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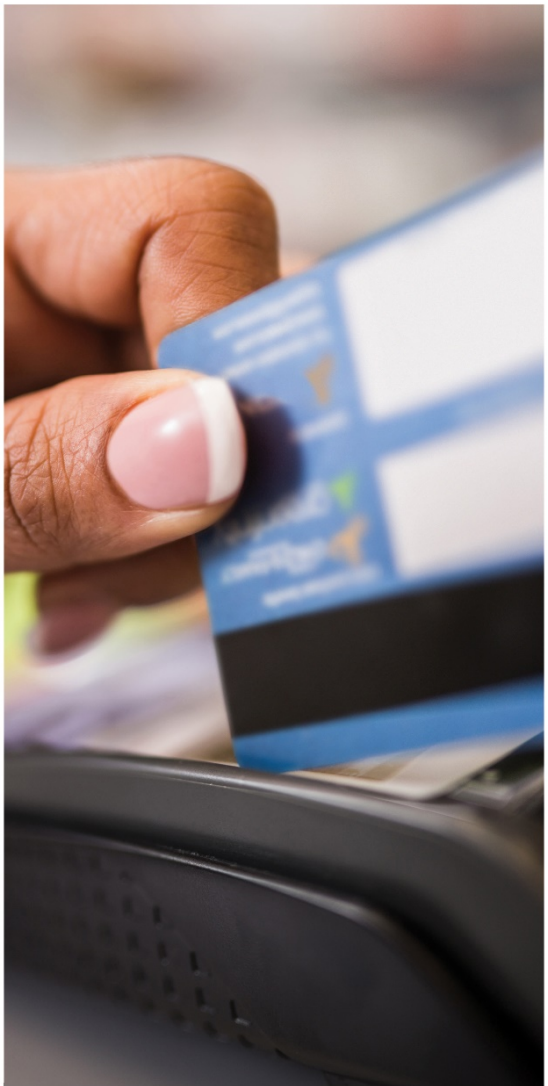
POLICY RESEARCH

Benefit Redemption Patterns in the Supplemental Nutrition Assistance Program in Fiscal Year 2017

Volume II: Appendices F–I



March 4, 2020

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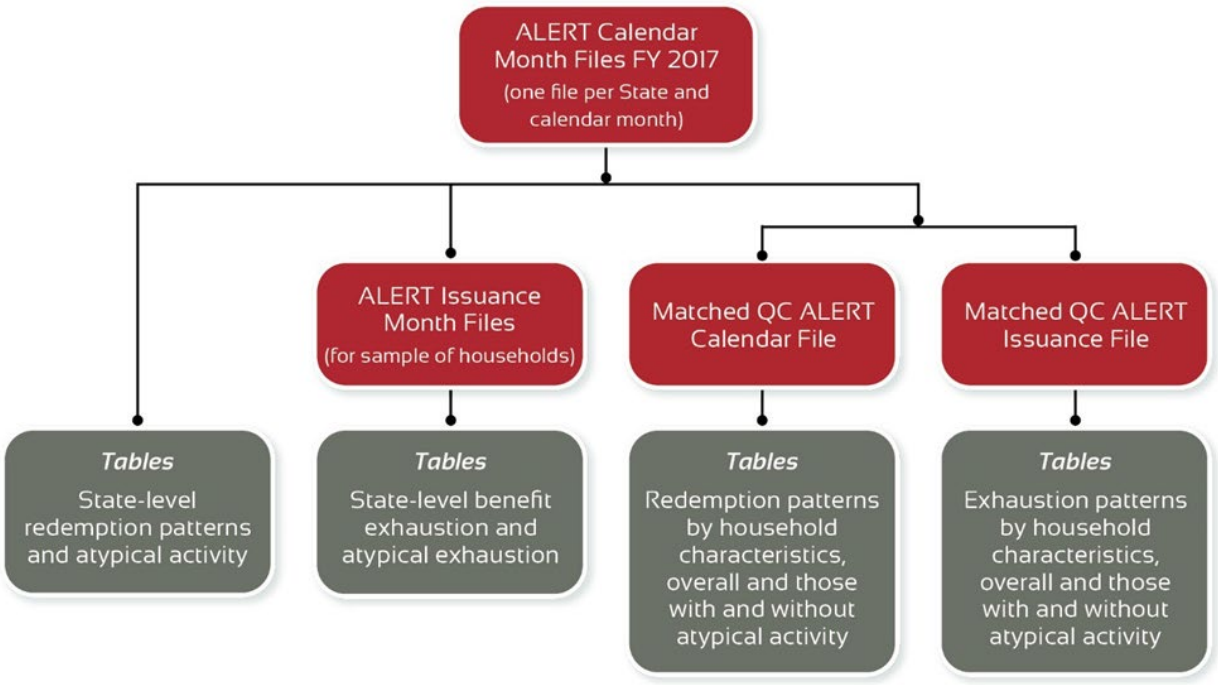
Appendix F. Detailed Description of the Methodology

Insight cleaned and combined multiple datasets to assemble four sets of analysis files (red boxes in figure F.1), which correspond with four sets of tabulations (gray boxes). This appendix provides details on the procedures used to clean and merge the raw data and the issues encountered in constructing those files.

Figure F.1. Four Analysis Files and Their Relationship With Tabulations



Note: State refers to the State SNAP Agency issuing benefits.

A. Raw Data Cleaning

The study assembled three primary types of data for analyses of electronic benefit transfer (EBT) redemption patterns:

1. EBT transaction data (ALERT)
2. Data describing SNAP-authorized retailers (STARS)
3. Data describing characteristics of SNAP households (SNAP QC data)

Additional data include county poverty data, county adjacency information, and State EBT issuance schedules.

1. Anti-Fraud Locator for EBT Redemption Transaction System

The primary data used in the analyses were the Anti-Fraud Locator using Electronic Benefit Transfer (EBT) Retailer Transactions System (ALERT) data, which are compiled by the EBT vendor for each State and maintained by FNS. These data contain a record of each EBT transaction for each participating household. FNS provided Insight with monthly ALERT files for July 2016 through December 2017.

Each ALERT record contains the SNAP household account number (HHACCT), EBT card number, household State, FNS number, store State, date and time of transaction, transaction amount, available account balance before transaction, transaction type (purchase, refund, void or balance inquiry), transaction method (electronic entry, manual/key entry, or paper voucher), and an indicator for whether the transaction was accepted or rejected. The files do not contain a record of the amount or date of a household's benefit issuance; an issuance instead is inferred between a household's sequential transactions as an observed increase in the available balance not resulting from a void or refund.

The first processing step was to parse the data into separate monthly files for each State, excluding rejected transactions and balance inquiries. Next, the study team assessed the quality of the data by reviewing the number of records per State and month, the types of transaction codes, the distribution of households by months of participation, and whether multiple household accounts were associated with a single card number. For analysis, household records were grouped by the HHACCT because households could have multiple or different EBT card numbers throughout the year.

The main findings from the data quality analysis follow:

- All State files, except Montana, contained only three transaction type codes (10, 20, and 30) corresponding with purchase, refund, and void. Montana data, beginning with June 2017, also included codes 51, 52, and 53 for voucher authorization, voucher clear, and voucher release; and code 60 for adjustment.[1] As noted below, because most ALERT data do not include records of balance adjustments and card replacement fees, balance decrements from one record to the next were not always consistent with observed transaction amounts.[2]
- The number of months of participation per household and number of HHACCTs per card indicated households were not being linked across months in Montana, Utah, and Virginia. For Montana and Utah, the format of HHACCT changed and was resolved by removing leading zeros. Virginia issued new HHACCTs mid-year, and the study team overwrote new HHACCTs with the old ones using the EBT card number to identify households.[3]

[1] Voucher clear (52) transactions have no impact on available balances and were dropped from the files. Code 51 is equivalent to a purchase transaction, and 53 is equivalent to a void.

