and Redemption System (STARS) database. The STARS data provide the total amount of EBT benefits redeemed each month by state and store type and the number of unique households using EBT for each state-month.[35] For each state-

lists a specific location that offers online shopping, even though the retailer has more stores in the state. In this case, I assume that online purchasing is only available at the indicated location.

[34] According to Aparicio, Metzman and Rigobon (2024), Amazon held 35 percent of the online grocery market as of 2019.

[35] States are defined by the residence of households redeeming the benefit, rather than by the location of the store where benefits are redeemed.

storetype-month cell, I define the outcome as the total EBT benefits redeemed divided by the total number of households using EBT. Therefore, the outcomes can be interpreted as the average purchase amount for a given state and store type across all EBT-using households.

Although these data provide unique information on where EBT users spend their benefits, they have several limitations. First, these data cannot distinguish between SNAP, P-EBT, and S-EBT purchases due to how EBT benefit redemptions are recorded administratively. The reported data therefore represent EBT redemptions combined across programs. Second, these data record whether an EBT purchase was completed online (i.e. with an internet retailer), but they does not distinguish between purchases intended for pick-up versus delivery. Third, the data provided exclude eight states.[36] The analyses therefore represent effects for the remaining set of 43 states.

Finally, redemption data cells are redacted when they represent three or fewer stores. The redactions are expected to attenuate early estimates of the effect of online availability on EBT redemptions at internet retailers because these are likely to be small cells (e.g. just Walmart and Amazon). To more accurately represent the early effects of online availability, I adjust the main measure of online EBT purchases to include both EBT redemptions observed at internet retailers and total redemptions at redacted stores.[37] I show in Figure A.9 that these redactions affect early estimates of the effects of online shopping, as expected, so that using the adjusted measure is more accurate.

SNAP enrollment I collect county-month level SNAP enrollment data from digitized records compiled from individual state websites. SNAP households enrolled at the county-level is the primary outcome. These data cover counties accounting for 72 percent of the U.S. population.[38] I also use data on SNAP applications received, approved, and denied

[36]These excluded states are AK, AL, AR, AZ, CA, CO, CT, and DC.

[37]Specifically, I observe overall EBT redemptions totals, which represent redemptions at both redacted and non-redacted stores, so I back out total EBT redemptions among redacted stores. Although this total reflects multiple store types, I determine that the vast majority of these totals represent redemptions at internet retailers.

[38]Geographic coverage of county-level dataset is comparable to that of FNS; the FNS data covers counties accounting for 85 percent of the U.S. population (Ganong and Liebman, 2018). This dataset also improves

available from six states. Data availability is summarized in Table D.1.[39]

4.3 Local area covariates and controls

County characteristics I use county demographic characteristics to describe the traits of counties containing retailers authorized to accept EBT purchases in-store and online. I source these data from Opportunity Insights' Opportunity Atlas, which sources from the American Community Survey (ACS).

Unemployment data The unemployment rate is a key control for contemporaneous economic conditions: the primary factor besides policy changes which could affect SNAP enrollment. I collect monthly state- and county-level unemployment rates from the Bureau of Labor Statistics Local Area Unemployment Statistics series.

SNAP COVID Policy Data Trends in SNAP enrollment and redemptions during this period may reflect SNAP policy changes other than online purchasing availability. To account for these other factors, I use the SNAP COVID Policy Data, which provides monthly information on states' adoption of policies to adjust SNAP enrollment requirements and benefits during the COVID-19 federal public health emergency (Pukelis, 2024). A key factor is states' removal of "Emergency Allotments": emergency supplemental SNAP benefits implemented in response to the COVID-19 pandemic. Emergency Allotment removal was staggered across states between April 2021 and March 2023.

over FNS's SNAP Data Tables at the county level since it includes every month of enrollment, rather than just enrollment from January and July. Monthly data is useful for studying the enrollment changes that occurred during this relatively short time period of less than four years.

[39] Unfortunately, existing state-level data on P-EBT participation is not suitable for assessing the impacts of online shopping. Existing participation counts for P-EBT reflect the number of individuals issued benefits in a given month, which could reflect either a single or multiple months of benefits, depending on the state. See P-EBT Data Tables for additional details: https://www.fns.usda.gov/pd/supplemental-nutrition-assistance-program-snap.

5 Rollout of SNAP Online

5.1 Defining exposure to online EBT purchasing

I first describe the variation in online EBT purchasing availability where the *retailer* is the unit of analyses. Next, I aggregate statistics nationwide across SNAP-authorized, brick-and-mortar stores to describe the *store types* were EBT online is available. Third, I describe the geographic availability of delivery among Amazon: a key *online-only* retailer. Finally, I combine all of this information to define EBT online exposure at a *local* level.

Rollout of online purchasing authorization across retailers Figure 3 shows the timing of roll-out of online shopping for 20 retailers out of 407 operating EBT online, ranked by the number of states where they were online EBT-authorized by the end of the sample period. In most states, online grocery shopping was first rolled out through Amazon and Walmart and has since been expanded at other large retailers. Notably, most large retailers expand online groceries nationally all at once, rather than gradually state-by-state. Retailer behavior in this domain is consistent with other evidence that retailers adopt national, uniform strategies in product pricing (DellaVigna and Gentzkow, 2019). This suggests that, conditional on retailer, the rollout of SNAP online is not endogenous to changing local economic conditions. However, some select states are somewhat later in accepting EBT payments online, generating additional variation in online EBT exposure across states conditional on retailer. This variation is likely driven by state governments' limited capacity in setting up online EBT payment systems, rather than retailer choice to strategically delay online EBT availability in select states.

Retailers with physical, "brick-and-mortar" locations Among SNAP-authorized brick-and-mortar stores, online adoption is concentrated among four store types: super

stores, supermarkets, combination grocery / other stores, and convenience stores.[40] Figure 4 shows the percent of physical store locations offering online shopping over time among these four store types. Supermarkets and super stores were early-adopters of SNAP online, while some combination grocery/other and convenience stores adopted SNAP-authorization online later. Adoption among super stores accelerated at the beginning of the COVID-19 pandemic. In late 2020, adoption began among supermarket retailers. Adoption was approximately linear among both of these groups, which is consistent with limited capacity of federal and state government officials to review and authorize retailers. By the end of the sample period, more than half of all SNAP-authorized stores classified as super stores and supermarkets were authorized to accept EBT purchases online, respectively.

Later, around early 2024, several retailer chains in the combination grocery store and convenience store categories became authorized to accept EBT online. These represent a smaller share of store location in each category: about one-third of combination grocery stores and less than 3 percent of convenience stores could accept online EBT purchases by the end of the sample period. However, Table A.4 indicates that the total *number* of online-authorized combination grocery stores exceeds that of super stores and supermarkets, respectively. Thus, the availability of online purchasing among this set of stores may be significant, particularly for EBT users living in areas far from super stores and supermarkets.

What might explain the disproportionate share of supermarkets and superstores among early online adopters? Recall that supermarkets and superstores account for the vast majority of EBT benefits redeemed. Therefore, for these store types, it is more likely that the benefits of offering EBT online in terms of redemptions outweigh the upfront authorization costs. Many of these retailers likely already had grocery pick-up and delivery infrastructure set up for non-EBT customers, so the marginal cost of becoming authorized to accept EBT was relatively small. In contrast, among other large retailers who did not already offer online grocery purchasing for non-EBT users, the costs of both setting up such infrastructure and

[40] Table A.4 shows the number and share of stores in each category among (1) stores authorized to accept SNAP in-store only and (2) stores authorized to accept SNAP online and in-store.

obtaining SNAP authorization would be large. Note that I do not observe retailers' non-EBT entry dates into the online grocery market, so these are speculations.

For other types of retailers, it is possible that entering the online EBT market could be a strategic move or a reaction to market conditions. For example, Walgreens has been in decline in part due to the rise of consumer spending online at competing retailers (, 2025). Perhaps to counter falling sales, Walgreens became authorized to accept EBT benefits online nationally in April 2024. For dollar stores, becoming authorized to accept EBT online may be a strategy to capture a larger share of low-income grocery markets. Since changes to online EBT availability among combination grocery stores are relatively recent, the long-term effects of these changes on consumers remain to be determined.

Online-only food retailers Grocery delivery areas for Amazon Fresh are shown in Figure A.10. Generally, Amazon Fresh delivery is only available in major metropolitan areas. The limited footprint of Amazon Fresh delivery is likely due to the difficulty of setting up the infrastructure to deliver perishable food items. Notably, Amazon's grocery delivery footprint is significantly smaller than other large food retailers. As of early 2025, Walmart claimed it could offer same day delivery to 93 percent of American households (, n.d.). In comparison, I estimate that Amazon's footprint, recorded as of 2023, covered counties accounting for only 55 percent of the U.S. population. Figure A.10 also shows that Whole Foods delivery is more widely available compared to Amazon Fresh, but is still limited to metropolitan areas. The discrepancy between Whole Foods' and Amazon Fresh's delivery areas is somewhat surprising since Amazon now owns both grocery outlets, but is consistent with the importance of existing food stores in supporting the availability of online grocery purchasing for pick-up and delivery.

Aggregating to the county and state levels I aggregate the store-level and Amazon data to define exposure to online EBT purchasing by month, store type, and either state or county. I define online exposure among "large retailers" to include super stores, su-

permarkets, and Amazon, and I define online exposure among "small retailers" to include combination grocery/other and convenience stores. Exposure on the extensive margin is defined as having any store in the month, category, and geographic area that offers EBT online purchasing. Exposure on the intensive margin is defined as the number of stores offering EBT online purchasing per ten thousand people.[41] I define these measures at the state-month and county-month levels to match outcome data on EBT redemptions and SNAP enrollment, respectively.

Figure 5 presents maps showing the rollout of SNAP online among large retailers across counties and over time. In February 2020, just before the COVID-19 pandemic, SNAP online was available only in select states with early pilots. A year later, many counties nationwide contained a large retailer accepting EBT online. Online availability continued to grow nationwide among large retailers over the next few years. Notably, many rural counties, including those in the Great Plains region, have remained without access to EBT online among large retailers. 37 percent of this lack of online availability is due to a lack of any brick-and-mortar SNAP-authorized large retailer in the county. However, 63 percent of counties remain unexposed because the large retailers located there have not become authorized to accept EBT benefits online.

Figure 6 presents maps showing the roll-out of EBT online among small retailers across counties and over time. Through 2023, very few stores in these categories adopted SNAP online. As of early 2025, however, the availability of SNAP online among small retailers became widespread, reaching similar levels of saturation per capita as online availability among large retailers.[42] Still, online exposure even among small retailers remains zero in many rural counties.

[41] For both extensive and intensive exposure measures, I consider an area untreated if it does not have a physical store in the category. For example, many rural counties do not contain a brick-and-mortar supermarket or super store (or Amazon delivery), so they are coded as having no EBT online exposure among large retailers throughout the study period.

[42] This is mainly driven by three retailers: Walgreens, Family Dollar, and Rite Aid.

5.2 Describing selection of areas with EBT purchasing online

Online purchasing with EBT has the potential to improve food access among low-income households, particularly among those with mobility and transportation barriers and those living in rural areas or far from food stores. However, the potential for online EBT purchasing to address food access issues depends on whether retailers in those areas elect to participate in online EBT purchasing, and whether retailers locate their brick-and-mortar stores in those areas to begin with.

In this section, I describe the characteristics of places where EBT online is available to determine how much this policy may have affected food access nationwide. I compare places where EBT online is available to places where brick-and-mortar, SNAP-authorized food retailers are located. This helps to separate whether online EBT availability is driven primarily by geographic differences in food access among existing brick-and-mortar stores, or whether it is driven by other retailer incentives to enter the online market. This descriptive analysis helps to determine whether EBT online availability is well-targeted towards areas with low food access.

Table 1 describes the selection of locations with EBT online availability, separately for large and small SNAP-authorized retailers as of early 2025. The table shows that, among both large and small retailer categories, counties containing a store offering EBT online are more urban and higher-income compared to those that do not have an EBT online store. Counties exposed to EBT online are more urban and higher-income even when compared to counties with a brick-and-mortar SNAP-authorized store in the corresponding category. For example, among all counties with a large, brick-and-mortar SNAP food retailer, 13 percent are rural, but only 6 percent of counties with a large, online EBT food retailer are rural.[43] Similar patterns on urbanicity hold across counties with respect to small food retailers, although the differences are less stark because most counties have a small brick-and-mortar SNAP-authorized retailer.

[43] 19 percent of all counties in the sample are classified as rural during this period.

Table A.5 shows the same relationship between county characteristics and online availability but represented as county-level *predictors* of SNAP online availability from bivariate and multivariate regressions.[44] Bivariate regressions are useful for determining whether a county characteristic is associated with food access, whereas multivariate regressions help to narrow in on the *marginal* effect of a local characteristics, holding other characteristics constant. For example, we may be interested in knowing the relationship between a county's race/ethnicity population shares and food access regardless of other local characteristics (for equity reasons), as well as after conditioning on other local characteristics (to infer what may be driving retailer behavior).

These results show that, although a county's poverty share is positively associated with presence of a large, in-store SNAP retailer, local poverty share is negatively associated with presence of a large online SNAP retailer. In contrast, urbanicity and college-educated share are each positively associated with the presence of both in-store and online large SNAP retailers. These results suggest that larger retailers may have first joined the non-EBT online grocery market guided by higher-income consumers' preferences, and later sought EBT authorization for their existing food distribution networks.

Patterns are even more complex for small retailers. Urbanicity is negatively associated with having a small in-person SNAP retailer, but positively associated with having a small online SNAP retailer. Conversely, higher local population shares of racial and ethnic minorities are positively associated with having a small in-person SNAP retailer, but have a null or negative relationship with having a small online SNAP retailer. A county's college educated share is negatively associated with having an in-person small EBT retailer and with having an online small SNAP retailer. These patterns are consistent with these store categories generally targeting areas with low-income, minority consumers, although this relationship weakens when considering only their online EBT platforms. Across store categories and formats more generally, these complex patterns are likely due to different store types and

[44]Here, SNAP online availability is defined using the intensive measure: the number of SNAP-authorized stores (in-store or online) per ten thousand people.

formats trying to capture different segments of the consumer market, and facing different implementation costs to enter each market segment.

Overall, these analyses suggest that SNAP online availability is likely determined by online shopping availability among the general population, which is generally targeted toward higher-income demographic groups. Thus, while SNAP online purchasing may have the potential to address food access barriers among populations in rural and low food access areas, in reality, retailers focus online EBT purchasing availability in relatively higher-income and urban areas instead. As a result, EBT online purchasing availability is not well-targeted towards rural areas with low-income households and low-access to food stores, particularly among larger retailers.

6 Empirical Strategy

I next estimate effects on EBT redemptions and SNAP enrollment using variation in exposure to EBT online purchasing availability across place and time. I use a difference-in-differences research design where the treatment is an indicator for the availability of online grocery purchasing for EBT users within a geographic area (state or county) and category of stores (large or small retailers). I use the method for estimating average treatment effects from Callaway and Sant'Anna (2021), which is compatible with difference-in-differences designs with a binary treatment variable and staggered adoption. However, I present the analygous two-way fixed effects (TWFE) estimating equations for ease of interpretation.

The empirical approach is a difference-in-difference design using first exposure to EBT online within a geographic area. For county-level data, the corresponding two-way-fixed effects (TWFE) estimating equation is:

$$Y_{cst} = \sum_{r \in [\underline{r}, \bar{r}] \setminus \{-1\}} \beta_r \cdot \mathbf{1}(r = R_{cst}) + X_{cst} \cdot \boldsymbol{\pi} + Z_{st} \cdot \boldsymbol{\gamma} + \alpha_c + \delta_t + \varepsilon_{cst}$$

where Y_{cst} is the outcome, log of total SNAP enrollment or applications, in county c, state s,

and year-month t. R_{cst} is the time relative to the first exposure to EBT online in a given store category: either large or small food retailers. X_{cst} are county-level, time-varying covariates, including the unemployment rate. Z_{st} are state-level, time-varying covariates, including other state policies affecting SNAP enrollment that were adopted around the COVID-19 pandemic period (Pukelis, 2024).[45] I also include a control for the amount of P-EBT benefits issued each month, which may affect demand for SNAP benefits. County fixed-effects, α_c, capture time-invariant county characteristics that affect SNAP enrollment levels, such as demographic characteristics. Year-month fixed effects, δ_t, flexibly capture national trends, including the effects of the pandemic. Standard errors are clustered at the county level. The coefficients of interest are β_r: the percent effect of online exposure on SNAP enrollment r months after first exposure.

For EBT redemption outcomes which have data only at the state-level, I estimate an analogous equation with state and time fixed effects, and I omit time-varying controls:

$$Y_{st} = \sum_{r \in [\underline{r}, \bar{r}] \setminus \{-1\}} \beta_r \cdot \mathbf{1}(r = R_{st}) + \alpha_s + \delta_t + \varepsilon_{st}$$

Again, R_{st} is the time relative to the first exposure to SNAP online in a given store category: either large or small food retailers. In some state-level specifications, event time is relative to when Emergency Allotments are removed.[46]

I estimate event-study specifications using the approach from Callaway and Sant'Anna (2021). Across state- and county-level analyses, I use not-yet-treated groups as comparison groups. In state-level analyses, all states are eventually treated in the sample period. Therefore, all data is dropped from when the last cohort is treated, so that the last treated cohort becomes the "never-treated" cohort.[47] In the county-level data, there are some never-treated

[45] I include controls for Emergency Allotments, extended recertification periods, waived interview requirements, not offering face-to-face interviews, using reporting requirements in place of full recertifications, and waivers related to telephonic signatures.

[46] In these specifications, all data before March 2020—the month that Emergency Allotments were first implemented nationwide—is dropped.

[47] For exposure defined by large retailers, the last treated cohort is Alaska. For exposure defined by small

counties; however, recall that the set of never-treated counties is disproportionately rural. Therefore, comparing to the set of not-yet-treated counties makes the set of comparison groups more similar to the group of treated counties. The larger set of comparison counties should also improve precision (Baker et al., 2025).

This difference-in-differences approach requires an assumption of no anticipation of the treatment, meaning that the outcomes of SNAP participation and EBT redemptions were not affected by SNAP online expansions before these expansions actually occurred (Baker et al., 2025). This assumption is likely to hold in this setting since states and retailers typically did not announce authorization for EBT online until it became available, or only shortly before. Even if some individuals could anticipate online availability in their state, they could not act on it until online EBT purchases were first approved by their state. Therefore, premature responses to online EBT availability are unlikely, particularly for the EBT redemption outcomes.

This approach also requires the assumption of parallel trends of potential outcomes among treated and not-yet-treated counties in the absence of EBT online expansions. Virtually all of the outcomes considered show pre-trends close to zero under the chosen specifications. This suggests that the parallel trends assumption using not-yet-treated comparison groups may be reasonable.