[2] The documentation for ALERT files includes "transaction type" codes for adjustments (60) and card replacement fees (70). The files received did not include any transactions with transaction type 70.

[3] In five additional States (Iowa, Massachusetts, Maine, New York, and Texas), more than 3 percent of EBT card numbers were associated with multiple HHACCTs. If HHACCTs changed mid-year, the study team observed transactions for the card number under multiple HHACCTs but not in the same months. For these States, multiple HHACCTs were observed to use the same EBT card number in the same months, and the team concluded SNAP subunits may share the same EBT card number.

The study team found additional issues, which primarily affected the construction of ALERT issuance month files (the methods used to resolve these issues are described in the approach to constructing those files):

- **Inconsistent balance decrement.** The study team compared the recorded available balance (reflecting the account balance before the purchase) with the household's running balance (the first balance minus subsequent transactions, adjusting for benefit issuances). In most States, only a small percentage of households had discrepancies between the reported and running balances, and for only a small number of transactions. The two main causes of discrepancies appeared to be recorded transaction dates and times that were out of alignment with other transactions and missing records for account adjustments.
- **Large balance and transaction amounts**. All States had households with unexpectedly large balances; in 25 States, balances equal to the maximum balance could be displayed in the data ($9,999.99). In all States, the proportion of households affected was negligible (virtually 0 percent of households in each State). Similarly, all States had some households with unexpectedly large transactions (greater than $1,000) but never more than 0.2 percent of households, except in Alaska where an average of 3.7 percent of households had transactions greater than $1,000 each month. The study team retained the transactions in the analysis files.

2. Store Tracking and Redemption System

The Store Tracking and Redemption System (STARS) data contain a record of each retailer authorized to accept SNAP benefits. FNS provided the STARS data for each retailer authorized during the period from July 2016 through December 2017. Each record contained a store identification number, store name, location (city, State, ZIP Code, county Federal Information Processing Standard [FIPS] code, and geographic coordinates), business type, authorization date, current status, and arrays of codes and dates for sanctions and other compliance actions. An additional history file was provided with one record for every change in status (with status code, date, and reason). Status codes identify application, initial authorization, voluntary withdrawal, involuntary withdrawal, disqualification, and denial of authorization.

a. Store Type Categories

The store identification number was used to match the STARS data to each purchase transaction in the ALERT data. The study team used business type to group stores into three main store categories:

- Supermarkets/super stores
- Large/medium grocery stores
- Other stores, which is at times separated into the following subcategories:
  - Small groceries
  - Convenience stores
  - Specialty food stores, which represent stores classified as selling one of the following specialized items: bakery/bread, fruits/vegetables, meat/poultry products, or seafood products
  - Other stores, which includes stores classified as combination grocery/other, delivery route, farmers market, nonprofit food buying cooperative, wholesaler, or meal service providers

b. Types of Out-of-State Transactions

ALERT data identify out-of-State transactions (household State is not equal to store State). The store FIPS codes were used to further classify out-of-State transactions according to one of the following categories using the Census County Adjacency File:

- In a contiguous State, in a county on the State border
- In a contiguous State, in a county not on the State border
- In a noncontiguous State

c. Stores With Compliance Actions

Information about sanctions, other actions, and status changes was used to identify retailers with any compliance action during the period from July 2016 through the end of 2017. A compliance action is observed as a disqualification, civil monetary penalty, warning letter, or fine.

3. SNAP Quality Control Data

The FY 2017 SNAP Quality Control (QC) database contains detailed demographic, economic, and SNAP eligibility information for a nationally representative sample of 45,530 SNAP households. The raw datafile is generated from monthly reviews of SNAP cases conducted by State SNAP agencies as part of quality control reviews. The study team primarily used the edited version of the file provided by FNS, which included a monthly and fiscal year weight and a variety of constructed economic and demographic variables.

To match SNAP QC households with their ALERT records, the study team used the raw, nonpublic SNAP QC file to obtain each household's SNAP case number. For 25 States, the SNAP case number was the same as the ALERT household account number, and SNAP QC households were matched directly with ALERT. Remaining States were asked to provide a crosswalk file allowing a link of the SNAP QC household with ALERT records (see next section). The study team received crosswalks for 25 of the 28 States. Ohio was unable to provide a file because it transitioned to a new eligibility system in 2018 and no longer had reasonable access to 2017 records. After repeated contacts and inquiries, the study team was unable to obtain files from Delaware and Michigan.[4]

Table F.1 provides the number of households in the SNAP QC data by State, the percentage matched with ALERT data, and the percentage having transactions in the study period defined as the 3 months centered on the SNAP QC sample month.

[4] Initial requests to the States were made December 18, 2018, before the partial Federal Government shutdown. The study team resumed efforts at the end of January 2019. Delaware was working with its EBT vendor to try to provide the information requested but was unable to complete the request within the final timeframe (May 15, 2019). Michigan initiated a data use agreement with Insight but failed to provide the follow-up information needed to put the agreement in place and deliver the crosswalk.

Table F.1. Percentage of QC Cases Matched With ALERT

State	Method of Match	Number of QC Cases	SNAP QC Cases Matched With ALERT		SNAP QC Cases With ALERT Records in Study Period	
			Number	Percent	Number	Percent
Alabama	Direct	1,060	1,056	99.6	1052	99.2
Alaska	Direct	554	554	100.0	552	99.6
Arizona	Direct	797	797	100.0	795	99.7
Arkansas	Direct	1,074	1,064	99.1	1058	98.5
California	Crosswalk	861	861	100.0	860	99.9
Colorado	Crosswalk	798	798	100.0	773	96.9
Connecticut	Crosswalk	858	858	100.0	839	97.8
Delaware	**Crosswalk**	**763**	**0**	**0.0**	**0**	**0.0**
District of Columbia	Crosswalk	916	915	99.9	888	96.9
Florida	Direct	989	989	100.0	986	99.7
Georgia	Crosswalk	988	920	93.1	912	92.3
Guam	Direct	455	451	99.1	450	98.9
Hawaii	Direct	729	729	100.0	727	99.7
Idaho	Crosswalk	1,007	1007	100.0	986	97.9
Illinois	Crosswalk	1,041	1,040	99.9	1037	99.6
Indiana	Crosswalk	940	927	98.6	915	97.3
Iowa	Direct	950	938	98.7	930	97.9
Kansas	Crosswalk	946	946	100.0	881	93.1
Kentucky	Crosswalk	1,200	1,179	98.3	1166	97.2
Louisiana	Crosswalk	820	820	100.0	814	99.3
Maine	Direct	910	885	97.3	881	96.8
Maryland	Direct	776	736	94.8	735	94.7
Massachusetts	Crosswalk	968	968	100.0	963	99.5
Michigan	**Crosswalk**	**914**	**0**	**0.0**	**0**	**0.0**
Minnesota	Direct	1,031	922	89.4	896	86.9
Mississippi	Direct	1,013	1,008	99.5	1006	99.3
Missouri	Direct	871	868	99.7	866	99.4
Montana	Direct	778	771	99.1	763	98.1
Nebraska	Crosswalk	894	856	95.7	855	95.6
Nevada	Crosswalk	995	992	99.7	976	98.1
New Hampshire	Crosswalk	667	667	100.0	666	99.9
New Jersey	Direct	798	769	96.4	768	96.2
New Mexico	Crosswalk	964	959	99.5	950	98.5
New York	Crosswalk	919	919	100.0	899	97.8
North Carolina	Crosswalk	997	997	100.0	994	99.7
North Dakota	Direct	479	478	99.8	472	98.5
Ohio	**Crosswalk**	**988**	**0**	**0.0**	**0**	**0.0**
Oklahoma	Direct	1,017	1,003	98.6	991	97.4

State	Method of Match	Number of QC Cases	SNAP QC Cases Matched With ALERT		SNAP QC Cases With ALERT Records in Study Period	
			Number	Percent	Number	Percent
Oregon	Crosswalk	939	936	99.7	847	90.2
Pennsylvania	Crosswalk	835	835	100.0	830	99.4
Rhode Island	Crosswalk	681	666	97.8	572	84.0
South Carolina	Direct	980	979	99.9	975	99.5
South Dakota	Direct	719	717	99.7	716	99.6
Tennessee	Crosswalk	1,019	1,019	100.0	1016	99.7
Texas	Direct	1,010	1,009	99.9	1004	99.4
Utah	Direct	874	858	98.2	854	97.7
Vermont	Direct	689	439	63.7	415	60.2
Virgin Islands	Crosswalk	202	201	99.5	200	99.0
Virginia	Crosswalk	740	306	41.4	306	41.4
Washington	Crosswalk	950	950	100.0	944	99.4
West Virginia	Direct	850	850	100.0	847	99.6
Wisconsin	Direct	970	970	100.0	956	98.6
Wyoming	Crosswalk	347	347	100.0	347	100.0
	Total	45,530	41,729	91.7	41,131	90.3

Note: Delaware, Michigan, and Ohio were unable to provide crosswalk files for this study.

In nearly every State, the study team was able to match at least 96 percent of households in the SNAP QC data with households making transactions in the ALERT data. Typically, when there was no match for a household it was because the SNAP QC household identifier was incorrectly entered into the QC data (when possible, States provided the corrected identifiers for matching purposes). Instances of lower-than-average match rates were the result of the following:

- **Cash-out States.** Households participating in SNAP cash-out programs were not observed in the EBT data. In Vermont, for example, the study team learned about 38 percent of households receive cash benefits. Additional cash-out States are Minnesota, Ohio, Oregon, and Utah.[5] In Minnesota, the cash-out program operates only in Hennepin County.
- **System changes.** System changes in Virginia were accompanied by issuance of new HHACCTs in January and February 2017. The State provided a crosswalk file to link SNAP QC households with ALERT for case numbers in the old system (the EBT card number provided a link from old to new case numbers for households with transactions both before and after the change). The study team was unable to obtain a crosswalk from Virginia for households observed only with new case numbers.

[5] In FY 2016, 82,000 households participated in cash-out demonstration programs (https://www.fns.usda.gov/pd/snap-state-activity-reports). Because these programs focused on select groups of participants (such as households whose members who are all 65 or older or receiving Supplemental Security Income [SSI] in Vermont), results in these five States may not be representative of all participants in the State. In Vermont, for example, the study team will be missing many of the small households who tend to have lower benefits (because they likely have SSI or Social Security benefits) and shop less often than other households (because of their age and low benefits). However, match rates with the SNAP QC file imply the cash-out programs in Utah, Oregon, and Minnesota will not have as much impact on the findings as might be seen in Vermont.

4. Other Data

To create the analysis files, the study team gathered additional information from other sources, such as the following:

- **Poverty data by county.** Data are available through USDA's Economic Research Service website indicating persistence of poverty and population density by county, as measured through Census 2000.
- **Census county adjacency file.** The U.S. Census Bureau's county adjacency file lists each county, or county equivalent, and which county or counties are neighboring. The file includes all 50 States, the District of Columbia, Puerto Rico, and the Island Areas (American Samoa, the Commonwealth of the Northern Mariana Islands, Guam, and the U.S. Virgin Islands).
- **State EBT issuance schedules.** FNS provides details of State SNAP benefit issuance schedules on the FNS website.[6] Table F.2 provides, for each State, the issuance day, determinants of a household's issuance day, and whether issuance day was assigned or imputed for analysis (discussed in section B).

Table F.2. Benefit Issuance Schedules

State/ Territory	Determinant	Issuance Dates	Assigned or Imputed	
			ALERT QC File	ALERT Issuance Files
Alabama	Last two digits of case number	4–23	assigned	assigned
Alaska	Not staggered	1	assigned	assigned
Arizona	First letter of last name	1–13	imputed	imputed
Arkansas	Last digit of Social Security number	4, 5, 8, 9, 10, 11,12, 13	imputed	imputed
California	Last digit of case number	1–10	assigned	imputed
Colorado	Last digit of Social Security number	1–10	imputed	imputed
Connecticut	First letter of last name	1–3	imputed	imputed
Delaware	First letter of last name	2–28 even days	N/A[a]	imputed
District of Columbia	First letter of last name	1–10	imputed	imputed
Florida	Eighth and 9th digit of 10-digit case number, read backwards	1–28	assigned	assigned
Georgia	Last two digits of case number	5–23 odd days	assigned	imputed
Guam	Not staggered	1	imputed[b]	imputed[b]
Hawaii	First letter of last name	3, 5	imputed	imputed
Idaho	Last digit of birth year	1–10	imputed	imputed
Illinois	Case type and number	1, 3–10, 13, 17, 20	imputed	imputed
Indiana	First letter of last name	5–23 odd days	imputed	imputed
Iowa	First letter of last name	1–10	imputed	imputed
Kansas	First letter of last name	1–10	imputed	imputed
Kentucky	Last digit of case number	1–19 odd days	assigned	imputed

[6] FNS (Food and Nutrition Service). (2019). *SNAP monthly issuance schedule for all States and territories*. Alexandria, VA. Retrieved from https://fns-prod.azureedge.net/sites/default/files/snap/Monthly-Issuance-Schedule-All-States.pdf

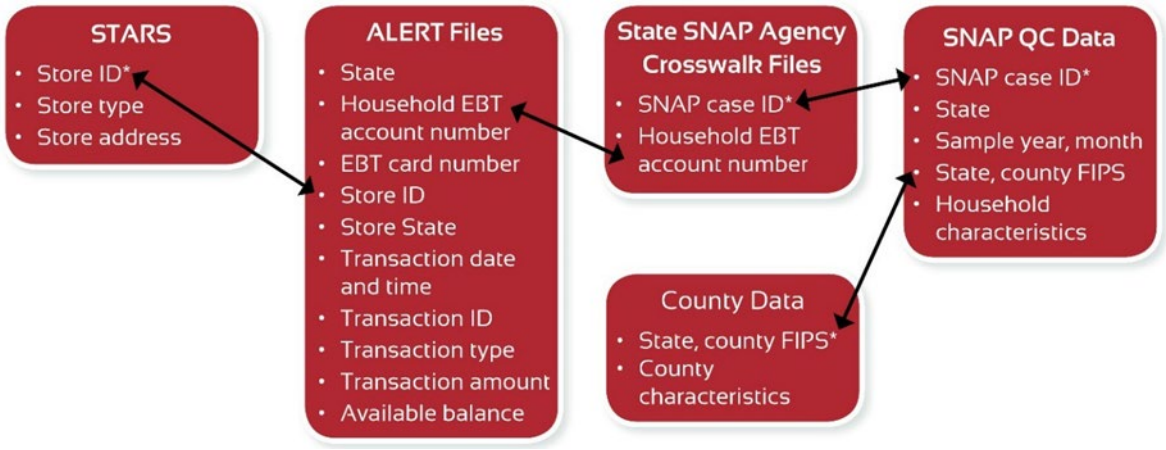
State/ Territory	Determinant	Issuance Dates	Assigned or Imputed	
			ALERT QC File	ALERT Issuance Files
Louisiana	Last digit of Social Security number	1–14[c]	imputed	imputed
Maine	Last digit of recipient's birth date	10–14	imputed	imputed
Maryland	First three letters of last name	4–23	imputed	imputed
Massachusetts	Last digit of Social Security number	1, 2, 4, 5, 7, 8, 10, 11, 13, 14	assigned	imputed
Michigan	Last digit of case number	3–21 odd days	N/A[a]	imputed
Minnesota	Last digit of case number	4–13	assigned	assigned
Mississippi	Last two digits of case number	4–21	assigned	assigned
Missouri	Client's birth month and last name	1–22	imputed	imputed
Montana	Last digit of case number	2–6	assigned	assigned
Nebraska	Last digit of Social Security number	1–5	imputed	imputed
Nevada	Not staggered	1	assigned	assigned
New Hampshire	Not staggered	5	assigned	assigned
New Jersey	Seventh digit of case number	1–5 d	assigned	assigned
New Mexico	Last two digits of Social Security number	1–20	imputed	imputed
New York	Last digit of case number	1–9 (outside New York City [NYC]); staggered over 13 days, excluding Sundays and holidays (NYC)	imputed[e]	imputed[e]
North Carolina	Last digit of Social Security number	3-21 odd days	imputed	imputed
North Dakota	Not staggered	1	assigned	assigned
Ohio	Last digit of case number	2–20 even days	N/A[a]	imputed
Oklahoma	Last digit of case number	1, 5, 10	assigned	imputed
Oregon	Last digit of Social Security number	1–9	imputed	imputed
Pennsylvania	Last digit of case number	Dates vary by month and county	assigned[d]	imputed
Rhode Island	Not staggered	1	assigned	assigned
South Carolina	Last digit of case number	2–10 even days and 11–19 odd days	assigned	imputed
South Dakota	Not staggered	10	assigned	assigned
Tennessee	Last two digits of Social Security number	1–20	imputed	imputed
Texas	Last digit of case number	1, 3, 5, 6, 7, 9, 11, 12, 13, 15	assigned	assigned
Utah	First letter of last name	5, 11, 15	imputed	imputed
Vermont	Not staggered	1	assigned	assigned
Virgin Islands	Not staggered	1	assigned	assigned
Virginia	Last digit of case number	1, 4, 7, 9	assigned	imputed
Washington	Last digit of case number	1–10	assigned	imputed