7 Effects of online exposure on EBT redemptions

7.1 Effects of online exposure among large retailers

Figure 7(a) shows the mechanical first stage of online purchasing availability among large food retailers. When a state is first exposed to online purchasing, there are about 0.2 large food retailers offering online EBT purchasing per ten thousand people. This effect is mechanical because event time is defined relative to a state's first exposure to online

retailers, the last treated cohort includes 42 states.

purchasing. As more retailers adopt EBT online over time, this number grows to 0.4 within two years of first exposure.

Figure 7(b) shows the effect of online EBT exposure among large retailers on online purchases. As soon as online purchasing becomes available, EBT-using households begin making purchases online. Online purchasing continues to grow more than 18 months after initial adoption, reaching about $25 monthly spending per household.[48] Overall, online EBT redemptions grew steadily following their initial availability and increased more than $16 in the post-period overall, as indicated by Table 2.

Because SNAP participants typically spend all of their benefits within a month, if EBT-users were spending more online, they must have been spending less on in-store purchases. Indeed, Figure 7(c) shows that EBT households were spending less on in-store purchases, and Figure 7(d) shows that the overall decrease was driven by in-store purchases at large food retailers: supermarkets and super stores. This is perhaps not surprising and confirms the substitution patterns seen in national aggregate data (Figure 2). Initial online EBT availability is concentrated among large retailers, and when EBT households redeem more of their benefits online, they spend less in-store at those same kind of large food retailers.

Table 2 shows effect sizes on EBT redemptions for these and other store type categories. Changes in spending at store categories other than internet retailers or large food retailers is either not significant or economically meaningful. It is important to note that when households began spending more at internet retailers, they did not substitute away from other store types typically associated with less healthy foods, such as convenience stores. However, recall that spending at these smaller food retailers accounts for a relatively small share of all EBT redemptions.

These redemption data are at the state-by-store type level, so, unfortunately, they do not allow me to determine if it is the *same* households making substitutions from in-store to online purchases.[49] However, supplementary data suggest that these results are consistent

[48] Figure A.9 shows that these results are robust to excluding EBT redemptions at redacted stores.

[49] Since EBT households typically spend their benefits within a month, however, this seems like a reason-

with some EBT households substituting an online order for a typical grocery trip to a large food retailer. First, Figure A.8 shows that EBT purchases at internet retailers are slightly larger than purchases at supermarkets and super stores. This suggests that EBT transactions with internet retailers may have a similar size and composition to what households would otherwise buy at large retailers. Second, other USDA data suggests that roughly one-quarter of SNAP households ever shopped online in Fiscal Year 2023 (Figure 1). Therefore, these aggregate results likely reflect large responses among a small set of households, rather than similarly sized responses among all households. For instance, it is more reasonable to interpret the overall $16 per month increase in purchases at internet retailers as a roughly $64 increase among one-quarter of EBT users and a $0 increase among the remaining users, rather than a uniform $16 per month increase across all EBT users.

Moreover, since these redemption data are only at the state-by-store type level, rather than the retailer level, they also do not allow me to determine if households are substituting from in-store to online purchases *within* or *across* retailers. If households only switched from in-store to online *within* retailer (e.g. from Walmart in-store shopping to Walmart.com), then retailers' profit margins would remain unchanged and we would be unlikely to see downstream consequences on store entry and exits. However, if households switched from in-store purchases at Retailer A to online purchases at Retailer B, for example, then Retailer B could capture some of Retailer A's market share and associated profits. Early adopting retailers of EBT online may have been more likely to capture such profits.

7.2 Effects of online exposure among small retailers

Figure A.11 shows the effects of online EBT adoption among small retailers on EBT redemptions. Figure A.11(a) shows the mechanical first stage of online purchasing availability among small food retailers. When a state is first exposed to online purchasing among smaller format stores, there are fewer than 0.2 small food retailers offering online EBT purchasing

able assumption.

per ten thousand people. Again, this effect is mechanical. We see little growth in exposure to small EBT online over time.

Figure A.11(b) shows the effect of online EBT exposure among small retailers on online purchases, for which we observe no detectable effect. At the 95 percent confidence level, we can reject that small retailer EBT adoption increased online purchases by more than $3.58 per household per month. Figure A.11(c) also shows effects on in-store spending at the corresponding categories of combination grocery/other and convenience stores. If effects on in-store spending were comparable between large and small retailers, then we would see a corresponding decrease in in-store spending at small retailers. However, these specifications show no effect. Estimates in Table 2 confirm that the adoption of online EBT online among small retailers had no detectable effect on EBT redemptions in any store category.

Altogether, these results suggest that EBT consumers value online availability less among small compared to large food retailers. Trips to convenience stores and combination grocery/other stores likely fill a particular role in the shopping habits of EBT consumers—including smaller, more impromptu purchases—that are less transferable to an online platform. Smaller purchase sizes at these store types (in-person) also make the fixed costs of any pick-up and delivery fees large relative to the purchase size. These factors likely contribute to low-income consumers' limited adoption of online purchases at smaller-format stores. However, online adoption among smaller food retailers is relatively recent and may grow in utilization over time.

7.3 Effects of a SNAP benefit decrease on EBT Redemptions

A luxury good or service is defined as one for which demand increases more than proportionally as income rises, whereas for a necessity good, demand changes proportionally with income. Large benefit changes to SNAP during the study period allow for empirical tests of whether online grocery purchasing and other types of grocery spending are luxury or necessity services for EBT consumers. Following the COVID-19 pandemic, SNAP benefit

amounts were increased to the maximum allotment per household size under the Emergency Allotments policy (Pukelis, 2024). Between April 2021 and March 2023, states removed these supplemental benefits, decreasing SNAP benefit amounts issued by 42 percent. The staggered removal of Emergency Allotment SNAP benefits across states provides an exogenous change to EBT households' near-cash income, permitting an examination of effects on EBT purchase composition. If online purchases decrease by more than the decrease in benefit amounts, this suggests that online grocery shopping is a luxury service.

Figure A.12 and Table 3 show the effects of Emergency Allotment removal on monthly SNAP benefits issued and EBT purchases by store category per household. I also indicate their implied percent change and "elasticity" defined as the percent change of EBT spending in the indicated category divided by the percent change in total SNAP benefits issued: a proxy for income. I find that EBT redemptions decrease across all categories when Emergency Allotments are removed. However, spending at internet retailers and, to a lesser extent, convenience stores are highly elastic to SNAP benefit levels, whereas in-store spending at larger retailers is less responsive. The elasticity estimates imply that for every $1 decrease in SNAP benefits due to Emergency Allotment removal, online EBT redemptions decreased by $1.08, on average. This reflects an average decrease in SNAP benefits issued of $185 and online EBT redemptions of $9. Meanwhile, for every $1 decrease in SNAP benefits due to Emergency Allotment removal, EBT redemptions at supermarkets and super stores decreased by $0.70. The corresponding elasticity for convenience store spending is 0.93, reflecting an average decrease of $9 following Emergency Allotment removal.

These estimates demonstrate that, under lower benefit levels and thus lower levels of near-cash income, EBT households decrease spending relatively more at internet retailers and convenience stores and relatively less in-store at large retailers. Therefore, spending at online retailers may be considered a luxury service, in an economic sense, whereas spending at large food retailers may be considered a necessity. These findings underscore how online grocery purchasing may be valued by EBT consumers for convenience and other factors like

avoiding stigma. They also suggest that, because of additional fees and potentially higher product prices, online grocery purchasing may be a complement to higher benefit levels, or higher levels of income more generally.

It is important to note to what extent these estimates, identified off of large changes to SNAP benefit levels, may generalize to other changes in near-cash income. First, in the absence of Emergency Allotments, SNAP benefits are meant to account for 30 percent of a household's net income, so benefits changes due to Emergency Allotment removal represent large changes to low-income households overall, near-cash income. Smaller changes to SNAP benefits may not have as large of impacts on household spending patterns. Second, some online grocery shopping pilots for another nutrition program—the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)—are considering subsidizing pick-up and delivery fees for participating households with food access issues. If fee subsidies were implemented, the elasticity of benefit spending online with respect to income may be larger since the subsidizes would go towards fees directly, rather than increasing the allotment limited to eligible food items.[50] Redemption of WIC benefits online may also be valued even more compared to SNAP benefit redemption due to the unique frictions associated with using WIC program benefits (Barnes, 2021).

8 Results: The effects of online purchasing availability on SNAP enrollment

8.1 Effects on SNAP participation

Figure 8(a) shows the effects of online exposure on overall enrollment in SNAP. The plot suggests that SNAP enrollment grew steadily for roughly the first year of exposure, reaching

[50]This is more likely to hold under a behavioral model of mental accounting (Hastings and Shapiro, 2018) and less likely to hold if participants' spending on food is inframarginal to their benefit levels and they treat benefits as fungible with cash.

a maximum effect of more than 10 percent. Across the second year of exposure, effects on SNAP participation fell but remain positive. Table 4 suggests that online EBT availability increased SNAP participation overall by 4 percent, over a pre-period mean of 633 SNAP households per ten thousand.

What may account for changes in the effects of online availability on SNAP participation over time? To shed light on this question, Figure A.13(a) shows the estimated effects of online exposure on SNAP participation over calendar time, rather than event time.[51] These estimates suggest that effects on participation were largest around mid- to late-2021. Several factors may have contributed to these patterns. First, Figure A.15 shows that the U.S. was still facing a high level of COVID-19 severity in terms of deaths recorded during this period, so consumers likely valued the ability to shop for groceries online more during this period compared to later periods. Second, despite high levels of COVID-19 severity throughout 2020, SNAP participation increases may not have occurred earlier as it took some time for awareness of the policy to proliferate. Third, previous results suggest that EBT consumers utilized online purchasing more under higher benefit levels. Between April 2021 and March 2023, states began removing Emergency Allotments and reducing SNAP benefit levels, potentially making online availability relatively less attractive and resulting in smaller effects on SNAP participation.

The magnitude of these effects on SNAP participation are reasonably sized and non-negligible. As a point of comparison, Ganong and Liebman (2018) find that a 1 percentage point increase in the unemployment rate raises county SNAP enrollment by about 16 percent, and that eight SNAP policies implemented jointly raise enrollment between 22 percent and 34 percent, corresponding to roughly 3-4 percent per policy. In work on other SNAP policy changes around the COVID-19 pandemic, I find that Emergency Allotment removal led to a roughly 5 percent decrease in SNAP enrollment (Pukelis, 2024). Thus, the effect of online EBT availability on overall SNAP enrollment is within the realm of effect sizes of other

[51] Figure A.14 shows the corresponding effects by treated cohort.

policies on SNAP enrollment found in the literature.

8.2 Effects on SNAP applications

Figure 8 shows effects of online EBT purchasing availability on SNAP applications received, approved, and denied. Although pre-trends for these outcomes are somewhat noisy around zero, these results suggest that that online availability increased the number of SNAP applications across all three categories. Table 4 shows that online EBT availability increased applications received by 33 percent, applications approved by 20 percent, and applications denied by 59 percent overall.

Why there were larger effects on applications denied compared to applications approved remain unclear from these analyses. Although this period coincided with a series of policies which simplified SNAP application requirements (Pukelis, 2024), these specifications control for the presence of these policies at the state level. Therefore, differences in effects must arise from another factor. It is possible that households induced to apply for SNAP by online shopping availability may have been relatively higher income and thus more likely to be ineligible for benefits, contributing to relatively larger changes in applications denied. This could be true, for example, if these marginal applicants lived in relatively higher income neighborhoods where anticipated or realized stigma regarding SNAP receipt was higher. However, exploring this hypothesis would require detailed data on applicant characteristics. Therefore, a more complete understanding of the drivers of differential effects on applications approved and denied remains open for future work.

How much were overall enrollment effects driven by new applications versus retention? The estimates of overall SNAP participation and applications approved permit backing out the relative size of retention effects in a back-of-the-envelope calculation.[52] The estimates imply that nearly two-thirds of the overall effect of online EBT availability on SNAP participation can be attributed to retention of existing participants, whereas the remaining

[52]Note that each of these outcomes is estimated on a different sample of states due to data availability.

one-third can be attributed to new applications approved.[53] These estimates provide a lower bound of the effects on retention since households churning on the program may still appear as new applications approved if they fail a recertification and subsequently submit a new application to re-enroll. Overall, these results demonstrate that online EBT availability increased SNAP participation primarily by increasing program retention, suggesting that the policy reduced frictions associated with redeeming SNAP benefits.

8.3 Heterogeneity by urbanicity

Table 4 also shows effects on SNAP participation and applications by county urbanicity. These results suggest that positive effects on participation are driven primarily by urban counties. Effect sizes are largest among urban metro counties, somewhat smaller among urban non-metro counties, and smallest and statistically insignificant among rural counties. This general pattern holds across the outcomes of overall SNAP enrollment and SNAP applications received, approved, and denied.

What might account for these differences in effects across county type? One possible explanation is that the availability of online grocery ordering and delivery may actually differ by urbanicity: a factor not captured in my measure of online EBT exposure. Recall that my measure of online EBT availability generally assumes that *all* retailer store locations in the state begin accepting EBT purchases online. If, in reality, some stores in the state did not accept online EBT purchases or did not offer grocery delivery at certain store locations, then my exposure measure may overstate the true presence of online EBT availability, which may be more likely for rural areas. Another possible explanation is that lack of access to broadband internet may have limited some rural households' access to online EBT purchasing. Exploring the relationship between internet access and use of EBT online remains important for future work.

[53] First, the effects on SNAP households enrolled imply an overall increase of 25.29 SNAP households per ten thousand people. Meanwhile, the effects on SNAP applications approved imply an increase of 8.97 SNAP households per ten thousand people. Thus, the remaining effect of online EBT availability on SNAP households retained is 16.32 per ten thousand.

9 Conclusion

This paper documents the growth of the availability of EBT purchasing online and provides estimates of its effects on EBT spending across store types and SNAP enrollment. I find that large food retailers, including supermarkets and super stores, were more likely to become authorized to accept EBT payments online compared to other types of food stores. Later on, some smaller food retailers, including combination grocery/other stores and convenience stores began accepting EBT purchases online. Online EBT availability is disproportionately available in urban and relatively higher-income areas, particularly among larger food retailers. This implies that retailers did not target online EBT availability towards areas with limited food access. Rather, these results are consistent with retailers being initially motivated to establish an online grocery infrastructure to support higher-income consumers and secondarily seeking authorization to accept EBT benefits online.

Using data on EBT redemptions across store types, I show that online EBT purchases increase with availability among large but not small retailers. Correspondingly, when households spend more of their benefits online, they spend less in-store at large retailers. Using an exogenous decrease in SNAP benefit amounts, I show that online grocery shopping is a luxury service, in an economic sense, while spending at supermarkets and super stores are necessities. Finally, I show that the availability of online EBT purchasing increased SNAP participation, driven by urban areas and retention of existing participants. These results suggest that online shopping relieved several frictions associated with using EBT benefits.

These findings point to the importance of both government policy and third-party retailers in determining the level of administrative burden—or ease—associated with redeeming government benefits. Online purchasing with EBT benefits is arguably the most significant change to the delivery of modern U.S. nutrition assistance programs. The ability of federal and state government workers to authorize online EBT retailers swiftly in response to COVID-19 has been recognized as a major policy achievement.[54]Widespread use of online

[54]https://servicetoamericamedals.org/honorees/lisa-gifaldi-shelly-pierce-andrea-gold-oconnor-and-the-

purchasing among EBT users reveals that low-income consumers value the service greatly, and perhaps even more than higher-income consumers.

At the same time, effectiveness of public in-kind programs requires the buy-in of participating retailers. In-kind public benefits programs, including nutrition assistance programs and health insurance, rely on private, third-party organizations to deliver benefits to participants. On the one hand, this allows for choice and flexibility among beneficiaries: EBT users can choose the stores where they shop and the eligible goods that they buy. On the other hand, this limits program effectiveness based on retailers' choices; when retailers' incentives do not align with policy goals of in-kind programs, program effectiveness may be weakened. In this context, the potential impacts of online EBT purchasing may have been even stronger if retailers expanded access in areas facing limited food access. This suggests a role for government intervention to bridge the gaps. For example, to address the lack of (online or in-store) entry of retailers into low food access areas, governments could consider subsidizing retailer entry, or making requirements more flexible for retailers in otherwise low food access areas.[55]

These results also have implications for other in-kind benefit programs, including the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Relative to other food and nutrition programs, WIC benefits are difficult for participants to redeem due to a limited selection of eligible foods, fewer authorized retailers compared to SNAP, and complex rules regarding WIC-eligible items across states (Barnes, 2021). To modernize the program and address concerns about low take-up and redemption rates (Gleason et al., 2021), USDA announced a proposal in 2023 to begin authorization of WIC purchases online, and pilots have since begun in many states. The positive effects of online shopping on SNAP participation found in this study suggest that the proliferation of online shopping is expected to have similarly positive effects on WIC participation.

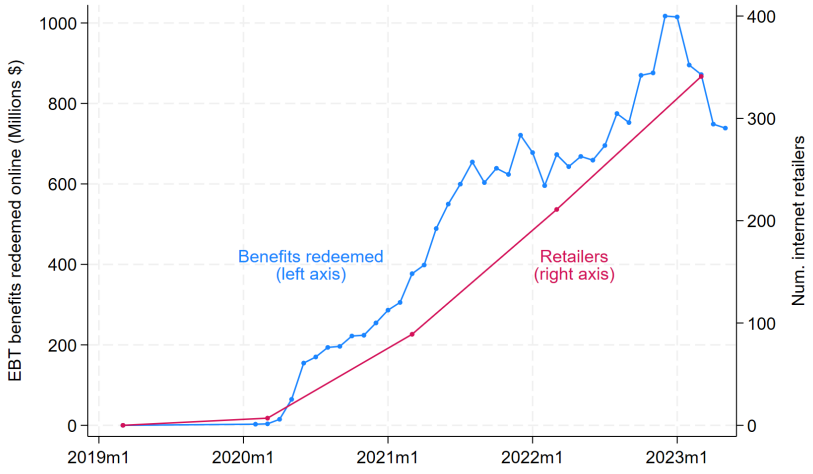
snap-online-purchasing-team/

[55]For example, there are already exemptions for in-store stocking requirements for SNAP-authorization among stores in areas where SNAP participants have very limited access to food (https://www.fns.usda.gov/snap/retailer/eligible).

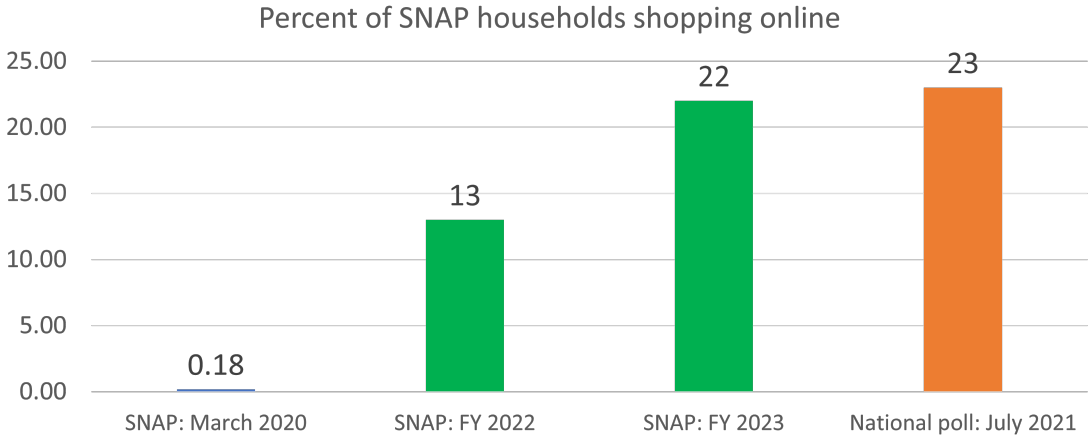
Moreover, policymakers could explore subsidizing grocery delivery fees to help some participants overcome food access challenges and afford more convenient ways to grocery shop. One state is already implementing subsidies for online grocery delivery fees for WIC participants in a pilot program.[56] In addition to improving low-income consumers' welfare, online grocery fee subsidies may have positive externalities on government budgets if, by reducing the time and travel costs associated with grocery purchasing, participants increase labor supply or improve childcare in response. These impacts may disproportionately affect women, since they are more likely to take on their households' grocery shopping responsibilities. A full evaluation of the costs and benefits of such measures remains to be explored.

[56] https://www.wicshopplus.org/projects/new-jersey-delivery-planning

10 Figures and Tables



(a) Online EBT Redemptions and Authorized Internet Retailers



(b) Percent of households ever grocery shopping online

Figure 1: Growth of Online EBT Benefit Redemptions and Retailers

Notes: Panel (a) shows the growth of online purchases with EBT nationally. The blue line plots total EBT benefits redeemed at Internet Retailers. The red line plots the total number of SNAP-authorized Internet Retailers for each fiscal year (displayed in March of each year). Panel (b) shows estimates of the share of all SNAP households (green) or U.S. adults (orange) who grocery shop online. For estimates for the SNAP population, numerators come from USDA press releases and denominators come from SNAP Data Tables. National poll data from Gallup's July 6-21 Consumption Habits survey, which estimates the percentage of U.S. adults who now say they order groceries online for pickup or delivery at least monthly. Poll information available online at https://news.gallup.com/poll/353090/grocery-shopping-online-fewerdining.aspx

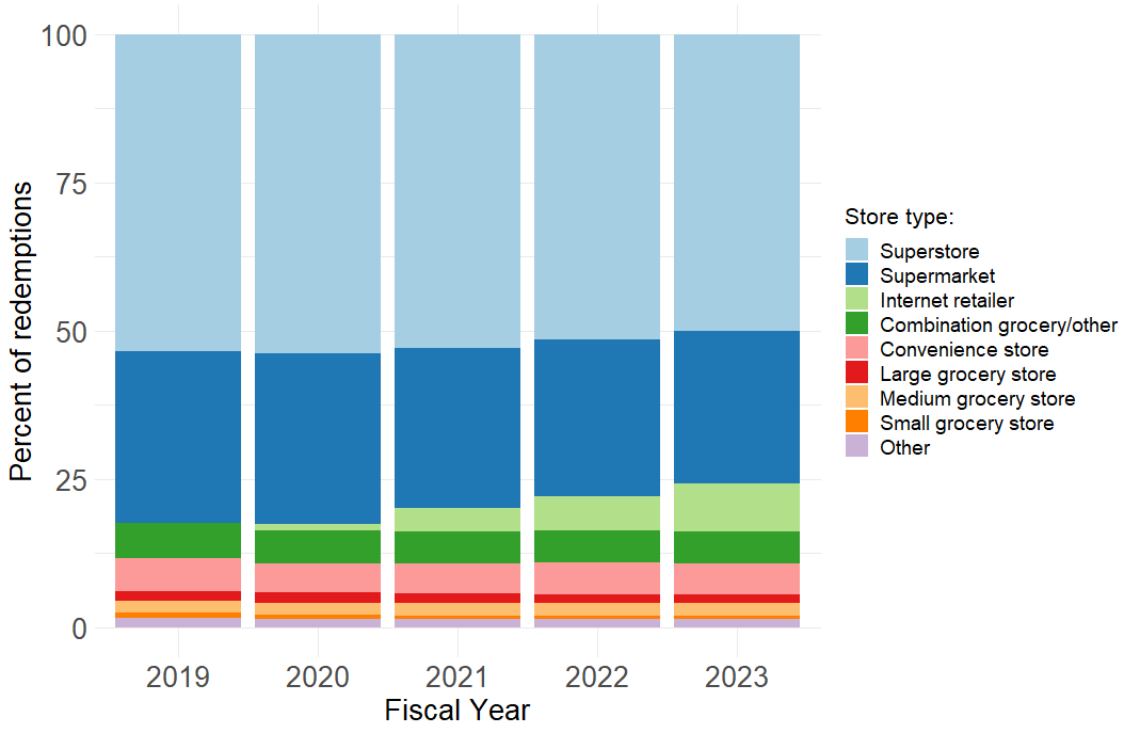


Figure 2: Aggregate EBT Redemptions by Store Type

Notes: The figure shows EBT redemptions by store type as a share of all EBT redemptions. "Internet retailer" redemptions represent online purchases. In FY 2023, 8.06 percent of all EBT benefits were redeemed at Internet Retailers. See Appendix B for detailed definitions of each store type. Data comes from USDA Retailer Management Year End Summaries.

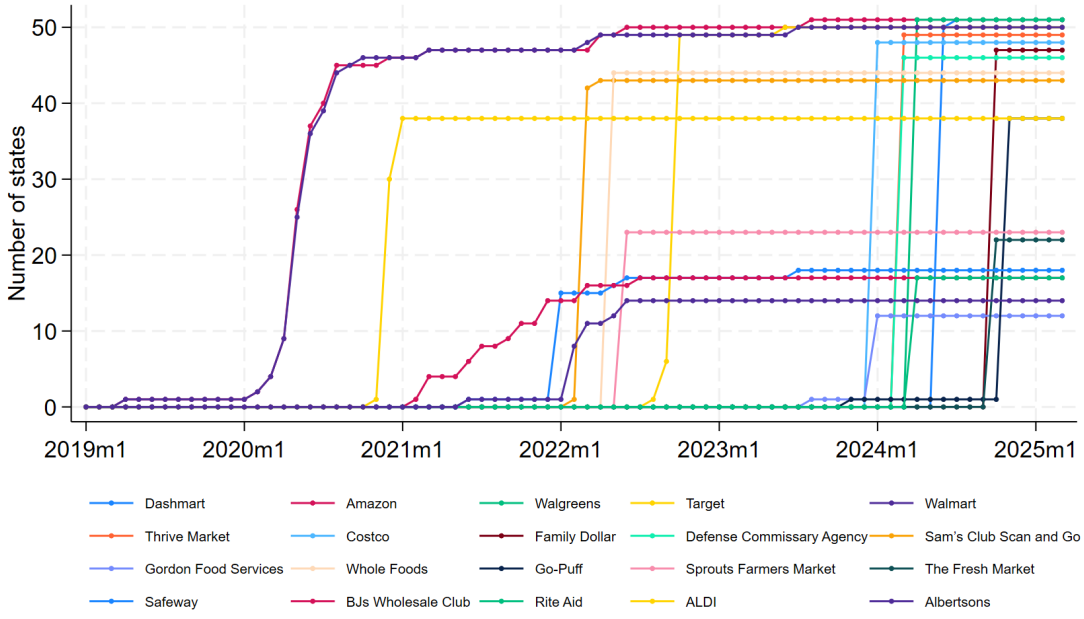


Figure 3: Roll-out of Online EBT Authorization for 20 Retailers

Notes: The figure shows, for each listed retailer, the number of states where that retailer was authorized to accept EBT online each month. The figure includes 20 (of 407 total) retailers which operated online, ranked by the number of states they operated in at the end of the study period. The District of Columbia is included, for a possible maximum of 51 states.

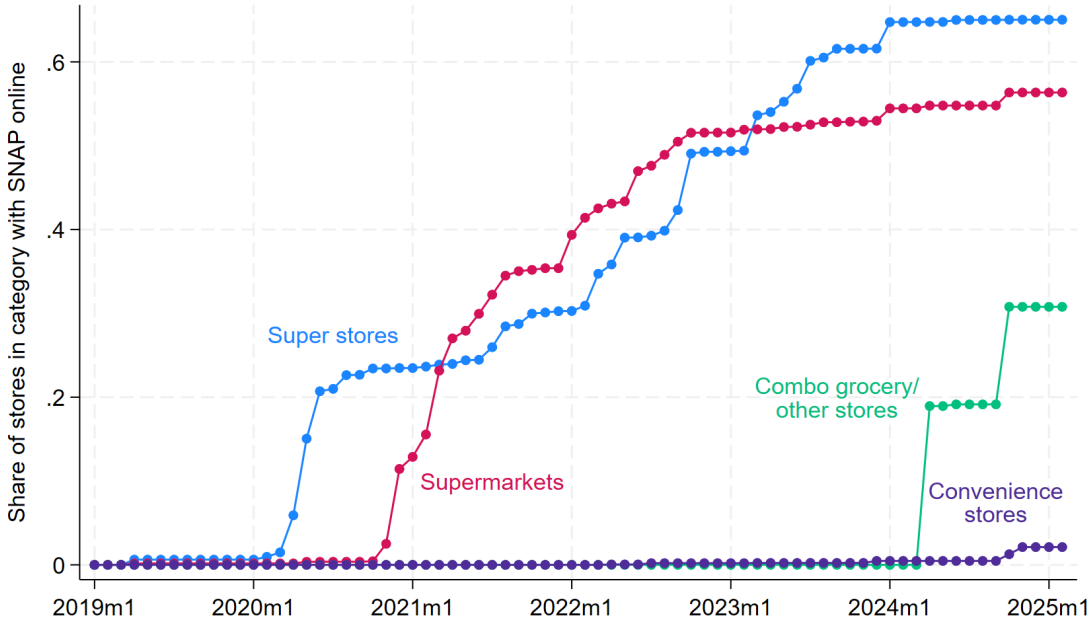


Figure 4: Rollout of EBT Online across Store Types

Notes: The figure shows the share of SNAP-authorized, brick-and-mortar store locations in each category that were authorized for SNAP online purchasing in the given month. The underlying set of store locations is fixed as of March 1, 2020. Online-only retailers, such as Amazon, that do not have physical, brick-and-mortar store locations are not represented.

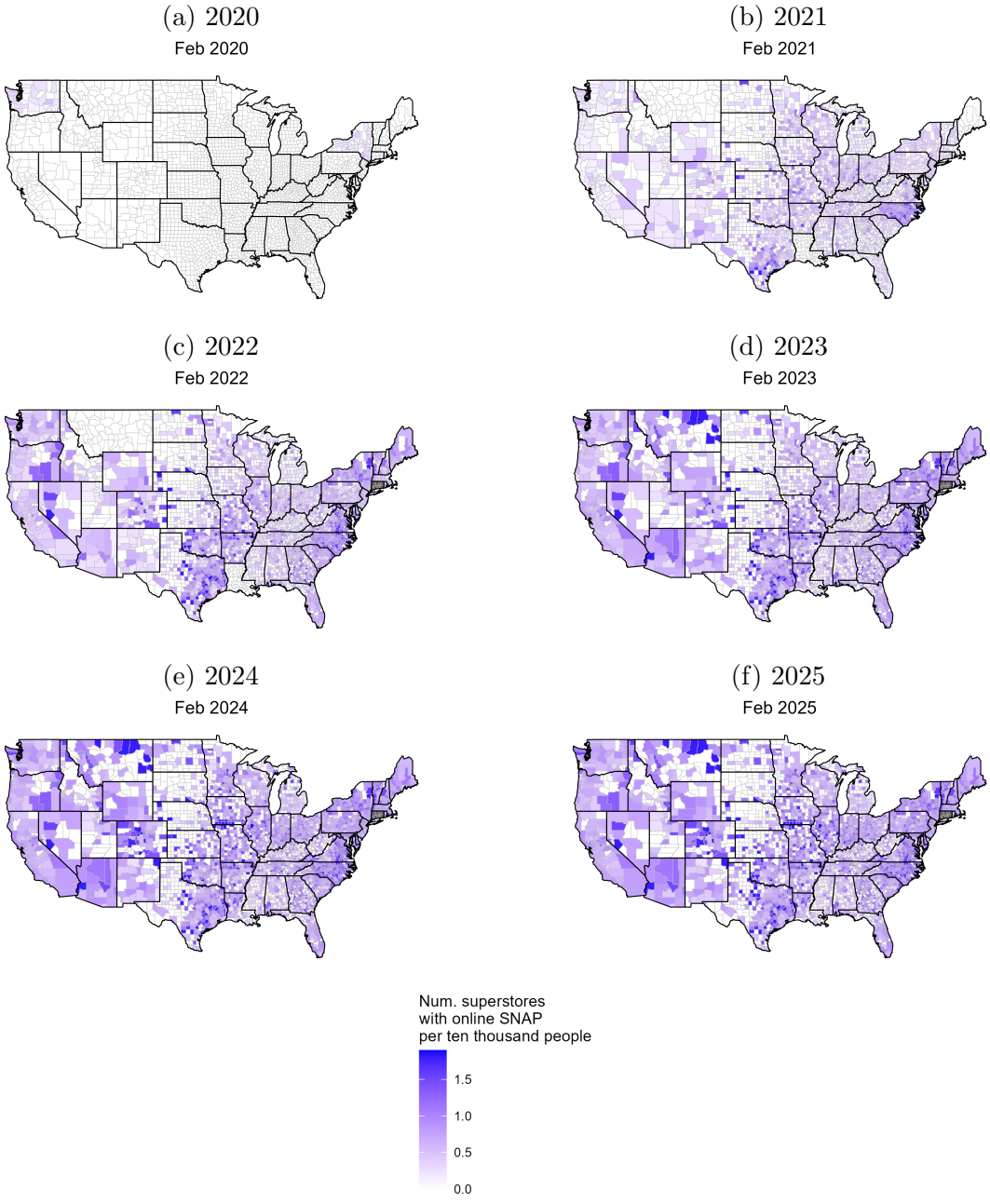


Figure 5: Roll-out of EBT Online Among Large Food Retailers

Notes: The figure shows the availability of EBT online purchasing by county over time among large food retailers. The availability of EBT online among large retailers is defined as the number of supermarkets and super stores located in the county authorized to accept EBT online per 10,000 people. The set of store locations is fixed as of March 2020. For counties where Amazon delivery is available, Amazon is counted as an additional store when online EBT purchasing becomes available.

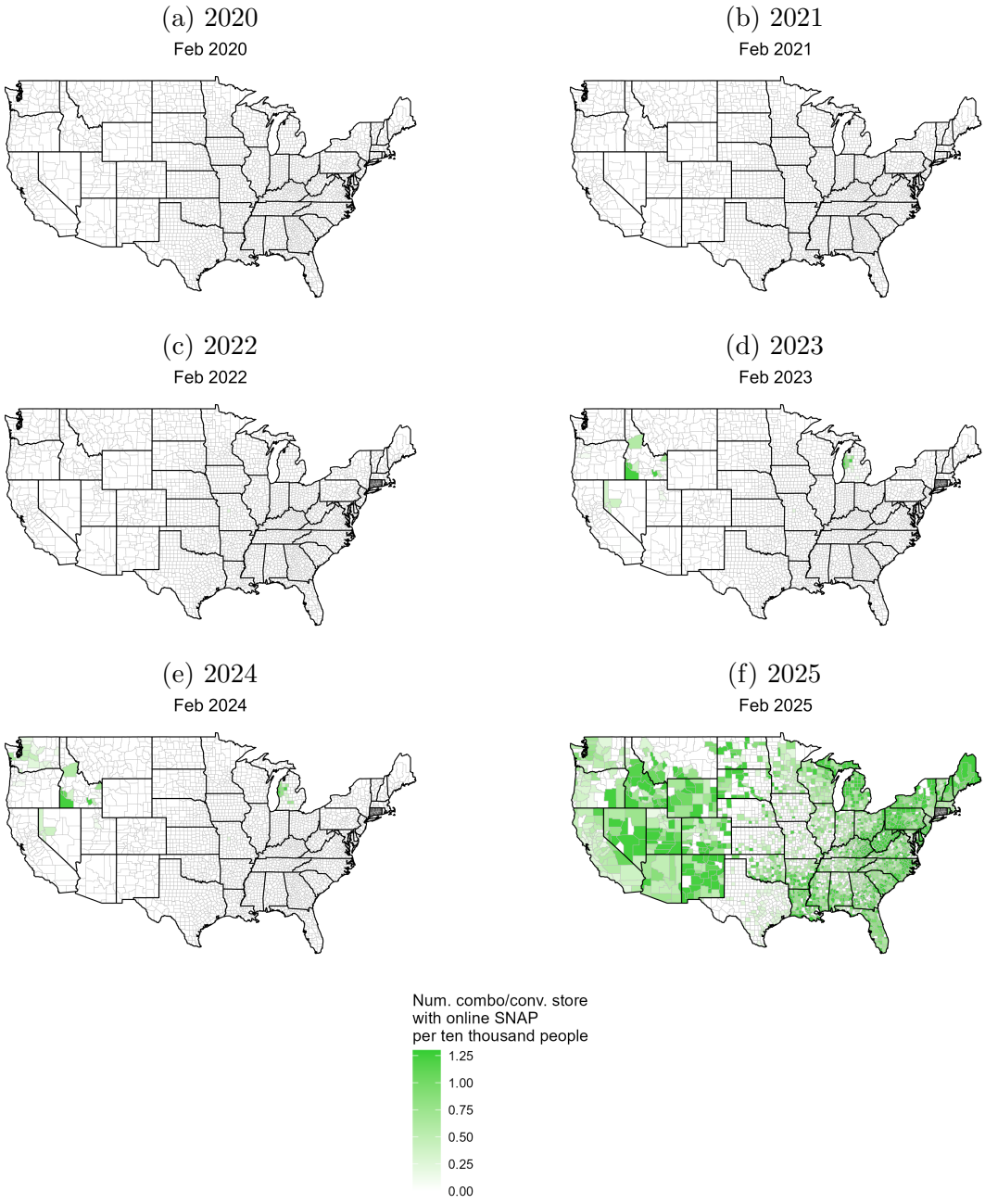
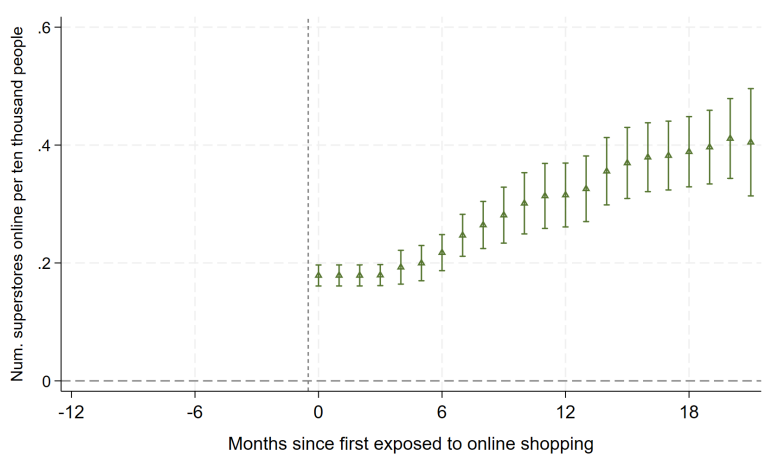
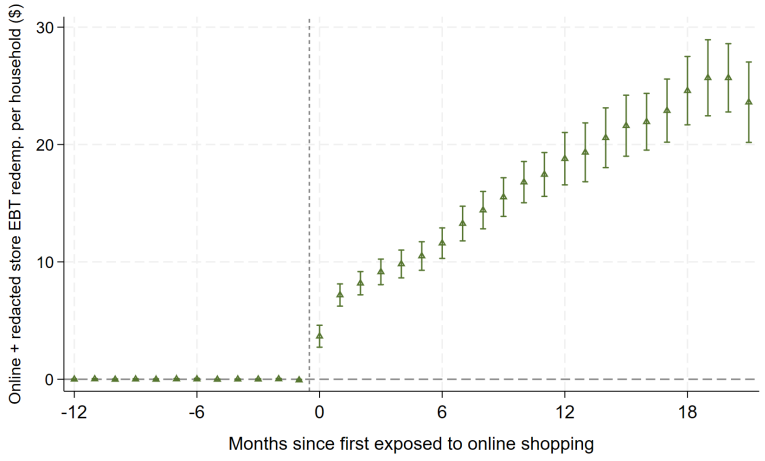