State/ Territory	Determinant	Issuance Dates	Assigned or Imputed	
			ALERT QC File	ALERT Issuance Files
West Virginia	First letter of last name	1–9	imputed	imputed
Wisconsin	Eighth digit of Social Security number	2, 3, 5, 6, 8, 9, 11, 12, 14, 15	imputed	imputed
Wyoming	First letter of last name	1–4	imputed	imputed

[a]As discussed, the study team was unable to acquire the information necessary to match the ALERT data with the QC data in Delaware, Michigan, and Ohio.
[b] Available information from FNS indicates Guam issues all benefits on the first of the month. Imputed issuance dates are clearly consistent with staggered issuance over the first 10 days of the month. The study team could not confirm Guam's schedule and used imputed dates for analyses.
[c] In Louisiana, benefits are available between the 1st and 14th of the month. Benefits are available to individuals who are elderly and disabled between the 1st and 4th of the month and to all other cases between the 5th and 14th.
[d] Warren County assigns all benefits on the first day of the month.
[e] To determine which schedule applied to each household, the study team identified the county of residence as the county where most transactions occurred in a month. For counties outside NYC, the team imputed issuance dates between the first and ninth day of the month; for New York counties, the team established issuance months according to the city's monthly rotating schedule. For Pennsylvania, the study team assigned each household to its county's monthly rotating schedule for the ALERT QC matched file and used imputed issuance days for the ALERT Issuance files.

The study team linked the data sources to build the analysis files, as illustrated in figure F.2. The store information from STARS was added to each ALERT transaction record. For the households in the SNAP QC sample, household identifiers provided a link between the household characteristics and the transactions. County data supplemented the characteristics available for households in the SNAP QC sample.

Figure F.2. Data Sources and Identifiers for Linking Data Sources



Notes: Asterisk denotes unique identifiers that appear on only one record within the datafile. In ALERT file, State refers to the State issuing benefits.
FIPS = Federal Information Processing Standards

B. Construction of Analysis Files

The study team constructed four sets of analysis files to correspond with four sets of tabulations (shown in figure F.1). The ALERT calendar month files provided monthly statistics that were averaged across calendar months. The team selected a sample of 10,000 ALERT households from each calendar month

for each State for construction of issuance month files. The issuance month files provide monthly statistics about benefit exhaustion. Matched ALERT-QC files include ALERT data for households in the SNAP QC sample.

1. ALERT Calendar Month Files (for Tables B.1 to B.15, B.22a, B.22b, B.25 to B.29)

The most straightforward analysis files were constructed from the ALERT calendar month files (one file per State and month). The ALERT files received minimal processing to drop rejected transactions and balance inquiries and to add store information (store type, out-of-State category, compliance actions). The study team constructed analytic variables, which were summarized by State and month (for State statistics) and by State, household, and month (for household-level statistics), and then averaged over months.

To obtain an accurate calculation of the number of transactions and the value of expenditures, the study team made adjustments for voids and refunds. To calculate the number of transactions, the team counted voids as "-1" and refunds as "0." To calculate the value of transaction amounts, voids and refunds contributed negatively to totals. This approach was sufficient because the tabulations from these files were monthly averages and did not depend on the order of transactions or the exact household balance after each transaction.[7]

Although in most States the calendar month did not exactly align with the issuance month (i.e., most States did not issue benefits to all participants on the first day of the calendar month), the calendar month remained a reasonable time unit for identifying the average number of transactions in a month and the average amount spent per month and per transaction. The tabulations in the analysis were monthly averages for SNAP participating households, calculated at the State and national level.

2. ALERT Issuance Month Files (for Tables B.16 to B.22, B.23 to B.24)

The issuance month files were used to answer questions about how quickly participants spend their benefits after issuance, how much money they carry over into the next month, and the prevalence of account inactivity. Issuance month files were constructed to include, for each household and month, all transactions beginning with the date of issuance through the day prior to the next issuance.

Because the ALERT data do not include a separate record to indicate the date of issuance, the issuance date was assigned based on knowledge of the State issuance schedule or inferred from the transaction data. However, where imputation was needed, accurate identification of the issuance amount and issuance day required data cleaning that was computationally intensive. Therefore, the study team used random samples of 10,000 households per month for each State to create these files. Weighting

[7] Because this file included all transactions for every household participating in SNAP, identifying the purchase transaction to pair with each void and refund was computationally intense.

ensured the national tabulations reflected the actual distribution of households, transactions, and benefits across the States.

a. Cleaning the Data

Prior to imputing issuance days, ALERT files were cleaned to (1) remove voids and their corresponding voided purchase or refund, and (2) sort records by household and transaction date and time, then reorder records to achieve decrements in the available balance that are consistent with transaction amounts. These steps eliminated spurious increases in the available balance that could have been mistaken for issuances.

To remove voids and voided transactions, the study team matched voids to the nearest preceding purchase or refund of the same amount. The voids and matched transactions were then deleted from the files.

To reorder the data, the study team identified "out-of-order transactions" as having an available balance prior to a transaction that did not match the remaining balance on the preceding transaction (excluding differences because of issuance). Next, the study team searched all transactions for that household and month to find the transaction with a remaining balance equal to the available balance on the out-of-order transaction. Initial record numbers were adjusted to reorder the transactions.[8]

b. Assigning the SNAP Issuance Day Based on State Issuance Schedules

For households in 16 States, the benefit issuance day was straightforward to identify, either because all participants received their benefit on the same day (usually the first of the month) or because the issuance day was determined by the participant's SNAP case number, which was also the ALERT HHACCT.[9]

c. Inferring the SNAP Issuance Day From ALERT Data

For 37 States, the study team needed to impute the issuance day for each household because it was tied to an identifier not available to the team, such as the participant's last name. To test the accuracy of imputations, all States were included in the imputation process, and imputed dates were compared with assigned dates for 16 States.

To impute the issuance day, the study team identified "observed issuance days" in each month as days with an increase in the household's available balance relative to the prior transaction. For example, a household with a $30 balance prior to making a $10 transaction would typically be observed to have a $20 balance on the subsequent record. If, instead, the balance on the subsequent transaction was more than $20 (say $55), the study team identified the date of the subsequent transaction as an "observed issuance day," with an issuance amount equal to the actual balance minus the expected balance ($35 in this example).