Figure 6: Roll-out of EBT Online Among Small Food Retailers

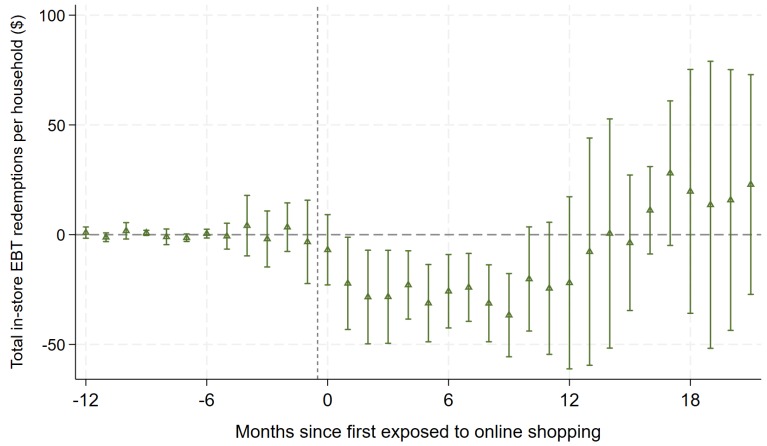
Notes: The figure shows the availability of EBT online purchasing by county over time among small food retailers. The availability of EBT online among small retailers is defined as the number of combination grocery/other stores and convenience stores located in the county authorized to accept EBT online per 10,000 people. The set of store locations is fixed as of March 2020.



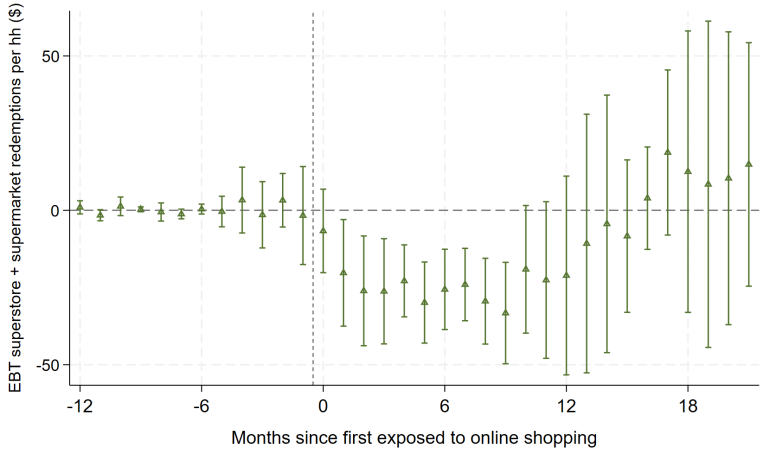
(a) Online EBT Exposure



(b) Online EBT Redemptions



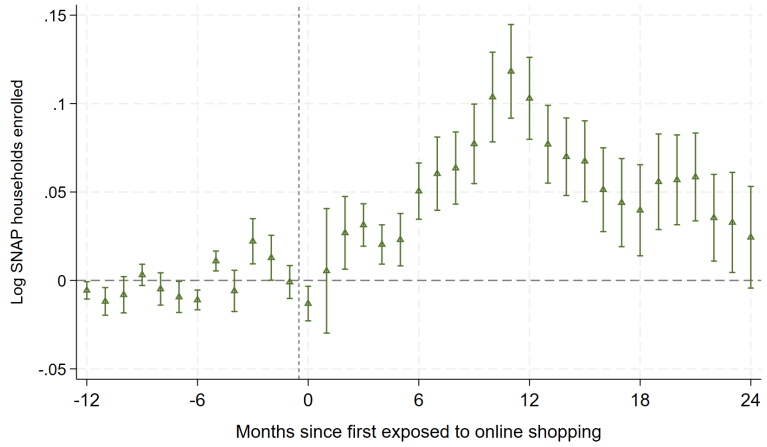
(c) Total In-store EBT Redemptions



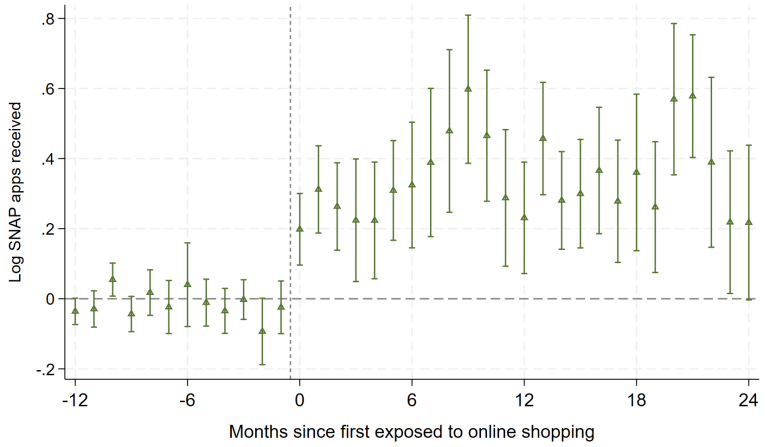
(d) In-store EBT Redemptions at Superstores and Supermarkets

Figure 7: Effects of Online Shopping Availability among Large Retailers on EBT Redemptions

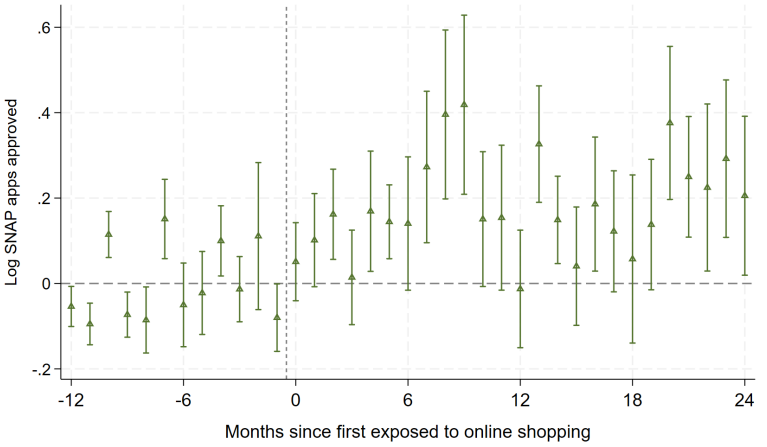
Notes: The figures show effects of online shopping availability among large food retailers on EBT redemptions. Event time is relative to the month that a state had online EBT purchasing available at a supermarket, super store, or Amazon. The outcome in Panel (a) is the number of online superstores and supermarkets (including Amazon) per ten thousand people: the mechanical first stage. The outcome in Panel (b) is monthly EBT redemptions at Internet Retailers and redacted stores per household. The outcome in Panel (c) is total monthly in-store EBT redemptions across all store types per household. The outcome in Panel (d) is monthly in-store EBT redemptions at super stores and supermarkets per household. The underlying data is at the state-month level. Plots created using Callaway and Sant'Anna (2021) estimators. Standard errors are clustered at the state level.



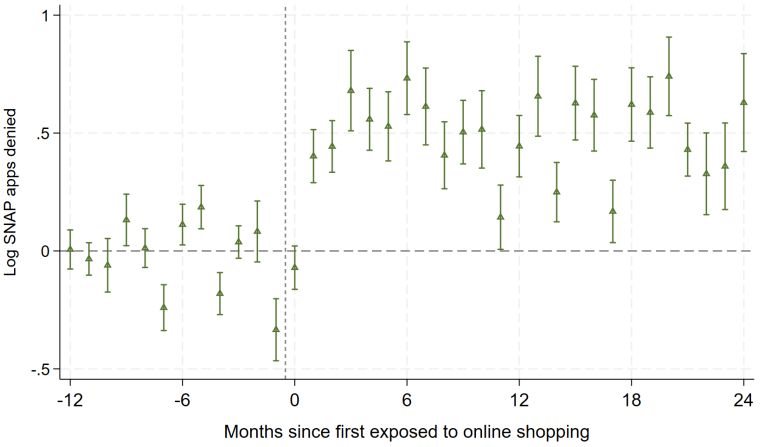
(a) SNAP Households Enrolled



(b) SNAP Applications Received



(c) SNAP Applications Approved



(d) SNAP Applications Denied

Figure 8: Effects of Online Shopping Availability on SNAP Participation

Notes: The figure shows the effects of online shopping availability among large retailers on SNAP participation. Event time is relative to the first month any supermarket or superstore in the county implemented SNAP online. The outcome in Panel (a) is the log of households enrolled in SNAP. The outcome in Panels (b), (c), and (d) are the log of SNAP applications received, approved, and denied in the indicated month, respectively. The underlying data is at the county-month level. Plots created using Callaway and Sant'Anna (2021) estimators and include controls for unemployment rates, other SNAP policies, and P-EBT issuance. Standard errors are clustered at the county level.

		Large food retailers				Small food retailers			
		Online		In-store		Online		In-store	
	Full sample	**None**	**Any**	**None**	**Any**	**None**	**Any**	**None**	**Any**
Mean hh income	62,111	56,599	64,025	56,899	62,664	58,881	63,330	74,799	62,061
Median hh income	50,226	46,246	51,609	47,050	50,564	48,568	50,852	58,748	50,193
Poverty share	0.16	0.16	0.15	0.15	0.16	0.15	0.16	0.11	0.16
White share	0.77	0.79	0.76	0.78	0.76	0.80	0.75	0.91	0.76
Black share	0.09	0.07	0.10	0.06	0.10	0.04	0.11	0.01	0.09
Hispanic share	0.09	0.08	0.09	0.11	0.09	0.10	0.09	0.04	0.09
College educated share	0.19	0.16	0.20	0.16	0.19	0.16	0.20	0.28	0.19
Single parent share	0.31	0.29	0.31	0.28	0.31	0.28	0.32	0.21	0.31
Foreign born share	0.04	0.03	0.05	0.03	0.04	0.04	0.05	0.03	0.04
Population	107,234	9,942	137,464	5,797	115,857	12,878	139,567	8,497	107,501
Urban metro	0.38	0.15	0.45	0.12	0.40	0.15	0.46	0.08	0.38
Urban nonmetro	0.43	0.26	0.49	0.08	0.47	0.41	0.44	0.17	0.43
Rural	0.19	0.58	0.06	0.80	0.13	0.44	0.10	0.75	0.19
N	3,051	776	2,275	287	2,764	823	2,228	12	3,039

Table 1: Selection of Counties with EBT Online Purchasing Availability

Notes: Table shows mean county characteristics for the full sample and for samples split by EBT online purchasing availability or in-store EBT authorized retailer availability as of February 2025. "Large" retailers include super stores, supermarkets, and Amazon (online only). "Small" retailers include combination grocery/other stores and convenience stores. Some counties containing no SNAP-authorized physical, brick-and-mortar stores are defined to have no EBT online availability.

	EBT redemptions per household ($)									
	Total	**Internet retailers**	**Total in-store**	**Super markets/ super stores**	**Super stores**	**Super markets**	**Combo grocery stores**	**Conven. stores**	**Grocery stores**	**Other stores**
Any large retailers online	4.98	16.13***	-11.15*	-12.91**	-7.94	-4.97	0.07	-0.10	1.37**	0.42*
	(6.44)	(0.80)	(6.32)	(5.29)	(5.91)	(5.28)	(0.87)	(0.47)	(0.62)	(0.23)
Pre-period mean	266.85	0.13	266.72	220.81	156.18	64.63	16.58	15.12	10.99	3.23
Percent change	2%	12447%	-4%	-6%	-5%	-8%	0%	-1%	12%	13%
N	1,634	1,634	1,634	1,634	1,634	1,634	1,634	1,634	1,634	1,634
Any small retailers online	10.61	0.19	10.42	9.16	3.94	5.23	1.05	-0.35	0.32	0.23
	(19.27)	(1.73)	(17.89)	(14.76)	(10.55)	(4.87)	(0.95)	(1.40)	(0.75)	(0.37)
Pre-period mean	353.83	18.00	335.83	276.71	195.73	80.98	20.49	19.88	14.77	3.98
Percent change	3%	1%	3%	3%	2%	6%	5%	-2%	2%	6%
N	2,709	2,709	2,709	2,709	2,709	2,709	2,709	2,709	2,709	2,709

Table 2: Effects of Online Exposure on EBT Redemptions

Notes: Table shows the effects of online EBT purchasing availability among large or small retailers on EBT redemptions by store type. Underlying data is at the state-month level. Regressions include state fixed effects and time fixed effects. Standard errors are clustered at the state level. Online exposure among large retailers is defined within the store categories of supermarkets and super stores, including Amazon. Online exposure among small retailers is defined within the store categories of combination grocery/other and convenience stores. Outcomes are redemption totals for a given store category divided by the unique number of households using EBT. Estimation uses the approach from Callaway and Sant'Anna (2021) with not-yet-treated units.

		EBT redemptions per household ($)									
	SNAP benefits issued	**Total**	**Internet retailers**	**Total in-store**	**Super markets/ stores**	**Super stores**	**Super markets**	**Combo grocery stores**	**Conven. stores**	**Grocery stores**	**Other stores**
After EA removal	-184.87***	-126.08***	-9.06***	-117.02***	-94.43***	-67.30***	-27.13***	-7.11***	-9.01***	-5.36***	-1.11***
	(16.50)	(9.87)	(1.22)	(9.28)	(7.47)	(6.98)	(3.40)	(0.80)	(1.10)	(1.07)	(0.34)
Pre-period mean	444.89	412.13	20.27	391.86	323.65	228.02	95.63	22.98	23.33	17.15	4.74
Percent change	-42%	-31%	-45%	-30%	-29%	-30%	-28%	-31%	-39%	-31%	-23%
Elasticity	1.00	0.74	1.08	0.72	0.70	0.71	0.68	0.74	0.93	0.75	0.56
N	1,505	1,505	1,505	1,505	1,505	1,505	1,505	1,505	1,505	1,505	1,505

Table 3: Effect of Emergency Allotment Removal on EBT Redemptions

Notes: Table shows the effects of removing Emergency Allotments on EBT issuance and redemptions by category. The first column shows effects of the policy on total SNAP benefits issued per household. Other outcomes are redemption totals for a given store category divided by the unique number of households using EBT. The "pre-period" refers to the period from March 2020, when Emergency Allotments was implemented, until it was removed between April 2021 and March 2023, depending on the state. Elasticity refers to the elasticity of EBT redemptions in that category with respect to total SNAP benefits issued. Standard errors clustered are at the state-level. Estimation uses the approach from Callaway and Sant'Anna (2021) with not-yet-treated units.

	Log SNAP Enrollment				
	Households	**Apps received**	**Apps approved**	**Apps denied**	**Online exposure**
Full sample					
Any large retailers online	0.04***	0.33***	0.20***	0.59***	1.02***
	(0.01)	(0.07)	(0.06)	(0.09)	(0.04)
Pre-period mean (per capita)	632.25	70.59	44.85	24.72	–
N	100,826	19,795	19,795	16,015	186,880
Urban metro counties					
Any large retailers online	0.09***	0.53***	0.34***	0.84***	0.74***
	(0.03)	(0.09)	(0.08)	(0.13)	(0.03)
Pre-period mean (per capita)	565.90	64.22	38.36	23.58	–
N	41,364	8,724	8,724	7,884	69,187
Urban non-metro counties					
Any large retailers online	0.02**	0.38***	0.19***	0.64***	1.01***
	(0.01)	(0.09)	(0.04)	(0.10)	(0.04)
Pre-period mean (per capita)	684.64	79.26	52.63	26.14	–
N	42,390	7,774	7,774	6,139	79,367
Rural counties					
Any large retailers online	0.02	0.21	0.30*	-0.19	4.31***
	(0.04)	(0.25)	(0.17)	(0.24)	(1.15)
Pre-period mean (per capita)	668.41	61.62	40.20	24.41	–
N	17,212	3,098	3,098	1,898	38,549

Table 4: Effects of Online Shopping Availability on SNAP Participation

Notes: The table shows the effect of online EBT exposure among large retailers on SNAP enrollment. Underlying data is at the county-month level. Standard errors are clustered at the county level. Outcomes are the log of SNAP enrollment and online exposure. Online exposure among large retailers is defined as number of online stores within the store categories of supermarkets and super stores, including Amazon per ten thousand people. "Pre-period mean" lists the pre-period average of the corresponding SNAP enrollment measure per ten thousand people. Outcomes are not available for all states; for details on data availability, see Table D.1. Estimation uses the approach from Callaway and Sant'Anna (2021) with not-yet-treated units and controls for unemployment rates, SNAP policies, and P-EBT issuance.

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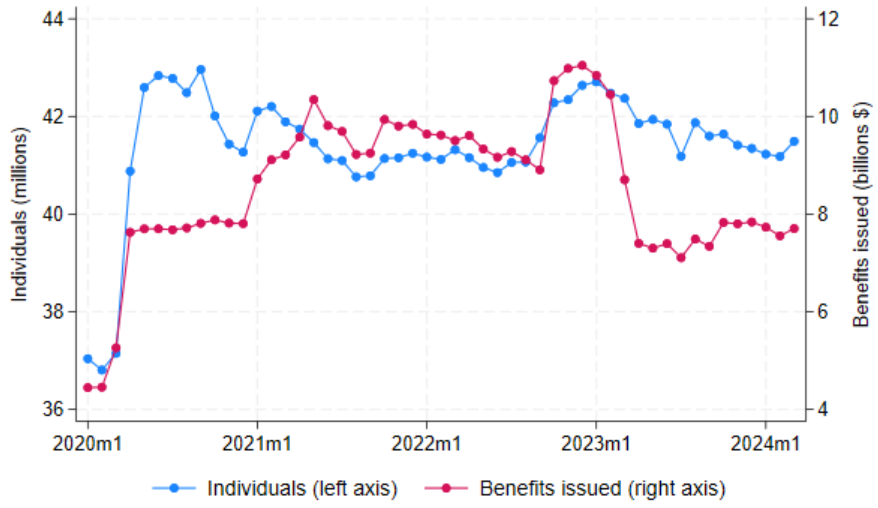
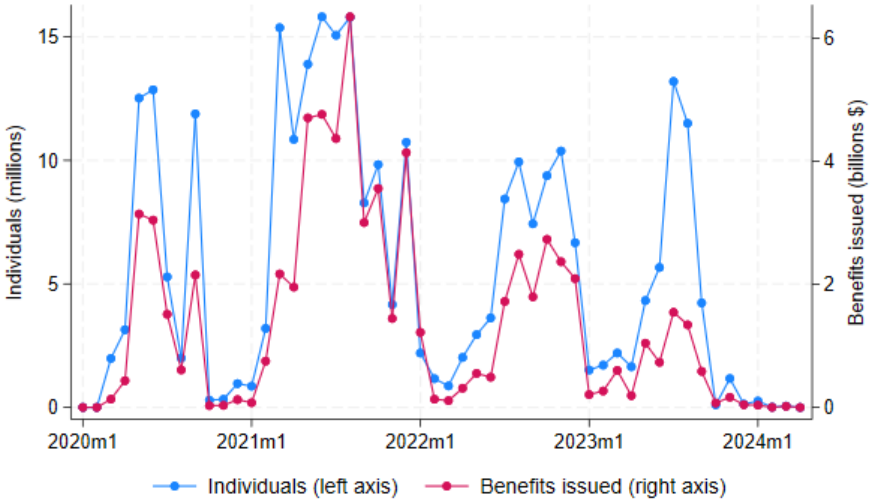
A Appendix Figures and Tables



(a) SNAP



(b) Pandemic EBT

Figure A.1: SNAP and P-EBT National Issuance and Enrollment

Notes: Includes 50 states and DC. Data from SNAP Data Tables (FNS, 2024*a*). P-EBT participant totals should be interpreted with caution. See text and source for additional details.

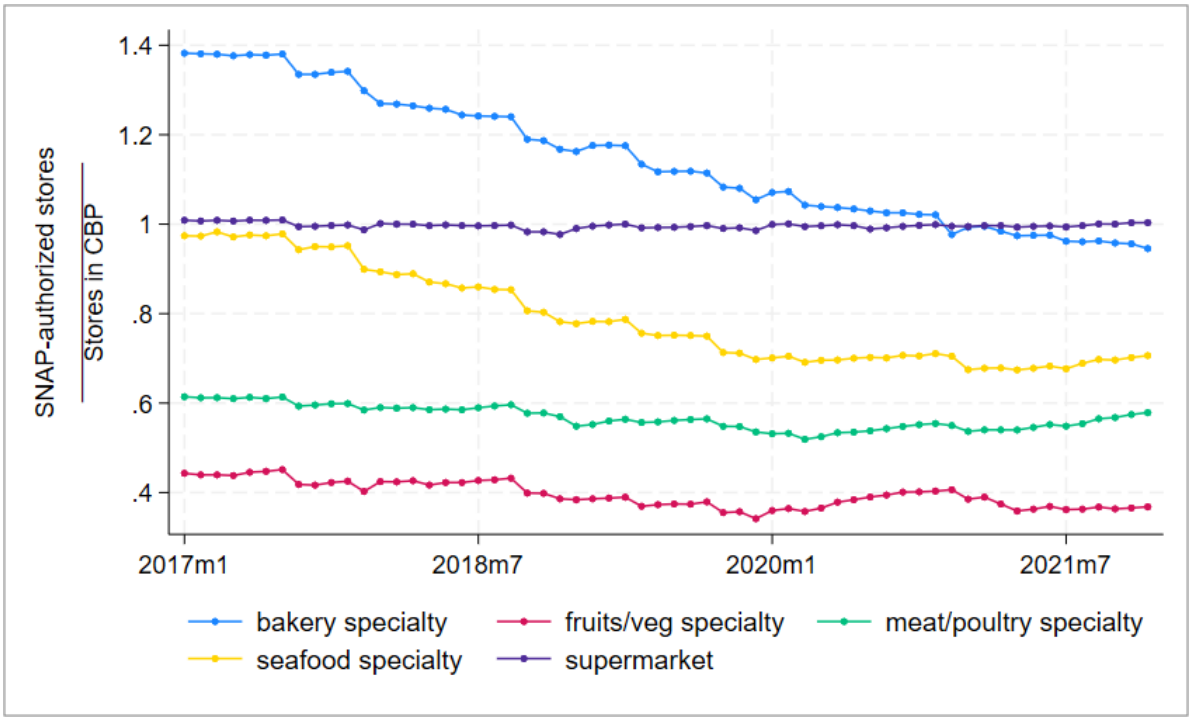
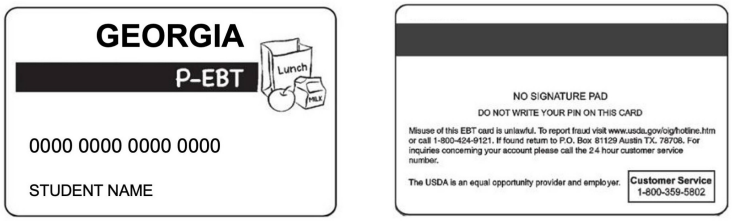


Figure A.2: Share of store categories that are SNAP authorized

Notes: For each category, I compare national store counts in the SNAP retailer data (numerator) to national store counts from County Business Patterns (denominator). County Business Patterns is yearly, so I expand each observation to the full calendar year. County Business Patterns uses NAICS codes and SNAP retailer data uses its own classification of store types, so I harmonize categories manually. Convenience stores are excluded because frequent ownership changes likely overstate the number of convenience stores in the SNAP retailer data. Information on other store types is not available because there is not a clear corresponding category across datasets. There is likely measurement error in shares for several reasons: (a) differences in store type categorizations across the two datasets, (b) the timing of data collection does not align (yearly vs. monthly), (c) there are duplicate listings of the same store in the SNAP data due to re-authorization or ownership changes, and/or (d) a store is marked as authorized in the SNAP retailer data but has actually closed. Shares may be less than 1 if not all stores in the category are SNAP authorized. "Supermarket" includes the following USDA store type categorizations: large grocery store, medium grocery store, small grocery store, supermarket, superstore, wholesaler.

(a) SNAP



(b) Pandemic EBT

(c) Summer EBT

Figure A.3: SNAP, P-EBT, and S-EBT Cards

Source: SNAP images retrieved from https://www.fns.usda.gov/snap/online-purchasing-pilot. P-EBT images obtained from https://allongeorgia.com/floyd-schools/fcs-families-receive-p-ebt-benefits-from-dfcs/. S-EBT images obtained from https://www.nj.gov/summerebt/recieve-benefits/. Pandemic EBT and Summer EBT cards look nearly identical across states.

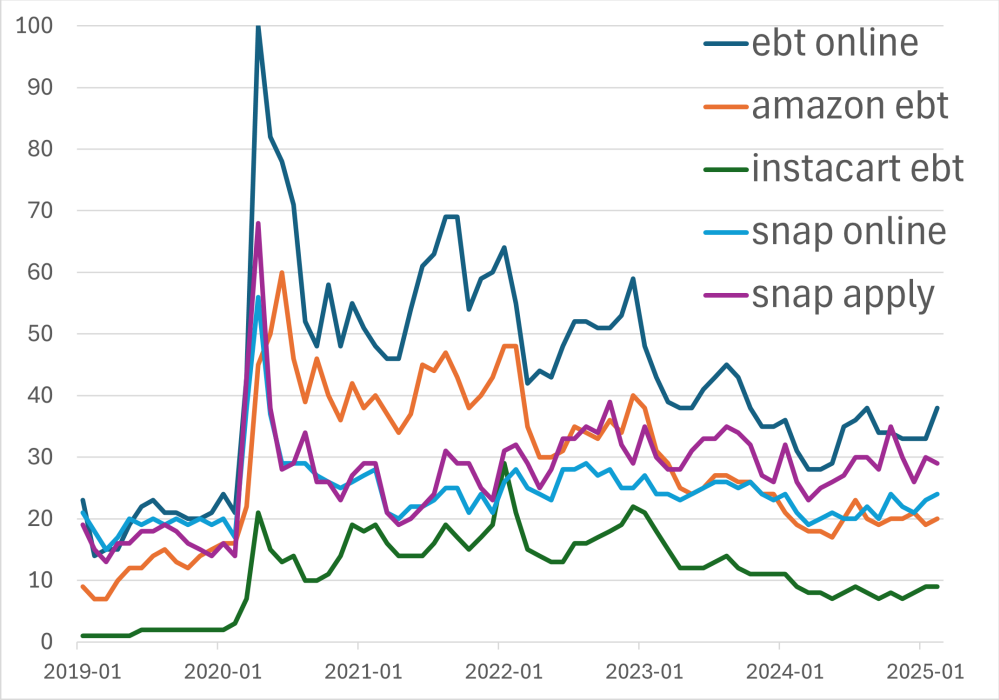


Figure A.4: Interest in SNAP online: Google Trends

Source: https://trends.google.com/trends/explore

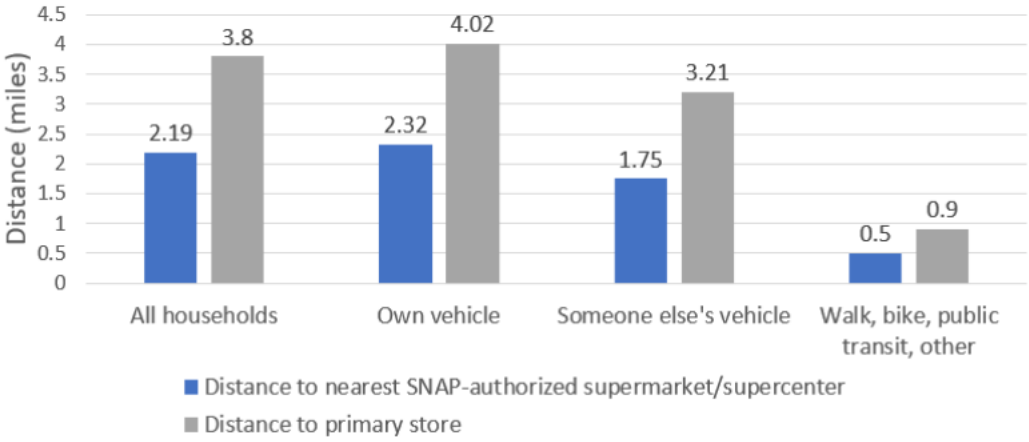


Figure A.5: Average household does not grocery shop at closest store

Notes: Broken down by primary method of travel to grocery store.
Data Source: Ver Ploeg et al. (2015)

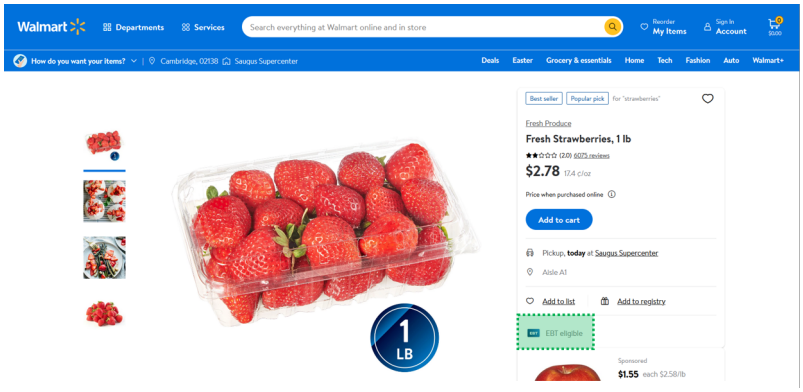


Figure A.6: Grocery shopping online screenshot

Notes: Green box highlighting EBT eligibility added.
Source: Screenshot retrieved from http://www.walmart.com

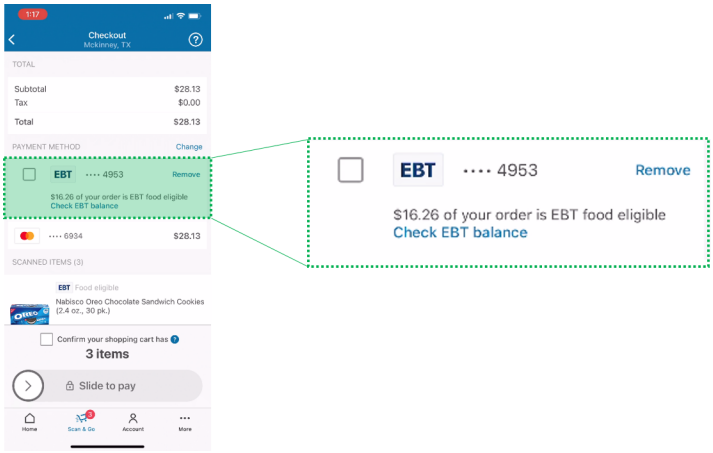


Figure A.7: Online payment screenshot

Notes: Green box highlighting EBT eligibility added.
Source: Screenshot retrieved from https://corporate.samsclub.com/newsroom/2022/03/08/theres-even-more-to-love-about-scan-go-shopping-now-offering-more-member-convenience-and-accessibility-with-ebt

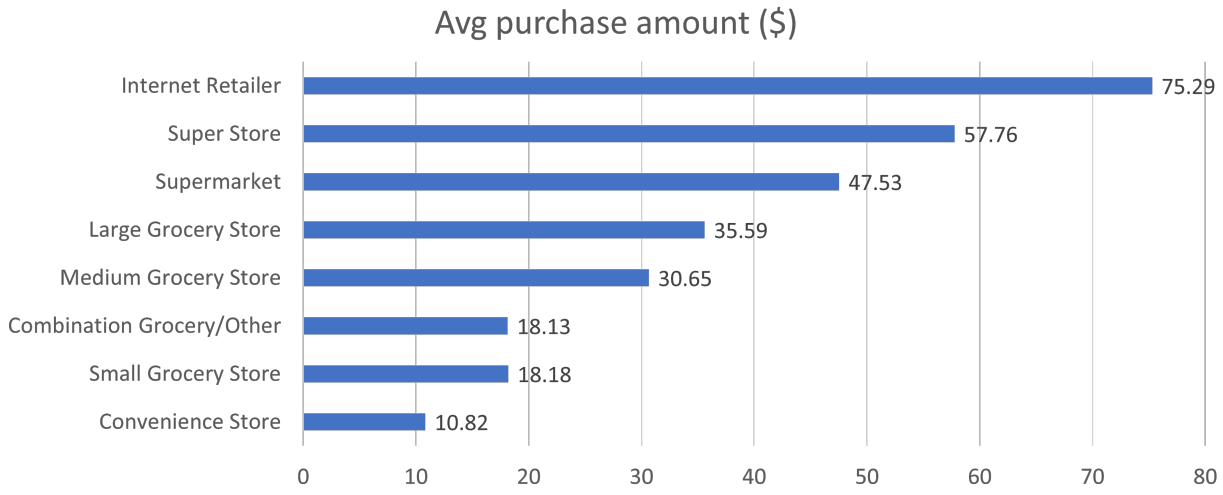


Figure A.8: EBT average purchase amount by storetype

Source: SNAP Retailer Management Year End Summary Dashboard – Fiscal Year 2023. U.S. Department of Agriculture, Food and Nutrition Service. https://www.fns.usda.gov/data/snap-retailer-management-dashboard

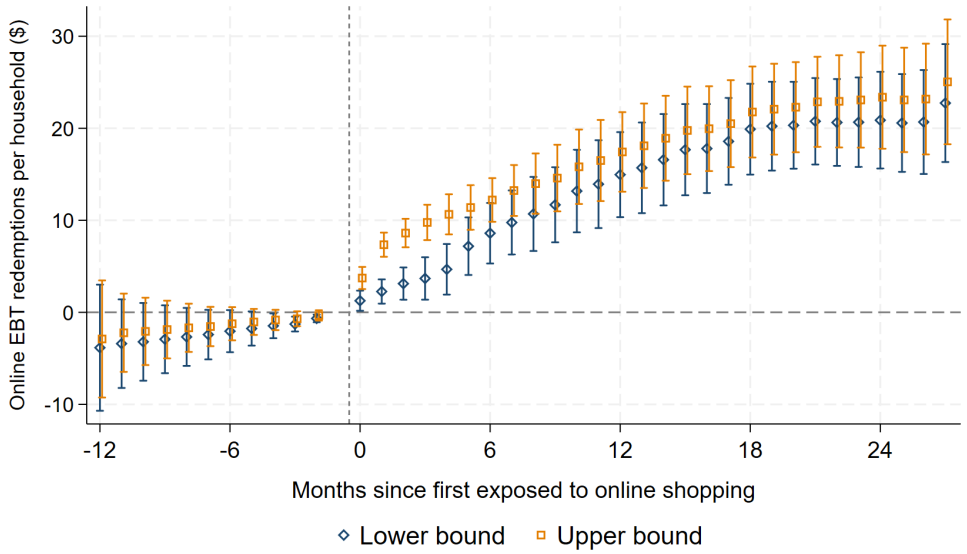
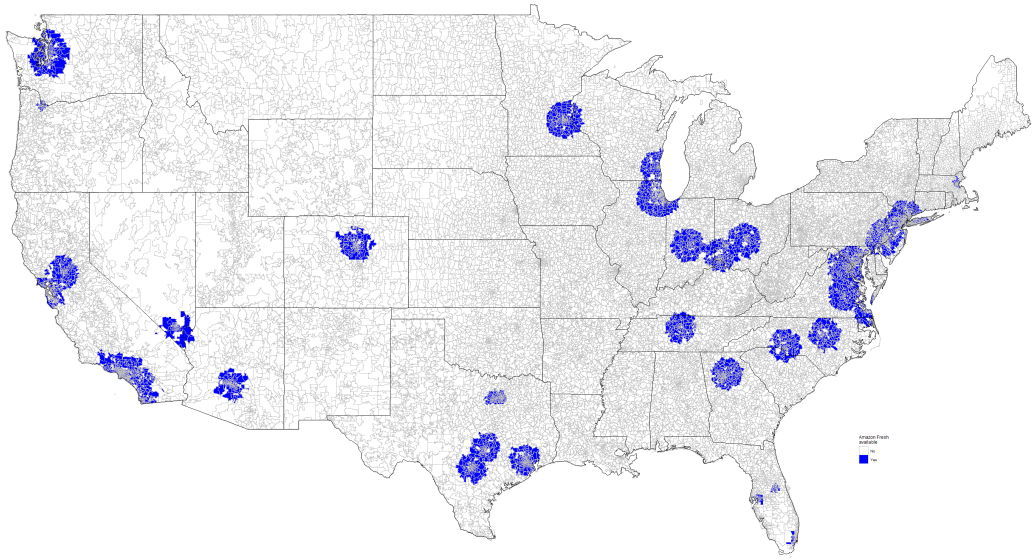
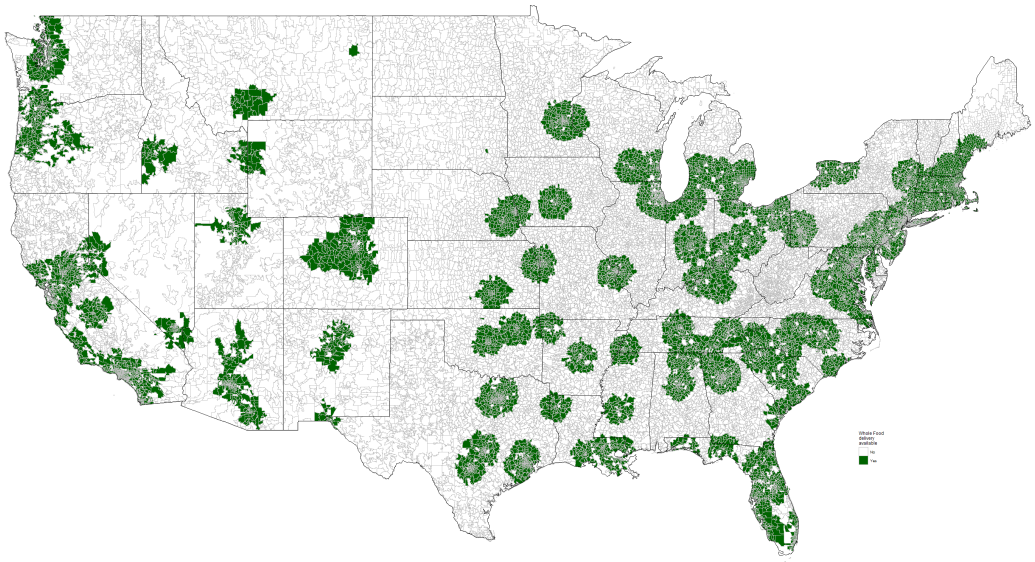


Figure A.9: Effects of Online Shopping Availability among Super stores and Supermarkets on EBT Redemptions

Notes: Plot shows two-way fixed effects estimates of the effect of online EBT exposure among supermarkets and superstores on online EBT redemptions. The blue series shows the effects on EBT redemptions that are directly labeled as purchases at internet retailers: a lower bound on total EBT purchases. The orange series shows the effects on both internet retailer redemptions and calculated redemptions at stores originally redacted from the data due to small store cell sizes, which are likely also internet retailers. The latter outcome is the primary outcome used in the main text.