It is possible a household does not make a purchase on the day the benefit is deposited into its account. For example, if a household receives its benefit on the first of the month but does not make a purchase

[8] Previous studies reordered the data by searching for a transaction amount to reconcile inconsistent balance decrements. However, transactions amounts are not unique, while the value of account balance is unique after removing voids and voided transactions.
[9] For the ALERT-QC matched file, issuance days could be assigned for households in 27 States because the case number is included in the QC data.

until the sixth of the month, the study team would identify the issuance day for that month as the sixth. Therefore, to ensure the greatest accuracy in determining a household's issuance day, the study team used 18 months of data to impute the issuance day as the earliest day the team observed an issuance for each household across the months.

The study team compared imputed and assigned issuance days for the 16 States for which the team could assign days. Among 14 of these States, imputed and assigned issuance day matched exactly for between 78 and 95 percent of households. Assigned and imputed days matched for only 42 percent of households in Florida; the study team was unable to reconcile this difference using the assigned days. Assigned and imputed days matched for only 16 percent of households in Guam. Imputed days clearly showed Guam staggered issuance over 10 days, and the study team retained the imputed day rather than the assigned first of the month for Guam.

The imputation process identified the number of issuances for all households, regardless of whether issuance day was assigned. It is possible that, in any given month, a household has more than one issuance. There are several possible reasons for multiple issuances:

- **Adjustment in benefit amount.** Household benefits may change during a month because of changes in household income or composition, leading to a midmonth additions or subtractions. Households are not likely to be able to anticipate the timing and certainty of these adjustments to their benefit level. Therefore, the trajectory of benefit exhaustion in these months is not representative of their usual redemption activity. For this reason, households with multiple issuances from adjustments are removed from the analysis file for that month.
- **Disaster benefits.** Following a disaster, SNAP households in the affected area may qualify for a replacement benefit to replace the food lost from power outages or damage to the residence. Transactions for households affected by disasters are also not likely to be representative of their usual redemption activity, so they are removed from the analysis for that month.
- **Supplements.** While examining States with higher-than-average levels of multiple issuances, the study team discovered three States (California, Maine, and New Hampshire) issue supplements to households that meet certain work requirements (bonuses are $10 in California and New Hampshire and $15 in Maine).[10] Most supplements are issued near the end of a household's issuance month.[11] However, it is likely households anticipate supplements because they are either identified as eligible at certification/recertification or the supplement is automatically processed and distributed based on the household's work hours. Households are then likely to spend down their regular benefit amount as if it included the supplement. Therefore, the study team did not exclude these households from analyses and did not adjust transactions in any way for the exhaustion analysis for these States.

Another factor important to identifying the household's issuance date is ensuring examination of a household that appears to be spending only 1 month of benefits (or at least a part of its benefit). The study team did not include in the imputation algorithm a month in which a household has multiple months of benefits to spend. The study team did not know if the household's first observed balance

[10] For more information on California's program, see http://www.cdss.ca.gov/cdssweb/entres/forms/English/WINS1.pdf. For more information on Maine's program, see https://www.maine.gov/sos/cec/rules/10/144/ch331/14433111.docx.

[11] In California, regular benefits are issued from the 1st to the 10th of the month, and half of all supplements are observed from the 21st to the 24th. In Maine, regular benefits are issued from the 10th to the 14th, and 80 percent of supplements were observed on the 4th to the 6th. In New Hampshire, regular benefits are issued on the 5th; 60 percent of supplements were observed from the 1st to the 4th, and 28 percent were observed from the 15th to the 18th.

increase (observed by transactions in the current month) was from a previous benefit issuance or the current month's issuance.

In summary, the process for imputing issuance date for each household follows:

1. Extract all ALERT transactions over the 18-month period.
2. Remove voids and corresponding voided purchases and refunds.
3. Sort transactions by household and transaction data and time, examine balance decrements, and reorder records to achieve decrements in available balance that are consistent with transaction amounts.[12]
4. Identify all transactions with an observed issuance.
5. Discard data for any month with multiple observed issuances (except for $10 supplements in California and New Hampshire and $15 supplements in Maine).
6. Discard data for any month following a month with no transaction activity.
7. Identify the minimum issuance day.
8. Assign the issuance date equal to the minimum observed issuance date; assign households with minimum observed issuance dates outside the State's issuance schedule equal to the last day of the schedule.[13]

Once the issuance day was identified for each household, the month was redefined to reflect the issuance day as the start of each month for each household.

3. ALERT-QC Matched Files (for Tables A.1 to A.24)

ALERT data do not provide household characteristics, so the study team used the SNAP QC sample to examine EBT redemption patterns by household characteristics. The matched ALERT-QC files included household characteristics from the SNAP QC data and redemption records from ALERT merged by household identifier (CASEID in QC file; HHACCT in ALERT). These files were used to calculate the same statistics as with the ALERT calendar and issuance month files, except the study team tabulated the statistics by characteristics rather than by State.

SNAP QC data represent the characteristics for a household in just the sample month; therefore, the study team analyzed redemption activity only for the 3-month period centered on the sample month, for each household. Therefore, the ALERT data were, at most, 1 month removed from the SNAP QC review.

The same methods used to clean the ALERT issuance month files were used to clean the ALERT-QC matched file, with two exceptions. First, to tabulate an accurate count of the number of purchases, the study team deleted purchases refunded in their entirety, along with the refund transaction. Second, the issuance day could be assigned to households in 27 States because the QC data provided the SNAP case number.

[12] Transactions were not reordered for prior studies because of the computational burden, and this may have resulted in higher percentages of households observed with multiple issuances and excluded from the study.

[13] As in prior studies, for Texas, the study team used the mode observed issuance day to assign issuance dates.

The study team augmented the geographic information on the ALERT-QC matched files using the Department of Agriculture Economic Research Service definitions of metropolitan, micropolitan, and noncore statistical areas. A Metropolitan Statistical Area has at least one urbanized area with a population of 50,000 or more and includes adjacent territory with a high degree of social and economic integration with the core, as measured by commuting ties. A Micropolitan Statistical Area has at least 1 urban cluster of at least 10,000 but less than 50,000 in population and includes adjacent territory with a high degree of social and economic integration with the core, as measured by commuting ties. All other areas are noncore.

Again, using information from the Economic Research Service, the team added identifiers of persistent poverty. A county was classified as experiencing persistent poverty if 20 percent or more of its residents were poor as measured by the 1980, 1990, and 2000 decennial censuses and the American Community Survey 5-year estimates for 2007–2011.

Appendix G. Supplemental State and Territory Tables

Table G.1—Number of authorized retailers by type and state

State	Authorized retailers	Number of authorized retailers, by store type					
		Supermarket/ Super store	Large/medium grocery	Small grocery	Convenience store	Specialty stores	Other stores
Total U.S.	273,072	38,316	14,119	14,910	129,069	9,079	67,579
Alabama	5,530	689	195	148	2,664	179	1,655
Alaska	554	84	62	47	245	18	98
Arizona	4,339	725	167	130	2,017	126	1,174
Arkansas	2,950	392	95	100	1,412	72	879
California	28,104	4,327	2,025	1,394	13,087	910	6,361
Colorado	2,961	611	166	114	1,300	159	611
Connecticut	2,832	419	131	235	1,372	48	627
Delaware	853	114	21	74	346	34	264
District of Columbia	494	52	17	54	219	18	134
Florida	16,983	2,542	723	543	8,262	629	4,284
Georgia	10,905	1,294	397	338	5,915	328	2,633
Guam	269	20	50	44	105	11	39
Hawaii	1,043	175	53	38	426	115	236
Idaho	1,117	178	62	42	552	80	203
Illinois	9,990	1,501	693	707	4,380	277	2,432
Indiana	5,529	800	247	203	2,561	157	1,561
Iowa	2,906	421	172	89	1,512	83	629
Kansas	2,104	339	158	64	885	91	567
Kentucky	4,777	604	150	150	2,466	95	1,312
Louisiana	5,155	601	235	145	2,319	246	1,609
Maine	1,554	183	92	53	761	41	424
Maryland	4,127	718	192	300	1,736	208	973
Massachusetts	5,779	718	265	389	2,732	70	1,605
Michigan	10,466	1,235	479	249	5,767	322	2,414

State	Authorized retailers	Number of authorized retailers, by store type					
		Supermarket/ Super store	Large/medium grocery	Small grocery	Convenience store	Specialty stores	Other stores
Minnesota	3,604	607	310	173	1,555	207	752
Mississippi	3,772	356	109	114	2,004	98	1,091
Missouri	5,235	804	238	169	2,523	155	1,346
Montana	801	143	77	22	377	37	145
Nebraska	1,280	225	169	72	447	49	318
Nevada	1,916	310	61	37	993	49	466
New Hampshire	1,093	183	37	22	513	14	324
New Jersey	6,542	899	486	1,196	2,280	211	1,470
New Mexico	1,615	232	66	61	734	59	463
New York	19,941	2,317	1,811	3,409	7,470	769	4,165
North Carolina	9,972	1,552	307	313	4,839	286	2,675
North Dakota	546	96	82	38	187	38	105
Ohio	10,086	1,442	422	275	4,731	272	2,944
Oklahoma	3,724	457	123	53	1,967	82	1,042
Oregon	3,660	495	188	109	1,952	257	659
Pennsylvania	11,004	1,531	574	1,572	4,101	356	2,870
Rhode Island	1,049	107	75	95	446	23	303
South Carolina	5,592	752	112	125	2,918	197	1,488
South Dakota	771	89	77	44	336	45	180
Tennessee	7,305	877	234	200	3,877	163	1,954
Texas	20,959	2,670	827	438	11,127	599	5,298
Utah	1,513	313	67	68	674	86	305
Vermont	723	86	36	15	368	8	210
Virginia	6,713	1,168	206	187	3,305	144	1,703
Virgin Islands	91	17	9	13	33	6	13
Washington	5,300	803	270	238	2,810	310	869
West Virginia	2,237	251	61	39	1,185	33	668
Wisconsin	4,326	713	220	157	2,089	192	955
Wyoming	381	79	18	6	187	17	74

Source: Insight Policy Research tabulations of ALERT and STARS Data, FY2017. Average monthly statistics.

Table G.2—Number of authorized retailers by type, land area, and state

State	Authorized retailers	Number of authorized retailers, by store type and land area						Total square miles
		Supermarket/ Super store	Large/medium grocery	Small grocery	Convenience store	Specialty stores	Other stores	
Total U.S.	77.3	10.8	4.0	4.2	36.5	2.6	19.1	3,532,346.5
Alabama	109.2	13.6	3.8	2.9	52.6	3.5	32.7	50,645.3
Alaska	1.0	0.2	0.1	0.1	0.4	–	0.2	570,641.0
Arizona	38.2	6.4	1.5	1.1	17.8	1.1	10.3	113,594.1
Arkansas	56.7	7.5	1.8	1.9	27.1	1.4	16.9	52,035.5
California	180.4	27.8	13.0	9.0	84.0	5.8	40.8	155,779.2
Colorado	28.6	5.9	1.6	1.1	12.5	1.5	5.9	103,641.9
Connecticut	584.8	86.5	27.0	48.5	283.3	9.9	129.5	4,842.4
Delaware	437.8	58.5	10.8	38.0	177.6	17.4	135.5	1,948.5
District of Columbia	3,126.6	329.1	107.6	341.8	1,386.1	113.9	848.1	158.0
Florida	316.7	47.4	13.5	10.1	154.1	11.7	79.9	53,624.8
Georgia	189.6	22.5	6.9	5.9	102.8	5.7	45.8	57,513.5
Guam	1,282.2	95.3	238.3	209.7	500.5	52.4	185.9	209.8
Hawaii	162.4	27.2	8.2	5.9	66.3	17.9	36.8	6,422.6
Idaho	13.5	2.2	0.8	0.5	6.7	1.0	2.5	82,643.1
Illinois	179.9	27.0	12.5	12.7	78.9	5.0	43.8	55,518.9
Indiana	154.3	22.3	6.9	5.7	71.5	4.4	43.6	35,826.1
Iowa	52.0	7.5	3.1	1.6	27.1	1.5	11.3	55,857.1
Kansas	25.7	4.2	1.9	0.8	10.8	1.1	6.9	81,758.7
Kentucky	121.0	15.3	3.8	3.8	62.4	2.4	33.2	39,486.3
Louisiana	119.3	13.9	5.4	3.4	53.7	5.7	37.2	43,203.9
Maine	50.4	5.9	3.0	1.7	24.7	1.3	13.8	30,842.9
Maryland	425.2	74.0	19.8	30.9	178.8	21.4	100.2	9,707.2
Massachusetts	740.9	92.0	34.0	49.9	350.2	9.0	205.8	7,800.1
Michigan	185.1	21.8	8.5	4.4	102.0	5.7	42.7	56,538.9
Minnesota	45.3	7.6	3.9	2.2	19.5	2.6	9.4	79,626.7
Mississippi	80.4	7.6	2.3	2.4	42.7	2.1	23.2	46,923.3
Missouri	76.2	11.7	3.5	2.5	36.7	2.2	19.6	68,741.5

State	Authorized retailers	Number of authorized retailers, by store type and land area						Total square miles
		Supermarket/ Super store	Large/medium grocery	Small grocery	Convenience store	Specialty stores	Other stores	
Montana	5.5	1.0	0.5	0.2	2.6	0.2	1.0	145,545.8
Nebraska	16.7	2.9	2.2	0.9	5.8	0.6	4.1	76,824.2
Nevada	17.4	2.8	0.6	0.3	9.0	0.4	4.2	109,781.2
New Hampshire	122.1	20.4	4.1	2.5	57.3	1.6	36.2	8,952.6
New Jersey	889.6	122.2	66.1	162.6	310.0	28.7	199.9	7,354.2
New Mexico	13.3	1.9	0.5	0.5	6.0	0.5	3.8	121,298.2
New York	423.1	49.2	38.4	72.3	158.5	16.3	88.4	47,126.4
North Carolina	205.1	31.9	6.3	6.4	99.5	5.9	55.0	48,617.9
North Dakota	7.9	1.4	1.2	0.6	2.7	0.6	1.5	69,000.8
Ohio	246.8	35.3	10.3	6.7	115.8	6.7	72.0	40,860.7
Oklahoma	54.3	6.7	1.8	0.8	28.7	1.2	15.2	68,594.9
Oregon	38.1	5.2	2.0	1.1	20.3	2.7	6.9	95,988.0
Pennsylvania	245.9	34.2	12.8	35.1	91.7	8.0	64.1	44,742.7
Rhode Island	1,014.7	103.5	72.6	91.9	431.4	22.2	293.1	1,033.8
South Carolina	186.0	25.0	3.7	4.2	97.1	6.6	49.5	30,060.7
South Dakota	10.2	1.2	1.0	0.6	4.4	0.6	2.4	75,811.0
Tennessee	177.2	21.3	5.7	4.8	94.0	4.0	47.4	41,234.9
Texas	80.2	10.2	3.2	1.7	42.6	2.3	20.3	261,231.7
Utah	18.4	3.8	0.8	0.8	8.2	1.0	3.7	82,169.6
Vermont	78.4	9.3	3.9	1.6	39.9	0.9	22.8	9,216.7
Virginia	170.0	29.6	5.2	4.7	83.7	3.6	43.1	39,490.1
Virgin Islands	677.5	126.6	67.0	96.8	245.7	44.7	96.8	134.3
Washington	79.8	12.1	4.1	3.6	42.3	4.7	13.1	66,455.5
West Virginia	93.1	10.4	2.5	1.6	49.3	1.4	27.8	24,038.2
Wisconsin	79.9	13.2	4.1	2.9	38.6	3.6	17.6	54,157.8
Wyoming	3.9	0.8	0.2	0.1	1.9	0.2	0.8	97,093.1

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Source: Insight Policy Research tabulations of ALERT and STARS Data, FY2017. Average monthly statistics.