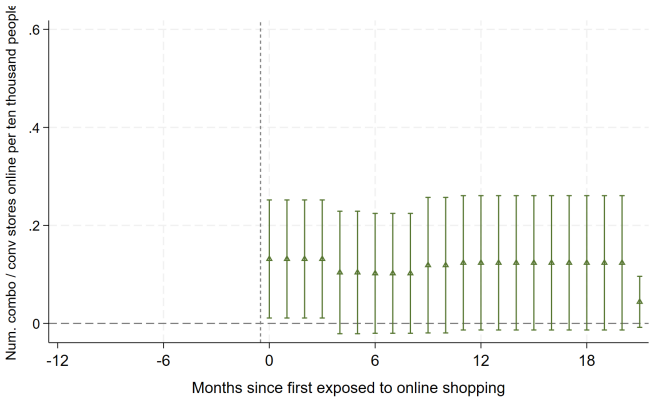
(a) Amazon Fresh



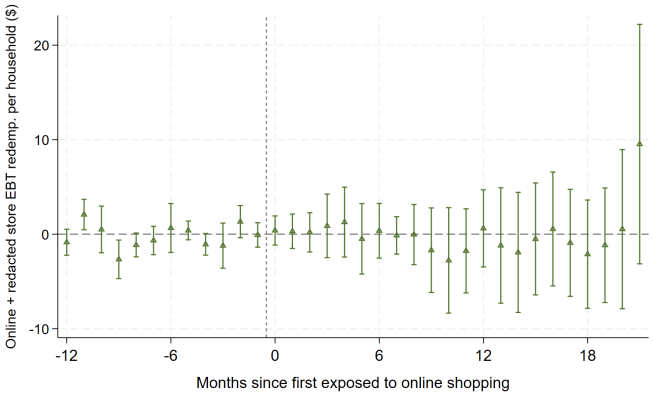
(b) Whole Foods

Figure A.10: Availability of Amazon-affiliated grocery delivery by ZCTA

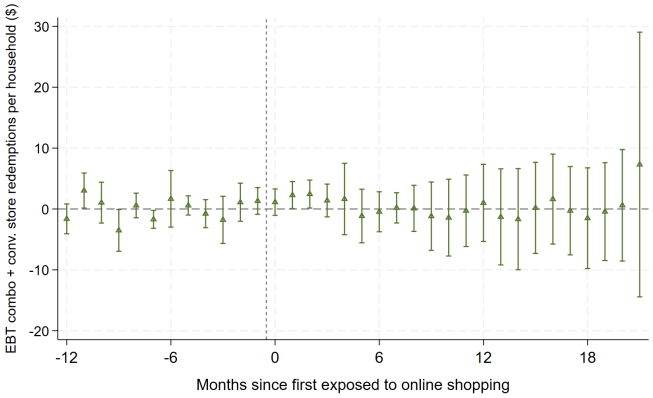
Notes: Plotted at the ZIP Code Tabulation Area (ZCTA) level. Queried from Amazon's webpage as of June/July 2023.



(a) Online EBT Exposure



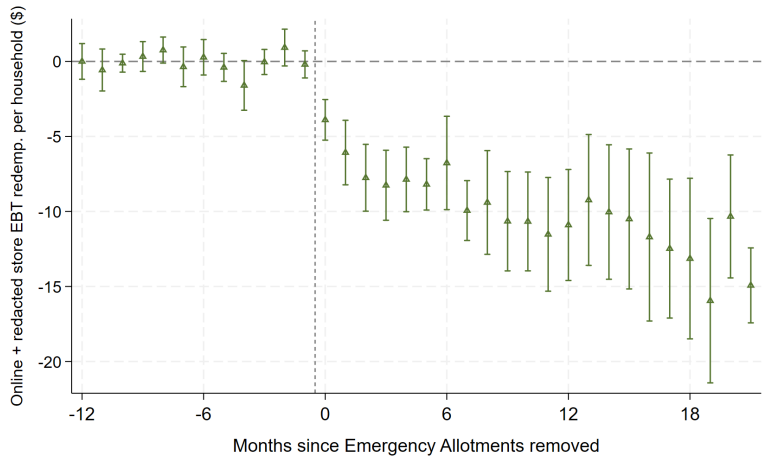
(b) Online EBT Redemptions



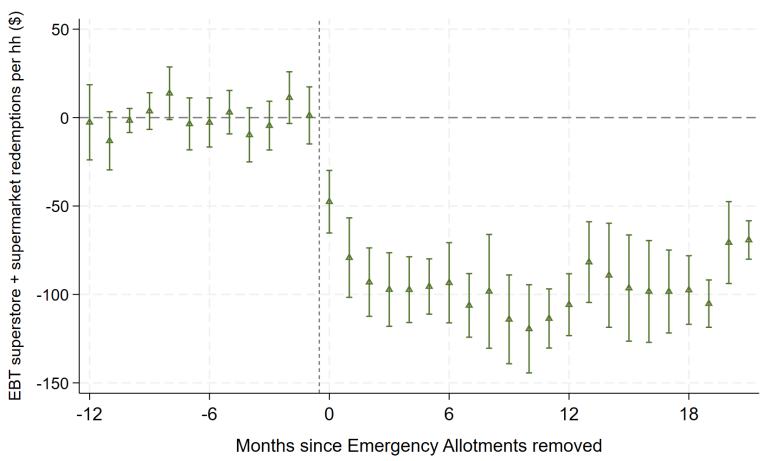
(c) In-store EBT Redemptions at Combination and Convenience Stores

Figure A.11: Effects of Online Shopping Availability among Small Retailers on EBT Redemptions

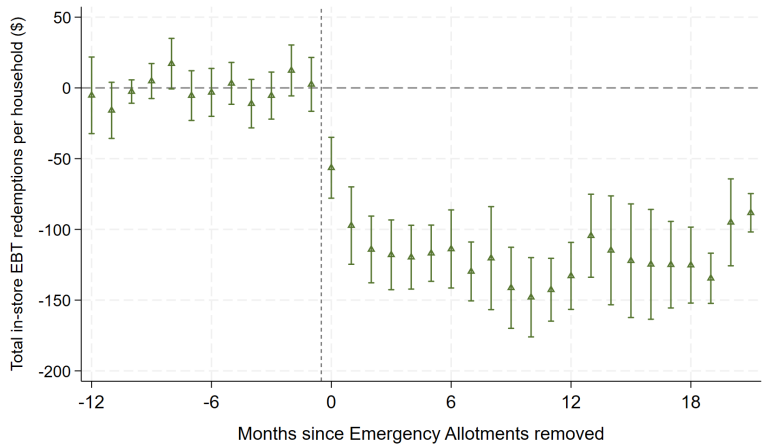
Notes: The figures show effects of online shopping availability among small food retailers on EBT redemptions. Event time is relative to the month that a state had online EBT purchasing available at a combination grocery/other store or convenience store. The outcome in Panel (a) is the number of online combination grocery/other stores and convenience stores per ten thousand people: the mechanical first stage. The outcome in Panel (b) is monthly EBT redemptions at Internet Retailers per household. The outcome in Panel (c) is monthly in-store EBT redemptions at combination grocery/other stores and convenience stores per household. The underlying data is at the state-month level. Plots created using Callaway and Sant'Anna (2021) estimators with not-yet-treated units. Standard errors are clustered at the state level.



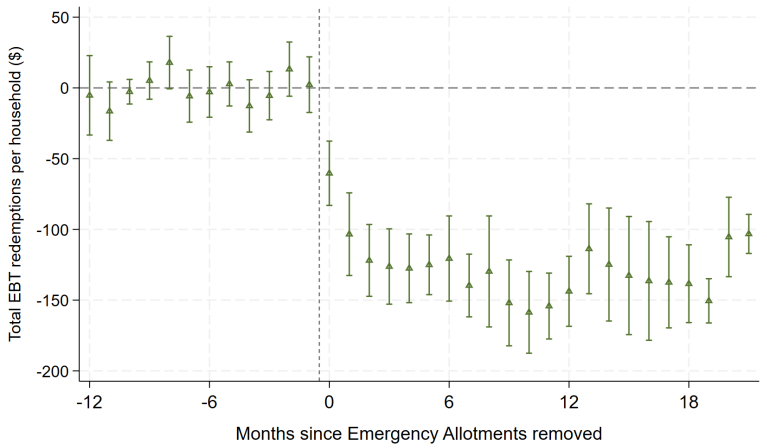
(a) Online EBT Redemptions



(b) In-store EBT Redemptions at Super stores and Supermarkets



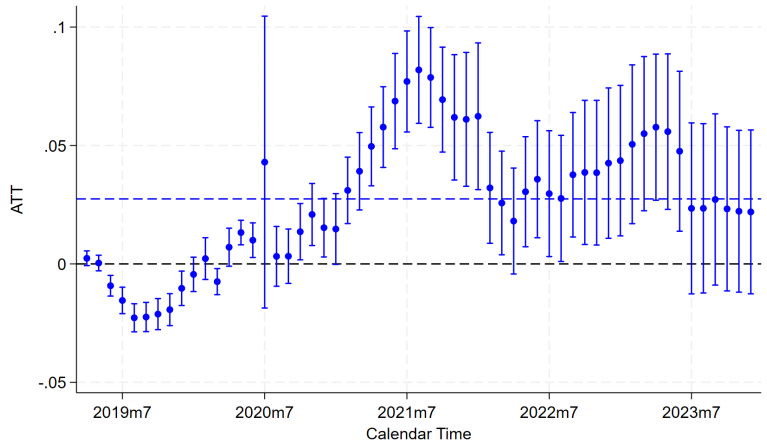
(c) Total In-store EBT Redemptions



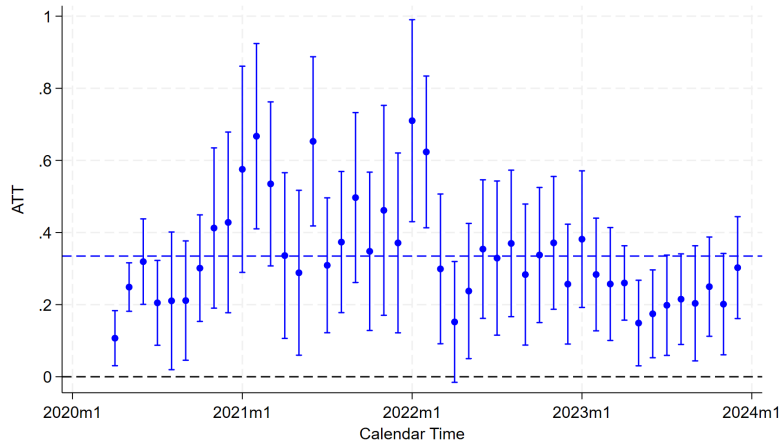
(d) Total EBT Redemptions

Figure A.12: Effects of Emergency Allotment Removal on EBT Redemptions

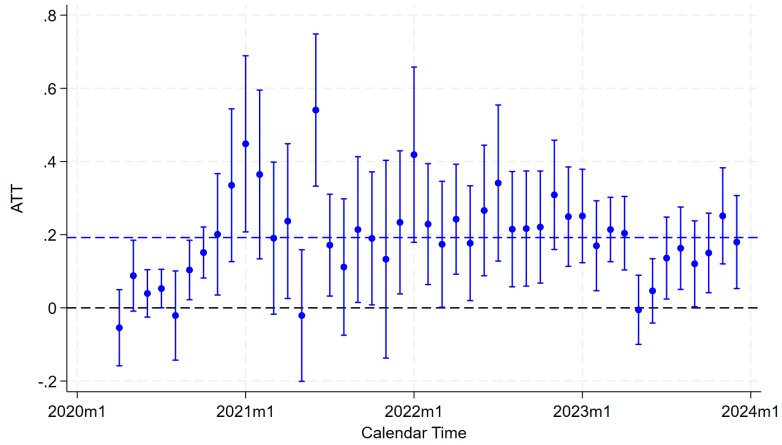
Notes: The figures show effects of Emergency Allotment removal on EBT redemptions. Event time is relative to the month that a state removed Emergency Allotments. The outcome in Panel (a) is monthly EBT redemptions at Internet Retailers and redacted stores per household. The outcome in Panel (b) is monthly in-store EBT redemptions at supermarkets and super stores. The outcome in Panel (c) is total in-store EBT redemptions per household. The outcome in Panel (d) is total EBT redemptions per household (online or in-store). The underlying data is at the state-month level. Plots created using Callaway and Sant'Anna (2021) estimators with not-yet-treated units. Standard errors are clustered at the state level.



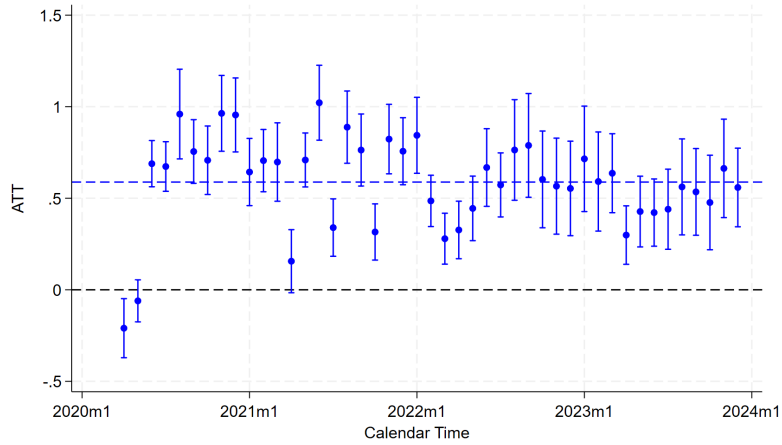
(a) SNAP households enrolled



(b) SNAP applications received



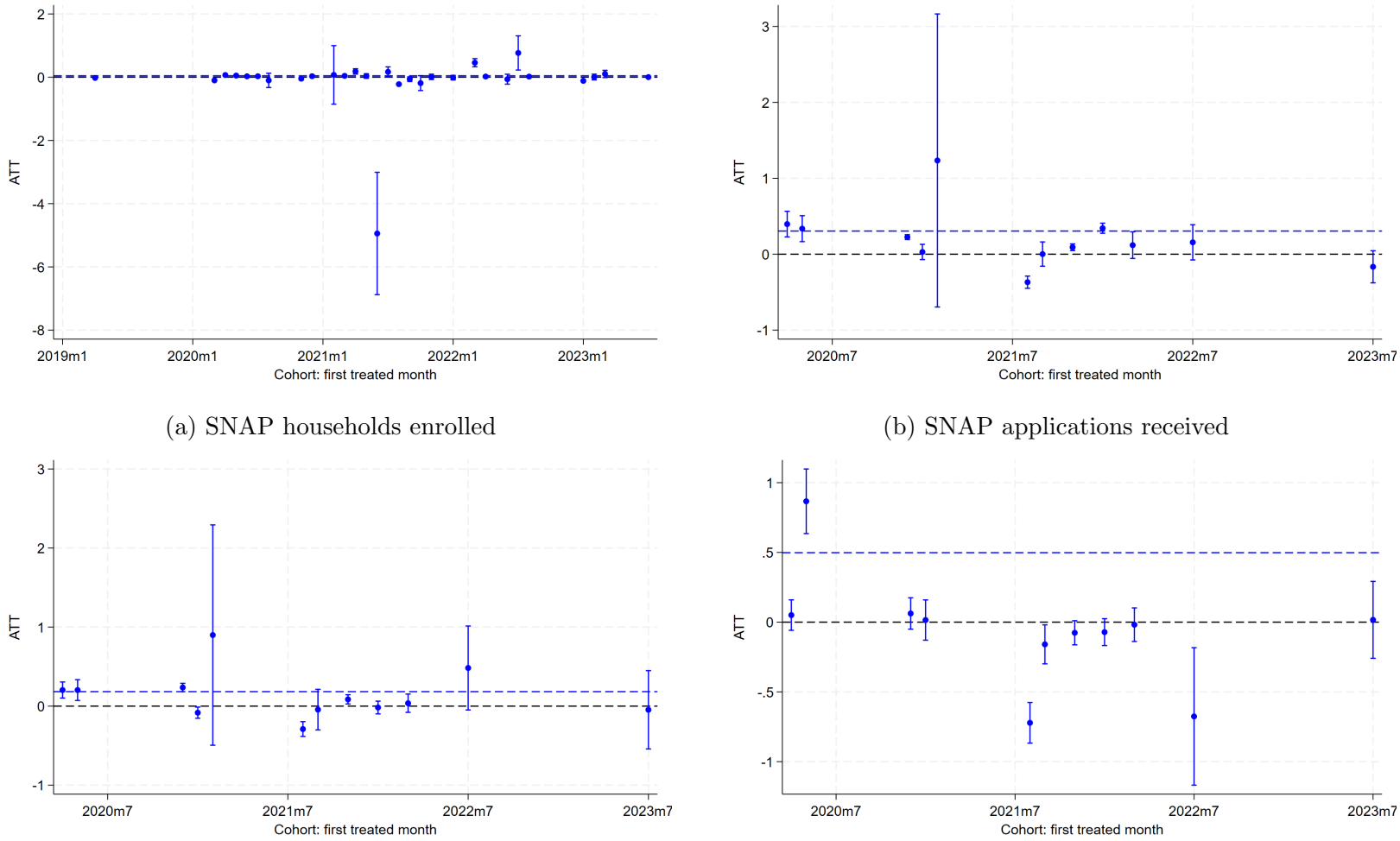
(c) SNAP applications approved



(d) SNAP applications denied

Figure A.13: Heterogeneity of Enrollment Effects by Calendar Time

Notes: Graphs show mean SNAP participation effects from Callaway and Sant'Anna (2021) estimation by calendar time. Specifically, each estimate represents the average effect of participating in the treatment in time period t across groups that have adopted the treatment by period t. Horizontal blue lines show the overall average treatment effects averaging across time periods.