Appendix H. Descriptive Statistics for Regression Analysis

Table H.1. Characteristics of Households With and Without Atypical Activity

Characteristic	Inactivity		Redemption in Noncontiguous State or Nonborder County		Large End-of-Month Balance		Large Transactions (Over $200)		No Redemptions at Supermarkets		Redemptions at Four or More Stores in 1 Month, on Average		Households With Four or More Transactions on the Same Day		Households With More Than One Even Transaction	
	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs
Household type																
Single adults with children	26.0	13.1	24.9	36.2	25.0	37.6	19.6	51.1	26.7	10.9	15.6	36.9	23.5	39.6	19.0	28.0
Multiple adults with children	13.6	5.9	13.1	17.0	12.9	21.6	8.8	33.0	13.9	6.2	8.0	19.3	11.8	24.3	9.7	14.7
Children only	3.9	1.7	3.9	2.4	3.7	6.1	3.6	4.8	4.0	1.8	2.9	4.8	3.8	3.7	3.8	3.8
No children	56.5	79.3	58.1	44.3	58.3	34.7	68.1	11.1	55.4	81.0	73.5	39.0	60.9	32.4	67.5	53.5
Elderly/disabled individuals only	34.6	62.9	36.5	21.2	36.2	20.2	43.1	3.5	34.1	55.1	53.1	15.8	39.2	10.9	46.4	31.6
Household size																
1	51.6	72.6	53.1	40.7	53.4	30.4	63.0	6.6	50.6	75.0	68.0	34.7	55.9	27.9	62.6	48.6
2	17.5	14.8	17.5	16.5	17.4	19.2	17.3	18.0	17.8	12.8	15.8	19.3	17.6	16.0	16.8	17.7
3	13.3	5.8	12.8	16.4	12.8	19.4	10.1	25.6	13.7	5.3	8.0	18.8	12.2	18.7	9.6	14.3
4+	17.5	6.8	16.6	26.4	16.5	31.1	9.6	49.8	18.0	6.9	8.3	27.2	14.3	37.4	11.1	19.4
Race/ethnicity of household head																
White, non-Hispanic	45.9	51.2	46.4	41.2	46.0	46.5	47.4	40.8	46.1	46.9	53.2	38.0	48.1	32.2	53.8	43.2
African American, non-Hispanic	22.5	19.1	21.9	31.3	22.6	16.4	22.0	23.7	22.3	22.7	17.9	27.4	20.7	34.0	14.2	25.5
Hispanic	9.4	7.6	9.3	8.3	9.2	10.3	9.1	9.9	9.6	5.5	7.8	11.0	9.5	7.6	8.5	9.6
Asian, non-Hispanic	4.0	3.0	4.0	3.0	3.9	5.4	3.4	6.3	3.9	4.6	2.5	5.7	3.4	8.2	4.2	3.9
Native American, non-Hispanic	3.3	3.1	3.3	3.5	3.4	2.1	2.7	5.7	3.1	5.7	3.0	3.6	2.9	5.7	3.2	3.3
Unknown	15.0	16.1	15.1	12.7	14.9	19.3	15.3	13.7	15.0	14.6	15.6	14.4	15.4	12.2	16.1	14.6

Characteristic	Inactivity		Redemption in Noncontiguous State or Nonborder County		Large End-of-Month Balance		Large Transactions (Over $200)		No Redemptions at Supermarkets		Redemptions at Four or More Stores in 1 Month, on Average		Households With Four or More Transactions on the Same Day		Households With More Than One Even Transaction	
	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs
Households with earnings	31.3	21.9	30.8	33.9	30.5	38.8	28.1	43.3	31.7	22.1	25.6	37.1	30.5	33.9	28.2	32.0
Household receives TANF	4.6	1.9	4.4	6.2	4.5	6.2	3.1	10.5	4.7	2.5	2.4	6.9	3.9	9.1	2.6	5.2
SNAP benefit																
$16 or less	3.5	20.7	4.4	1.1	4.1	0.3	5.2	0.1	3.4	14.3	7.7	0.2	4.8	0.4	5.1	3.9
$17–100	14.1	35.3	15.4	6.4	15.2	2.3	18.4	0.3	13.8	28.4	25.5	2.8	16.8	2.0	20.3	12.9
$101–200	38.8	24.5	38.5	33.7	39.1	25.2	46.0	4.3	38.3	37.8	43.8	31.8	40.1	24.3	42.9	36.4
$201–300	10.2	7.6	10.1	10.0	10.2	10.0	10.3	9.5	10.4	7.4	8.8	11.7	10.2	9.6	10.1	10.1
$301–400	13.1	5.4	12.6	16.6	12.7	18.8	10.7	21.8	13.4	5.4	7.5	18.9	12.3	16.7	10.4	13.7
$401–500	6.9	1.6	6.5	9.5	6.5	11.1	4.2	17.5	7.0	2.2	3.1	10.7	6.0	11.4	4.2	7.6
$501 or more	13.4	4.9	12.5	22.6	12.2	32.2	5.4	46.4	13.7	4.4	3.5	23.9	9.9	35.7	7.2	15.3
Months in certification period																
≤ 6 months	25.1	16.2	24.5	29.6	24.3	36.6	22.6	33.8	25.3	17.7	20.1	30.0	24.2	28.5	22.6	25.5
7–12 months	56.1	52.4	55.8	58.8	56.1	52.3	54.7	61.5	56.1	53.9	52.9	59.4	55.0	62.9	54.6	56.5
> 12 months	18.7	31.1	19.6	11.2	19.5	11.0	22.5	4.6	18.4	28.2	26.8	10.4	20.7	8.5	22.7	17.8
Missing	0.2	0.3	0.2	0.5	0.2	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2
Region																
Northeast	12.8	11.6	12.9	9.3	12.8	9.2	13.4	9.7	12.5	15.1	14.1	11.1	13.3	8.9	13.8	12.3
Mid-Atlantic	11.0	12.9	11.1	12.3	11.1	11.7	11.1	11.0	10.9	13.8	11.8	10.4	11.3	9.8	9.1	11.9
Midwest	9.1	11.5	9.2	9.4	9.5	6.9	9.5	8.1	9.2	9.7	9.3	9.1	9.2	9.0	9.7	9.0
Southeast	19.8	18.1	19.6	23.9	19.3	21.1	20.0	18.9	19.9	18.4	18.7	21.0	19.4	22.6	17.1	20.8
Southwest	11.7	11.0	11.8	10.5	11.6	15.3	11.4	13.1	11.8	10.2	11.1	12.4	11.5	13.5	10.1	12.3
Mountain Plains	18.1	17.3	18.0	20.9	18.2	17.7	18.0	18.5	18.1	18.3	20.0	16.0	18.5	15.4	21.5	16.8
Western	17.4	17.5	17.5	13.7	17.5	18.1	16.6	20.6	17.6	14.6	15.1	20.0	16.9	20.8	18.6	16.9