(a) SNAP households enrolled

(b) SNAP applications received

(c) SNAP applications approved

(d) SNAP applications denied

Figure A.14: Heterogeneity of Enrollment Effects by Cohort

Notes: Graphs show mean SNAP participation effects from Callaway and Sant'Anna (2021) estimation by cohort. Specifically, each estimate represents the average effect of participating in the treatment among units in the treated cohort g, across all their post-treatment periods. Horizontal blue lines show the overall average treatment effects averaging across groups.

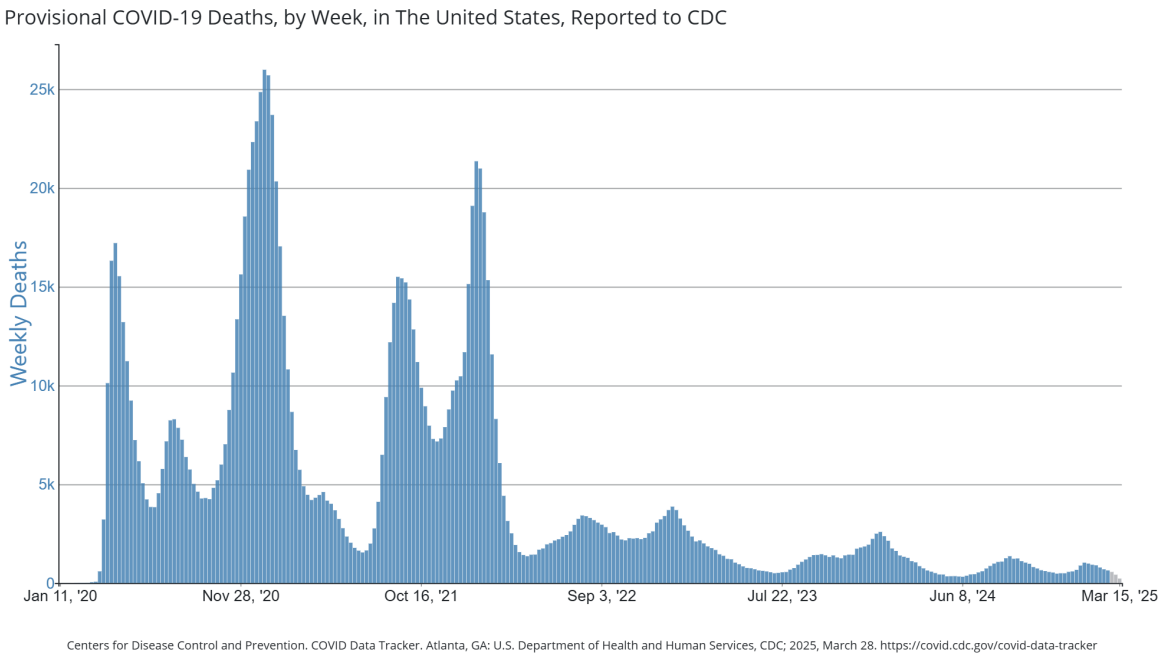


Figure A.15: U.S. Weekly COVID-19 Deaths

Notes: Chart downloaded from https://covid.cdc.gov/covid-data-tracker/. Accessed 2025-03-28.

Store Type	**Example 1**	**Example 2**
Convenience Store	7-Eleven	Speedway
Combination Grocery / Other	Dollar General	Walgreens
Direct Marketing Farmer	–	–
Delivery Route	–	–
Farmers' Market	–	–
Internet Retailer	Amazon Fresh	Walmart.com
Large Grocery Store	Save-a-lot	Piggly Wiggly
Medium Grocery Store	Village Market	La Mexicana Market
Military Commissary	–	–
Non-Profit Food Buying Cooperative	–	–
Small Grocery Store	Community Grocery	Asian Market
Specialty Food Store-Bakery/Bread	–	–
Specialty Food Store-Fruits/Vegetables	–	–
Specialty Food Store-Meat/Poultry Products	–	–
Specialty Food Store-Seafood Products	–	–
Supermarket	Aldi	Albertsons
Super Store/Chain Store	Walmart	Target

Table A.1: Store Types

Notes: For additional details and descriptions, see https://www.fns.usda.gov/snap/store-definitions

Platform
Always On Grocery / RSA America
CSAware
DoorDash
eGrowcery
Flashfood
Grocerist
GrownBy
Instacart
Local Express
Mercato
Mercatus
NCR Voyix (Freshop)
Pay Now Direct
Point Pickup Technologies
Rosie, an Instacart Company
ShopHero
Stor.ai
Uber Eats & Postmates
Vroom Delivery
Webcart by ECRS

Table A.2: eCommerce Platform Providers

Source: https://www.fns.usda.gov/snap/ecommerce-platform-providers Accessed 02/12/2025.

	Mean	Median	Min	Max	n	n/N
Total stores w/ SNAP online (= N)					44,488	1.00
Partners with Instacart	0.64				24,401	0.55
Delivery available	0.85				14,304	0.32
Pickup available	1.00				14,316	0.32
Cart minimum ($)	28.46	35.00	0.00	50.00	21,333	0.48
Min delivery fee ($)	6.26	3.99	0.00	15.00	12,171	0.27
Min pickup fee ($)	1.02	0.00	0.00	5.00	14,309	0.32
Delivery fee could be higher	0.92				12,171	0.27
Pickup fee could be higher	0.38				14,309	0.32
Offers a deal for SNAP hh's - delivery	0.54				19,221	0.43
Offers a deal for SNAP hh's - pickup	0.23				14,309	0.32
SNAP deal fee - delivery ($)	0.00				10,308	0.23
SNAP deal fee - pickup ($)	0.00				3,260	0.07

Table A.3: Pick-up and delivery fee summary statistics

Notes: Table summarizes online pick-up and delivery fees where data is available from the Providers mobile app. "Min delivery fee ($)" and "Min pickup fee ($)" list the starting fee listed on the app, which could be larger depending on the retailer. The full sample of stores includes retailers who adopted SNAP online February 2023 or before and whose fees were listed in the Providers app. Not all information is available for all stores, so the column "n/N" shows the share of the original sample represented. Fee information was collected from the Providers phone application (https://www.joinproviders.com/) and merged to the universe of SNAP-authorized stores using retailer name.

	N	Ever online	Years open	Years online
In-store authorization only				
All store types	234,543	0.196	6.60	2.03
Super store	19,832	0.657	6.86	3.22
Supermarket	18,555	0.577	6.91	3.36
Combo grocery/other	59,393	0.323	6.86	0.65
Convenience store	105,807	0.026	6.48	0.87
Other	30,956	0.009	6.12	1.36
Online and in-store authorization				
All store types	45,959	1.000	6.99	2.03
Super store	13,026	1.000	7.09	3.22
Supermarket	10,712	1.000	7.03	3.36
Combo grocery/other	19,160	1.000	6.90	0.65
Convenience store	2,787	1.000	6.90	0.87
Other	274	1.000	6.79	1.36

Table A.4: SNAP in-store and online authorization by store type

Notes: Limited to stores open as of March 1, 2020. Years open and online calculated as of February 2025. USDA store data currently through December 2023, so years open and year online calculations assume that each store remains open between Jan 2024 and Feb 2025.

	Supermarkets / super stores				Combo / convenience stores			
	In-person		Online		In-person		Online	
	Bivariate	Multivariate	Bivariate	Multivariate	Bivariate	Multivariate	Bivariate	Multivariate
Has an in-person store			0.20***	0.27***			0.03***	0.04***
			(0.03)	(0.02)			(0.00)	(0.00)
Poverty share	0.94***	0.44	-0.47***	-0.68***	24.20***	9.56***	1.54***	0.22
	(0.28)	(0.42)	(0.14)	(0.23)	(1.05)	(1.45)	(0.14)	(0.24)
Single parent share	0.87***	0.91***	0.46***	0.74***	13.93***	5.46***	1.58***	0.65***
	(0.27)	(0.30)	(0.11)	(0.17)	(0.84)	(1.06)	(0.10)	(0.17)
College educated share	-0.11	0.55**	1.00***	0.72***	-16.90***	-5.72***	-0.30***	-0.39***
	(0.16)	(0.26)	(0.09)	(0.15)	(0.54)	(0.88)	(0.08)	(0.15)
Median hh income ($100,000's)	-0.40***	-0.65***	0.45***	0.14	-12.57***	-3.42***	-0.59***	0.00
	(0.11)	(0.20)	(0.06)	(0.12)	(0.41)	(0.66)	(0.06)	(0.12)
Urban	0.15**	0.23***	0.47***	0.36***	-1.52***	-0.52***	0.20***	0.18***
	(0.06)	(0.05)	(0.02)	(0.03)	(0.20)	(0.16)	(0.02)	(0.03)
Population (Millions)	-0.12***	-0.09**	0.07***	-0.03*	-1.68***	-0.29***	0.02	0.04
	(0.03)	(0.03)	(0.02)	(0.01)	(0.44)	(0.11)	(0.02)	(0.02)
White share	0.04	-0.58**	-0.07	0.19	-3.42***	2.16***	-0.22***	0.23*
	(0.08)	(0.29)	(0.04)	(0.15)	(0.41)	(0.84)	(0.04)	(0.13)
Black share	0.08	-1.08***	0.13**	0.14	5.74***	4.36***	0.85***	0.10
	(0.09)	(0.30)	(0.06)	(0.15)	(0.38)	(0.87)	(0.05)	(0.13)
Hispanic share	-0.37**	-1.14***	0.04	0.28*	0.24	2.16**	-0.46***	-0.44***
	(0.14)	(0.31)	(0.06)	(0.16)	(0.63)	(1.00)	(0.06)	(0.14)
Republican vote share, 2020	-0.10	-0.04	-0.48***	0.11	3.22***	1.84***	-0.61***	-0.69***
	(0.10)	(0.14)	(0.06)	(0.09)	(0.41)	(0.53)	(0.05)	(0.08)
R-squared		0.06		0.29		0.41		0.19
N	3,051	2,959	3,051	2,959	3,051	2,959	3,051	2,959

Table A.5: County-level Correlates of Exposure to In-person or Online SNAP-Authorized Stores

Notes: The table shows the relationship between county-level covariates and exposure to four types of SNAP-authorized stores: (1) In-person supermarket / superstore, (2) Online supermarket / superstore, (3) In-person combination grocery or convenience store, or (4) Online combination grocery or convenience store. Each outcome (exposure) variable is the number of such SNAP-authorized stores per 10,000 people. In "Bivariate" columns, I regress the outcome on each covariate separately. In "Multivariate" columns, I regress the outcome on all covariates simultaneously. "Has an in-person store" refers to a store of the same type: either supermarket / superstore or combo / convenience store. The definition of supermarkets and super stores includes Amazon.

B Appendix: Additional policy details

B.1 Definition of Store Types

Store Type	Store Code	Definition
Convenience Store	CS	Self-service stores that offer a limited line of convenience items and are typically open long hours to provide easy access for customers. Primarily engaged in retail sale of a variety of canned goods, dairy products, prepackaged meats and other grocery items in limited amounts. Usually sell a large variety of ineligible products; such as hot coffee, alcohol, or tobacco products.
Combination Grocery / Other	CO	Primary business is sale of general merchandise but also sell a variety of food products. Such stores include independent drug stores, dollar stores, and general stores.
Direct Marketing Farmer	DF	Designation applies to direct marketing farmers; these are individual producers of agricultural products, particularly fresh fruit and vegetables, as well as meat, fish, dairy, and/or grains that are sold to the general public through a direct marketing venue such as a roadside farm stand, pick-your own operation, and/or market stall within a farmers' market. This store type differs from fruit/vegetable, meat, fish, and bread specialty firms in that the products are sold directly by the producer (farmer) rather than a retailer selling produce, meat, dairy, and/or grains purchased from a wholesale or other entity (i.e. a third party selling products purchased from or on behalf of a farmer/producer is not a direct marketing farmer).
Delivery Route	DR	A store that does not have a permanent store location, this includes delivery routes that deliver food at set locations and times, as well as rolling routes. Routes typically sell milk, bread, produce or other staple foods and are most common in rural areas.
Farmers' Market	FM	A single or multi-stall market that sells agricultural products, particularly fresh fruit and vegetables, to the general public at a single or multiple locations. This designation applies to any organization that operates a farmers' market location.
Internet Retailer	IR	A store that accepts SNAP benefits on their website. A separate FNS authorization is required in order to participate in SNAP online purchasing.
Large Grocery Store	LG	A store that carries a wide selection of all four staple food categories. They may sell ineligible items as well, but their primary stock is food items.
Medium Grocery Store	MG	A store that carries a moderate selection of all four staple food categories. They may sell ineligible items as well, but their primary stock is food items.
Military Commissary	MC	Designation applies to all retail food entities, located on military installations that sell food and non-food products. Only authorized shoppers may shop at these entities and they must show proper military ID to use the commissary or Base Exchange.

Table B.1: Definition of Store Types: Part I

Source: https://www.fns.usda.gov/snap/store-definitions; Accessed 05/13/2023.

Store Type	Store Code	Definition
Non-Profit Food Buying Cooperative	BC	Any store that operates as a "cooperative."
Small Grocery Store	SG	A store that carries a small selection of all four staple food categories. They may sell ineligible items as well, but their primary stock is food items.
Specialty Food Store - Bakery/Bread	BB	Food stores specializing in the sale of bread/cereal products. May also carry non-food items or other food items, but such stock is incidental to the primary specialty food stock.
Specialty Food Store - Fruits / Vegetables	FV	Food stores specializing in the sale of fruits and/or vegetables that operates in a fixed or semi-permanent location. This includes any permanent store whose primary business is the sale of fruits/vegetables, such as a produce market; as well as any produce stand that does not qualify as a Direct Marketing farmer or is not affiliated with a farmers' market. Seasonal produce stands qualify under this category. May also carry non-food items or other food items, but such stock is incidental to the primary specialty food stock.
Specialty Food Store – Meat / Poultry Products	ME	Food stores specializing in the sale of meat products. May also carry non-food items or other food items, but such stock is incidental to the primary specialty food stock.
Specialty Food Store - Seafood Products	SE	Food stores specializing in the sale of seafood products. May also carry non-food items or other food items, but such stock is incidental to the primary specialty food stock.
Supermarket	SM	Establishments commonly known as supermarkets, food stores, grocery stores and food warehouses primarily engaged in the retail sale of an extensive variety of grocery and other store merchandise. This store typically has ten or more checkout lanes with registers, bar code scanners, and conveyor belts.
Super Store/Chain Store	SS	Very large supermarkets, "big box" stores, super stores and food warehouses primarily engaged in the retail sale of a wide variety of grocery and other store merchandise. Includes stores that are large food/drug combo stores and mass merchandisers under a single roof, and membership retail/wholesale hybrids offering a limited variety of products in warehouse-type environment.

Table B.2: Definition of Store Types: Part II

Source: https://www.fns.usda.gov/snap/store-definitions; Accessed 05/13/2023.

B.1.1 Definition of Internet Retailer

"STARS designates the "Internet Retailer" category as including all redemptions made through online retail stores, regardless of brick-and-mortar store type or method of grocery delivery (i.e., picked up by the customer at a brick-and-mortar store or delivered to a

customer's home). Benefits redeemed at retail businesses with both online and brick-and-mortar store(s) are associated solely with this category if they are redeemed online or solely with the other corresponding category if they are redeemed at a brick-and-mortar store. Redemptions do not include additional delivery or pickup fees, which cannot be paid with SNAP benefits. Some retailers offer online ordering of groceries and allow payment with SNAP benefits at the time of pickup; these redemptions are not included in this category. Data for online redemptions is only available for February 2020 and later months." Source: Jones (2021)

B.2 Prior changes to the delivery of SNAP benefits

Although a food assistance program existed between 1939 and 1943, pilot programs of food stamp programs began during the Kennedy administration in 1961. During this period, participating households exchanged paper vouchers for food, hence the prior name of "food stamps." In these early years, participants needed to purchase subsidized food stamps from USDA, which they could later exchange for eligible foods at participating retail stores. In 1977, USDA eliminated the purchase requirements for food stamps, facilitating low-income households' access to food support. The elimination of the purchase requirement was the first major change in delivery of food stamp benefits.

The second major change to SNAP purchasing technology was the switch from paper food stamps to the use of EBT cards, which was first authorized in 1990. States began adopting the EBT technology between 1993 and 2003 (USDA-ERS, 2024). The effect of the transition from more visible food assistance to EBT cards was studied in Currie and Grogger (2001), and the authors found no detectable impacts on take-up. However, the use of EBT cards still poses some frictions to participants, including one's SNAP status still being visible to the store cashier and others in the check-out line at grocery stores.[57]

The switch from in-person to online grocery shopping is the third major change in delivery

[57]For qualitative evidence of visibility at the grocery store, see Appendix C.

of the Food Stamp Program or SNAP. Removing a trip to the grocery store entirely through online shopping is expected to reduce claiming costs during the delivery of benefits more significantly compared to the food stamp-to-EBT transition.[58]

[58]The Women, Infants, and Children (WIC) Nutrition Program has undergone a similar evolution in program delivery in its history. However, WIC's technological advancements in program delivery have largely lagged behind SNAP. In addition, there are fewer WIC-authorized retailers compared to SNAP-authorized retailers nationally. In 2023, USDA FNS announced a proposal to begin authorization of WIC purchases online.

C Appendix: Qualitative evidence about in-store SNAP purchases

From interviews with SNAP participants, there is some qualitative evidence that stigma may be one factor affecting SNAP participants' shopping behavior when purchasing in-store.

SNAP participants have reported the following when shopping using SNAP benefits at the grocery store, which suggest that SNAP status is still potentially socially visible when shopping in-person.

- It takes longer in line at the register to sort items and process payments (requires extra steps).
- Cashiers "announce" to the store that someone is using SNAP benefits
- The SNAP participant might know a cashier who works at the store
- Cashier treats participant with less respect
- Participant uses cash instead of obtaining tokens to use SNAP at the farmers market

SNAP participants have reported the following behaviors which are often associated with avoiding potential stigmatization.

- Using the self-checkout line
- Limiting the number of trips to the grocery store
- Going to the store when it's less crowded (e.g. evenings, weekdays)
- Going to a different store where one is less likely to run into people they know
- Going to a store where SNAP payment is less visible i.e. because there are fewer extra steps to to process payment
- Giving EBT card to someone else to complete a grocery purchase

Here are some quotes that illustrate some of the behaviors described above.

"Two older adults mention feeling self-conscious when they are at the grocery store using their EBT card. Sandy mentioned not feeling treated with dignity and respect:

'I do find it's difficult at the grocery store. I always try and use the personal check out machines.'

Madeline, who tends to shop at Whole Foods in New York City, also talks about the difficulty of using her EBT card:

'*And the other thing I've noticed is that when I'm in Whole Foods, and this does bug me, none of the people on the checkout desk know how to process or they need a special code to enter into the register when they are dealing with a SNAP card which means they are running up and down calling 'SNAP benefit.' And you're standing there and you're like you know what I'd kind of like this to be a private transaction. I don't need the Whole Foods know that I'm using a SNAP card. So, they have to go and track down somebody else to come and help them with the transaction. A) it takes longer and B) there is no privacy. They are screaming up and down the aisle like 'can you come help with this SNAP customer.'* "

From Amaral and Gonzales (2022)

Cashiers annoucing a customer's SNAP status; EBT card looks different; EBT payment takes longer:

"I don't particularly like [the EBT card] because it's different from a credit card, you have to use a different machine and the card...it just looks different. So when you're in the line and there's customers behind you and you're dealing with the cashier, you know, like everyone, the whole world's announced that, 'Hey, this guy's on benefits.' He has to use a whole 'nother machine to process his payments. I don't think that's necessary. I think there should be a way that you can process the funds off the same machine as the credit card machine. And then change the card to look like any other credit card, like don't, you know, put a person on front street and like just broadcast to the whole grocery store that I'm on benefits, cuz it's really no one else's business."

Former SNAP participant, Interview conducted for Heath, Holcomb and Pukelis (2022)

Cashier treats participant with less respect:

"I do notice that some cashiers or whatever will kind of treat you with a different set of respect. Like they'll treat you differently because they feel like, I guess, you're just a...person on the bottom. I don't like that. I have noticed that a couple times, like, you know, if I go in there and spend my credit card and it's black, you know, 'Hey Mr. Such-and-Such, good morning,' you know, everything is professional and up the standard, and how it should be, you go in there with your EBT card, but, 'Hey, you guys accept EBT or,' 'Oh, it's right there'. You know, now they think they can just talk to you crazy. You know, just handle you, the, the attitude that's portrayed to you is different than the attitude that's portrayed when you present a credit card, you know, I have noticed that, but it, it didn't bother me. It does bother me. It does because it's not right. But not to the point where I wouldn't use it because I'm not gonna let pride stand in the way of the greater goal...I noticed it 'cause I make purchases and if I use cash or credit card, the atmosphere is slightly different than when you go in there with the EBT card...the hospitality is not as warm, I guess. And not to say all the time or on a consistent basis, but I've seen it before."

Former SNAP participant, Interview conducted for Heath, Holcomb and Pukelis (2022)

Individual avoiding using SNAP benefits at a farmers' market:

"Cassie, a single woman on SNAP living in a wealthy community in Florida sometimes goes to the farmer's market but feels the difficulty in using her EBT card at these markets. To use an EBT card at a farmer's market, the EBT card holder must swipe their card in exchange for market tokens to use at individual booths throughout the market:

'*And also it's a stigma. I don't know if other people could buy these tokens that they have. Now I live in an affluent neighborhood and so to go to the farmer's market it's very much the bougie upscale clientele you look at who is in the farmer's market. They are in their name brand flip flops and manicured nails. Sometimes it was easier just to use cash out of pocket to do that.*' "

From Amaral and Gonzales (2022)

Quotes from Carper (2022) about stigma at the grocery store

"When we would go to Walmart (especially) and Winn-Dixie, we often heard slurs about the contents of our shopping cart if the person behind us saw us use an EBT/SNAP card or WIC voucher. One time specifically at Walmart, an individual saw me checking out with the EBT/SNAP card while I was very pregnant and commented, 'See another user with a Michael Kors purse and pregnant and not working using food stamps.' I was so upset, I cried when I got in my vehicle. The Michael Kors purse was actually a Donney & Burke that my grandmother had gifted me for my 20th birthday. Though it has been several years, I remember this encounter vividly as one of the most stigmatized experiences while enrolled on SNAP. We experienced WIC stigma more often because of the use of the voucher system (thankfully, this has been transferred to cards). We were less likely to experience any negative comments at local grocery stores instead of big chains, so we quit going to Walmart and Winn-Dixie because of the experienced stigma and went to smaller stores until the end of our enrollment."

Carper (2022), p. 3

"Oh yeah, I would call my mom in tears, and she would be like why are you letting these people get to you and you do not even know them. I said I don't know it is just so embarrassing to be in the line at the grocery store, but they always sigh or make some type of snide comment."

Carper (2022), p. 61

"I have heard them say, 'She is buying shrimp, lobster, and all that expensive stuff, and she is buying all that on food stamps."'

Carper (2022), p. 61

"I pull out the EBT card and immediately my face got hot, and I had to pull out the other EBT card. At that moment what I felt like to be totally reliant on food stamps and how shameful."

Carper (2022), p. 61

"It was a little bit embarrassing; they would look at what you were buying."

Carper (2022), p. 61

"A white lady behind me said oh look another one using the government. It is just so rude, I was totally shocked."

Carper (2022), p. 62

"Last week I wanted to buy a sub sandwich from the store, and you know that you cannot buy a hot sub with your stamps. I wanted a hot sub, and I knew that I did not want to eat it right away. In my mind I wanted to ask them to not heat it up. I was afraid to ask it. . . I paid 10 in cash that I did not even like, but I could have got in my food stamps, and I would have liked. Even though she would not say it me, in my mind I thought she was going to think it."

Carper (2022), p. 62

"Or even on Facebook!! They should not be allowed to buy steak and they should not be allowed to buy shrimp, should only buy beans and rice, you know things like that!"

Carper (2022), p. 62

"To be honest, they see a young black woman with kids, they automatically assume/think you are lazy. I have a lot of people in the grocery store I was in at the time, and the lady made a comment the food choice that I was making, 'It's good to see that at least you are buying healthy food.' I mentioned something about my husband, and she said 'Oh, you are married I would never have assumed that you were married because you were not wearing

your ring.' She had never seen my hand to even know that I was not married. She had automatically assumed that I had all these babies by different men to get food stamps."

Carper (2022), p. 82

"I am sure that people have way worse experiences than me, 'cause I know it happens. I have read stories online about it. One lady was fostering some children and they did not have any clothes or anything like that. She brought them to Walmart in an attempt to pay for everything. And the guy behind her started attacking her... so she was trying to buy food for the night using food stamps because it was an emergency situation that she had got into and she did not know what to do. When the guy behind her starting stacking, she just broke down... These events can happen at any moment, all they have to do is look at you and assume things and it happens all of the time.

Carper (2022), p. 82

"When I would get in the line at the supermarket with the kids, you would hear all of the comments about using the EBT card and the WIC vouchers. They would sign and say there is another one; that happened one time at a Winn-Dixie in Gretna. A white lady behind me said, 'Oh look another one using the government.' It is just so rude, I was totally shocked. This has happened more than once, and at different stores too. One time it was a Walmart, Albertsons."

Carper (2022), p. 82-83

"You look at people while you are on it, at least the perception of, you hear people snickering, or any noise, and think 'Yep, they saw the card and they see that I am on it hey think that I am using the system."' Also from 93) "That is an interesting statement, you know with the free lunch thing with COVID, there is a moment of excitement, OMG I have $600, prior to that our budget for food is $100-$200 for a week. Here is $600 sitting on my table, it is very exciting. We all got ready and went to the grocery store; I felt fine, and I knew the moment

was coming to pull out that card. I was really excited to maybe get food that we had not been able to get because of the Covid virus. When we get to the cashier, $300 was gone so I pull out the EBT card and immediately my face got hot, and I had to pull out the other EBT card. At that moment what I felt like to be totally reliant on food stamps and how shameful to think that if I do not have money for this, I will have to put stuff back which is also embarrassing. Now, I know that the cashier does not care, the little old lady with the Coach bag behind you is staring at you, and the bagger is staring at you, and immediately I thought, 'Man, I do not miss being on food stamps."'

Carper (2022), p. 84

"Most of the time people will not say anything, but the moment you pull out the card people seeing it. Nothing is ever said to me, but you can see the sideway glances or the cashier that is kind of looking down on it. Oh, you are a white woman with kids, you should not be in need for government assistance. It's mostly the looks, no one has really ever said anything about it. But just the looks that they give you, you can tell what they are thinking."

Carper (2022), p. 85

"I have heard people, especially when I was a cashier at Walmart, individuals who had buggies full of groceries with things that they could not buy. And you would hear them say, 'Well, you know they are on food stamps.' I have witnessed that a lot. Off-hand, I remember comments about 'Well those people are on food stamps.' Or even on Facebook!! 'They should not be allowed to buy steak and they should not be allowed to buy shrimp, should only buy beans and rice.' You know things like that I have seen on Facebook and have got upset over that, even though I am not currently on it. Like what? I am not supposed to feed my kid any snacks? Those items are cheaper, what do they expect us to be able to eat? Frozen pizzas and snacks are cheaper than fresh fruit and vegetables. It is ridiculous with how people view SNAP recipients."

Carper (2022), p. 91

"Sometimes, especially when I am in the store, I know what types of statements the cashier make because I used to be a manager of several retail stores. I have heard them say "She is buying shrimp, lobster, and all that expensive stuff, and she is buying all that on food stamps."

Carper (2022), p. 91

"There have been times, now, and I will be honest, even though my husband has been laid off for a period of time. And so when we got it, I was mindful of where I put my card. I do not like people to see my card. Sometimes I swipe my card really quick. People are always making assumptions .To be honest they see a young black woman with kids, they automatically assume think you are on food stamps... Now that I am in a place in my life where it does not matter as much to me, sometimes old habits die hard, when I am in a grocery store now, I will still swipe my EBT card fast, because I have been off of SNAP benefits for many years and just got on them recently because of the pandemic my husband was laid off. When I wasn't getting, I would go for my sister and pick up her stuff; I didn't want people to judge me about it so I would hide. I still have problems today not wanting people to know about it. My wallet I carry right now, if I open it and can see the EBT card right away. I will move it behind other cards or hide it all together so people cannot see it."

Carper (2022), p. 93-94, 97

"We were kids going in at Walmart; there was a little confrontation that I saw where one guy was talking to another guy, and they fought, etc. Now go buy your food with food stamps. I was like was that insult, wow it is an insult (he did not know what the insult looked like of someone on SNAP as this was his first experience with witnessing that stigma). People that use food stamps do not like to show that they have it, you know. They hid it when they go to the store to block the view of the store. I know subconsciously people in the mind think that other people are looking and them and feel like they do not want to use the benefit."

Carper (2022), p. 94

"The Louisiana food stamp card is hideous and very obvious; I usually use self-checkout majority of the time. Never to my face, all of the people talk to tell me to my face, help me apply to SNAP... No, I pick who I tell. If I feel they will not react right, I just will not let them know. I would not tell them. They do not need to know how I buy food. I do have rich friends, by rich I mean upper-middle class. They just will not know; when we go grocery shopping, I make sure that they are somewhere else when I am self-checkout. They do not need to know everything."

Carper (2022), p. 112-113

"Mostly when I go to the store. The Dollar Store you actually have to say that I have food stamps, the credit or debit that is when you start to get the dirty looks. Sometimes you can hide the card when you swipe it, but if you have to announce that you have food stamps, God forbid that I am dressed for work, and I have a nice shirt on and all of that stuff. The looks will get way worse. I am dressed all nice, the looks get worse."

Carper (2022), p. 113

"Acquaintance who have been known to side or mention things about people who (are) on welfare, or they mention something slick about SNAP now. I know I can't trust you I do not want you to take me to the grocery store. I do not have a car, so I rely on my roommate to take me to the store, and she doesn't even know that I have food stamps. Not that I do not trust her, but she is top level middle-class family. They took us to some super expensive restaurant; this is why I will not tell you because you do not understand. They are sweet people but I will not bring it up."

Carper (2022), p. 121

"Even though she would not say it to me, in my mind, I thought she was going to think it."

Carper (2022), p. 62

"It did not look like I needed help."

Carper (2022), p. 62

"So I asked him (foster father) if we take the SNAP card and list of groceries and go yourself if you would rather do that. He was like 'absolutely not, I will not be seen with that card.' It was obvious that he was ashamed to be using something like that."

Carper (2022), p. 60

"You can tell the ones that are ashamed because they swipe their card long before the cashier ever finishes ringing them up. . . I have hurried up and swiped my card so the person behind me doesn't see you swipe the card."

Carper (2022), p. 60

Quotes from survey respondents (Pukelis, Heath and Holcomb, 2024)

Hiding card: "When I was on snap I often would not hold my card in any way where people could say [see] it"

Hiding card: "I try to hide my card and some people get upset at what I buy [w]ith the snap benefits."

Judgement from cashiers and other shoppers: "My experience pre-dated the change in terminology to 'SNAP'; it was Food Stamps, at the time. I believe the overt negativity that was very prevalent during that time has been reduced. The general public, including cashiers, appear to be either more accepting, or a least very much more quiet if they judge/disapprove. During my time, I actually had cashiers or a customer behind me in line, tell me I shouldn't be buying pork chops-I should be getting franks and beans, and they were harsh and nasty abou[t] it...just an example that happened many times...including telling me to 'get a job, you look like you can work' etc."

Self checkout: " I am a longtime self-checkout user, but I have never had a negative experience with a cashier."

Online shopping: "I'm not sure my experience with SNAP is typical of others, as I avoid grocery shopping in person and get everything I can online (at places that accept my SNAP

card)... With this being the case, I haven't really experienced some of the disdain that I know a lot of SNAP users do. A family member who has also had to rely on SNAP benefits in the past told me that cashiers were routinely rude to her, and even other family members made disparaging comments about her receiving benefits."

Caseworker, negative: "I can't convey to you how badly the woman at the food stamp office worked to make me and everyone else applying feel humiliated, and like we were trying to get away with something. I know this was part of the policy at the time under Reagan. It still revolts me so much I almost get sick thinking about it."

Caseworker, positive: "Thankfully my experience has been mostly positive with applying and with the people who work at the SNAP offices."

Fear of judgment: "My family previously declined SNAP benefits when my husband was out of work. This was 100% due to the thought of being judged."

Hassle: "The whole process is embarrassing."

Guilt: "I only had to receive benefits for a short time when I was pregnant and alone. This survey brought back some of the negative feelings I felt at that time which was over 40 years ago. I still feel guilty that I had to apply for help."

Switch from food stamps to SNAP: "SNAP is much better than years ago when the food stamps that were actual paper coupons. That system was very embarrassing for those using them."

D Data Appendix

D.1 Data Collection of SNAP Online Rollout

The primary source of data collection for the rollout of SNAP online was by visiting USDA's SNAP online webpage[59] monthly and coding up information of rollout across retailers and states. There were a few months where I failed to collect rollout information from this site. To fill in the timing of rollout for these state-retailer pairs, I used a combination of the Wayback Machine, state websites, online articles, Facebook postings on retailers' official accounts, and press releases from states or retailers. This allowed me to find an exact month of implementation for 94 percent of all state-retailer-month observations. Where I could only find a range of possible rollout months rather than an exact month, I impute using the midpoint of the range. When non-zero, the average range is 3.15 months long.

D.2 Matching Online Rollout to Store Location Data

Recall that the online rollout data is at the state-retailer-month level, and the store location data is at the (state-)retail store level. Thus, the match will occur within state-retailer. To match across the datasets, I limit candidate matches to within the same state. Then, I clean the retailer name strings in each dataset, including the following steps:

- trim spaces, make lowercase, remove punctuation
- split name at "DBA" ("Doing Business As") $\rightarrow$ two candidate matching names
- remove store numbers (store location data only)
- remove "inc", "llc"
- remove and tag common words (e.g. "food", "supermarket", "store")
- remove state name or state abbreviation

[59] https://www.fns.usda.gov/snap/online-purchasing-pilot

- remove city name or county name

Round 1 – Then I perform an exact match. Conditional on matching, 89 percent of store names match exactly on this first round.

Round 2 – For rollout data that doesn't match, I do some hand-checking with the aid of a fuzzy match. With this hand-checking, I make some manual changes to the retailer names, and rerun the exact match. Conditional on matching, the remaining 11 percent of store names match through this second round.

D.3 Aggregate Redemption Data

I collect aggregate redemption data at the store type-year level from USDA's Retailer Management Annual Reports between 2010 and 2023.[60] In particular, I use the table "Redemptions by Firm Type" for each year. All categories not listed specifically are collapsed into an "other" category. Data is also available at the state-year level.

D.4 Amazon Fresh availability data

Since Amazon grocery delivery through Amazon Fresh does not have physical store locations, I separately collect Amazon Fresh delivery availability. Specifically, I query Amazon Fresh's webpage for every U.S. zipcode.[61] The query also includes information on Whole Foods delivery availability. I collect this information between June 17, 2023 and July 16, 2023. Assuming the geography of Amazon Fresh availability is fixed over time, I code Amazon Fresh as available in a locality when Amazon online becomes available in that state according to the online rollout data. The Amazon Fresh availability data are collected at the zipcode-level (ZIP Code Tabulation Area, or ZCTA-level). Therefore, I use HUD files to crosswalk between zip and county, using the 2020Q1 version. I define a county as having Amazon Fresh available if *any* containing zipcode has Amazon Fresh available during that month. For the definition

[60] https://www.fns.usda.gov/snap/retailer/data
[61] https://www.amazon.com/fmc/learn-more

of online shopping availability at the county level: if Amazon Fresh delivery is available in a county, I count it as an additional store in both the numerator and denominator. If Amazon Fresh delivery is not available in a county, it is not counted in either the numerator or denominator.

D.5 SNAP enrollment data

Variable	**County level availability**
Households	AL AZ AR CA CO FL IL IA KS LA ME MD MA MI MN MO MT NJ NM NY NC OH OR SC SD TN TX VA WI
Applications received, approved & denied	CA LA MD MO NM NC

Table D.1: SNAP County Enrollment Data Availability, Variables

D.6 State-level SNAP and P-EBT enrollment data

Figure A.1 shows P-EBT and SNAP enrollment throughout the study period. These data are sourced from USDA's Data Tables (FNS, 2024*a*).