Characteristic	Inactivity		Redemption in Noncontiguous State or Nonborder County		Large End-of-Month Balance		Large Transactions (Over $200)		No Redemptions at Supermarkets		Redemptions at Four or More Stores in 1 Month, on Average		Households With Four or More Transactions on the Same Day		Households With More Than One Even Transaction	
	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs	Typical HHs	Atypical HHs
Urbanicity																
Metropolitan	67.8	65.9	67.8	65.4	67.8	69.0	68.2	65.6	68.2	61.5	64.4	71.6	67.8	67.2	66.1	68.3
Nonmetro, micropolitan	14.2	13.5	14.1	15.3	14.2	12.8	14.3	13.9	14.1	15.2	15.9	12.3	14.4	12.6	14.9	13.9
Nonmetro, noncore	10.7	11.5	10.8	10.5	10.7	10.4	10.6	11.1	10.2	17.0	12.7	8.5	10.7	11.2	11.4	10.5
Missing	7.3	9.1	7.3	8.8	7.4	7.8	6.9	9.4	7.5	6.3	7.1	7.6	7.1	9.0	7.6	7.3
County with persistent poverty																
Yes	10.1	7.5	9.9	12.3	9.9	9.1	10.0	10.3	9.8	12.6	9.2	10.9	9.3	15.2	7.1	11.1
No	80.8	80.0	80.9	77.8	80.8	81.2	81.3	78.2	81.0	77.8	81.7	79.6	81.6	74.1	83.2	79.8
Missing	9.1	12.5	9.2	9.9	9.3	9.8	8.7	11.5	9.2	9.6	9.1	9.4	9.0	10.7	9.7	9.1
Sample size (*n*)	39,141	1,718	38,903	1,956	37,798	1,831	33,262	7,597	37,624	3,235	21,867	18,992	35,934	4,925	11,453	29,406

Notes
Percentages may not add to 100 because of rounding. Regions are defined using FNS region as of FY 2017.
HH = household
Source: Matched QC ALERT data

Appendix I. Additional Tables for Regression Analysis

Table I.1. Average Marginal Effect of Atypical Account Activity

Covariate	Type of Atypical Activity									
	Large Transactions (Over $200)		No Redemptions at Supermarkets		Redemptions at Four or More				Households With More Than One Even Transaction	
					Stores in 1 Month, on Average		Households With Four or More Transactions on the Same Day			
	AME	S.E.	AME	S.E.	AME	S.E.	AME	S.E.	AME	S.E.
Household type										
No children	-	-	-	-	-	-	-	-	-	-
Single adult with children	1.5*	0.7	-3.6***	0.6	0.5	1.0	-2.5***	0.7	-1.8	1.1
Multiple adults with children	0.7	0.8	-2.6**	0.8	-2.3	1.2	-2.6**	0.8	-2.5	1.4
Children only	-0.8	0.9	-3.2***	0.8	-6.1***	1.2	-4.2***	0.8	-6.2***	1.5
Elderly/disabled individuals only	-5.8***	0.7	0.6	0.4	-19.4***	0.8	-8.7***	0.4	-6.7***	0.7
Household size										
1	-	-	-	-	-	-	-	-	-	-
2	11.0***	0.6	-0.7	0.5	-3.4***	0.8	0.5	0.6	1.6	0.9
3	13.0***	0.8	-1.4	0.8	-4.3***	1.1	1.9*	0.8	4.8***	1.2
4+	13.4***	1.0	0.3	1.1	-8.6***	1.2	2.7**	0.9	5.0***	1.4
Race/ethnicity of household head										
White	-	-	-	-	-	-	-	-	-	-
African American, non-Hispanic	0.4	0.4	1.0**	0.4	12.5***	0.6	7.8***	0.5	11.8***	0.6
Hispanic	-1.9***	0.5	-1.3**	0.5	7.0***	0.8	-0.0	0.5	4.3***	0.8
Asian, non-Hispanic	-1.5	0.9	5.3***	1.0	14.0***	1.2	7.2***	0.9	-1.6	1.3
Native American, non-Hispanic	3.1***	0.9	8.1***	1.1	-0.5	1.3	4.4***	0.9	1.3	0.9
Unknown	-0.3	0.5	0.5	0.4	4.4***	0.6	0.8	0.4	2.6***	0.7

Covariate	Type of Atypical Activity									
	Large Transactions (Over $200)		No Redemptions at Supermarkets		Redemptions at Four or More				Households With More Than One Even Transaction	
					Stores in 1 Month, on Average		Households With Four or More Transactions on the Same Day			
	AME	S.E.	AME	S.E.	AME	S.E.	AME	S.E.	AME	S.E.
Household with earnings	-2.5***	0.3	0.5	0.4	-2.2***	0.5	-3.6***	0.3	-2.2***	0.6
Receipt of TANF	1.4*	0.6	2.1*	1.0	1.7	1.1	2.4***	0.7	6.0***	1.1
SNAP benefit period										
6 months or less	-	-	-	-	-	-	-	-	-	-
7–12 months	0.4	0.4	0.0	0.4	3.0***	0.5	2.0***	0.4	1.4*	0.6
More than 12 months	-0.3	0.8	-0.1	0.5	3.0***	0.8	1.8**	0.7	1.7*	0.8
Region										
Midwest	-	-	-	-	-	-	-	-	-	-
Northeast	2.5***	0.7	0.4	0.6	0.3	0.9	-0.8	0.7	1.4	1.0
Mid-Atlantic	3.5***	0.7	1.3*	0.6	-4.0***	0.9	-2.7***	0.7	4.3***	1.0
Southeast	-0.3	0.6	-1.2*	0.6	1.9*	0.9	0.2	0.6	2.5*	0.9
Southwest	0.9	0.7	-1.4*	0.6	0.0	1.0	-0.1	0.7	2.8*	1.0
Mountain	-0.3	0.7	-0.4	0.6	-3.6***	0.9	-1.3*	0.7	-3.1**	0.9
Plains										
Western	1.5*	0.7	-1.1*	0.6	1.8*	0.9	0.2	0.7	-0.6	0.9
Urbanicity										
Metropolitan	-	-	-	-	-	-	-	-	-	-
Nonmetro micropolitan area	-0.2	0.5	1.6***	0.4	-7.4***	0.6	-1.5**	0.4	-0.8	0.7
Nonmetro noncore area	0.6	0.6	4.7***	0.6	-10.7***	0.8	-1.0	0.5	-2.5**	0.8

Covariate	Type of Atypical Activity									
	Large Transactions (Over $200)		No Redemptions at Supermarkets		Redemptions at Four or More				Households With More Than One Even Transaction	
					Stores in 1 Month, on Average		Households With Four or More Transactions on the Same Day			
	AME	S.E.	AME	S.E.	AME	S.E.	AME	S.E.	AME	S.E.
County with persistent poverty	0.1	0.5	0.6	0.5	6.3***	0.8	5.4***	0.6	6.5***	0.8
Average issuance amount (in $100 increments)	5.6***	0.1	-2.1***	0.2	11.3***	0.3	2.7***	0.1	2.7***	0.2
Sample mean	18.6		7.9		46.5		12.1		72.0	
Pseudo R-squared	0.38		0.07		0.23		0.15		0.05	
Sample size (n)	40,859		40,859		40,859		40,859		40,859	

Notes: "-" Indicates the effect was not calculated because the variable was the reference category. The other covariates in the category were estimated in reference to the omitted variable. For example, the average marginal effect of household type was estimated relative to a household with no children.
AME = average marginal effect
SE = standard error
* $p < .05$, ** $p < .01$, ***$p < .001$
Sample mean is the unweighted average percent of households that exhibited the atypical activity.
R-squared is the reported pseudo r-squared statistic from the logistic regression model. Sample sizes differ because of missing data.
Regions are defined using FNS region as of FY 2017. Source: Matched QC ALERT data

Table I.2. Variance Attributable to Issuance Amount and/or Location

Covariate	Type of Atypical Activity							
	Inactivity	Redemption in Noncontiguous States or Nonbordering Counties	Large End-of-Month Balance	Large Transactions (Over $200)	No Redemptions at Supermarkets	Redemptions at Four or More Stores in 1 Month, on Average	Households With Four or More Transactions on the Same Day	Households With More Than One Even Transaction
Issuance amount and location	0.02	0.01	0.02	0.34	0.02	0.22	0.10	0.03
Location only	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Issuance amount only	0.01	0.01	0.02	0.34	0.02	0.21	0.10	0.02
All covariates[a]	0.02	0.01	0.03	0.36	0.03	0.27	0.12	0.05

Note: The study team regressed issuance amount and/or location on each of the atypical measures in the table using an ordinary least squares regression model and presents the *R*-squared statistic in this table.

[a] See rows of table I.1 for a list of all covariates. Source: Matched QC ALERT data