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The Extent of Trafficking in the Supplemental Nutrition Assistance Program: 2006–2008

Final Report

United States Department of Agriculture

Food and Nutrition Service

March 2011

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CONTENTS

EXECUTIVE SUMMARY

This is the fifth in a series of periodic analyses to estimate the extent of trafficking in the Supplemental Nutrition Assistance Program (SNAP). Trafficking occurs when SNAP recipients sell their benefits at a discount to food retailers. Although trafficking does not represent a cost to the Federal Government, it is a diversion of program benefits. Benefits are intended to help low-income households access a nutritious diet, and trafficking impedes the program's mission and undermines its integrity. This trafficking update provides an important overview of SNAP integrity from 2006 through 2008.

APPROACH

As with previous analyses, current trafficking estimates are based on two types of Food and Nutrition Service (FNS) investigations: those occurring in stores and those based on Electronic Benefit Transfer (EBT) administrative (i.e., SNAP purchase) records. Both types of investigations focus on retailers that exhibit suspicious behavior; and thus will not be representative of the retailer population. Estimates calculated simply by using these sources, therefore, exaggerate the extent of trafficking. In order to correct for at least some of this bias, estimates in this and prior reports adjust the trafficking figures to reflect the population of SNAP redemptions and stores authorized to redeem them.

The report contains three sets of trafficking estimates. While the statistical procedures are the same for each set, the completeness of the available information has improved over time. In order to provide the most comprehensive assessment, one set of estimates for 2006–2008 relies on all the relevant information now available. These are referred to as "current estimates," and they include data on investigations conducted not only by FNS but also by the U.S. Department of Agriculture's Office of the Inspector General, the U.S. Department of Justice, and State law enforcement agencies. The current estimates also incorporate a broader population of stores with suspect redemption patterns that have been identified through the Agency's fraud detection system, the Anti-fraud Locator using EBT Retailer Transactions (ALERT) system.

Two other sets of trafficking estimates are included to support consistent comparisons over time. The "original estimates" are based only on in-store investigations conducted by FNS staff; these data have been available since the first estimates were made in 1993. The "revised estimates" rely on both FNS in-store investigations and trafficking determinations based on suspect transaction records. First calculated for 1999–2002 as EBT was being implemented nationwide, the revised estimates were also computed for 2002–2005 and for 2006–2008.[1]

[1] The 1999–2002 report included activity occurring between January 1999 and October 2002; the 2002–2005 report included activity occurring between November 2002 and December 2005.

Each set of estimates includes the following indicators:

- Total value of SNAP redemptions that were trafficked;
- Trafficking rate, or the proportion of SNAP redemptions that were trafficked; and
- Store violation rate, or the proportion of authorized stores that engaged in trafficking.[2]

TRAFFICKING IN 2006–2008

Based on the most complete data available for 2006–2008, current estimates indicate the following:

- Trafficking diverted an estimated $330 million annually from SNAP benefits;
- Overall, one cent of each benefit dollar was trafficked; and
- About eight percent of all authorized SNAP stores engaged in trafficking.

A variety of store characteristics and settings were related to the level of trafficking. Although large stores (supermarkets and large grocery stores) accounted for a little more than 87 percent of all SNAP redemptions, they accounted for about five percent of trafficking redemptions. Trafficking was much less likely to occur among publicly owned stores than privately owned ones and was much less likely among retailers in areas with less poverty rather than more.

TRENDS OVER TIME

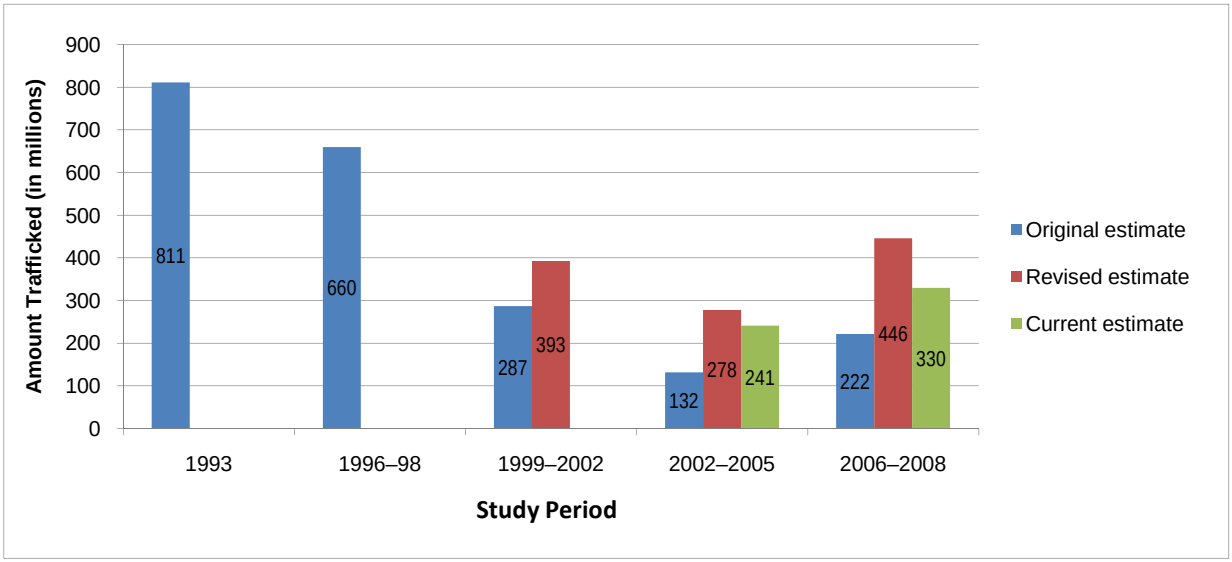
When using the same estimation procedures previously applied, the analyses show that although trafficking decreased in previous years, it increased slightly during the 2006–2008 period (see Exhibits E-1–E-3).[3] The increase in trafficking redemptions reflects the growth in annualized redemptions, from $25.1 billion for the period 2002–2005 to $32.1 billion for the period 2006–2008.[4]

[2] The study focuses only on active stores, i.e., stores that redeemed SNAP benefits at some point between 2006 and 2008.

[3] The actual redemption-based rate for the 2002–2005 period was 0.96 percent, about 0.07 percentage points less than the rate estimated for 2006–2008.

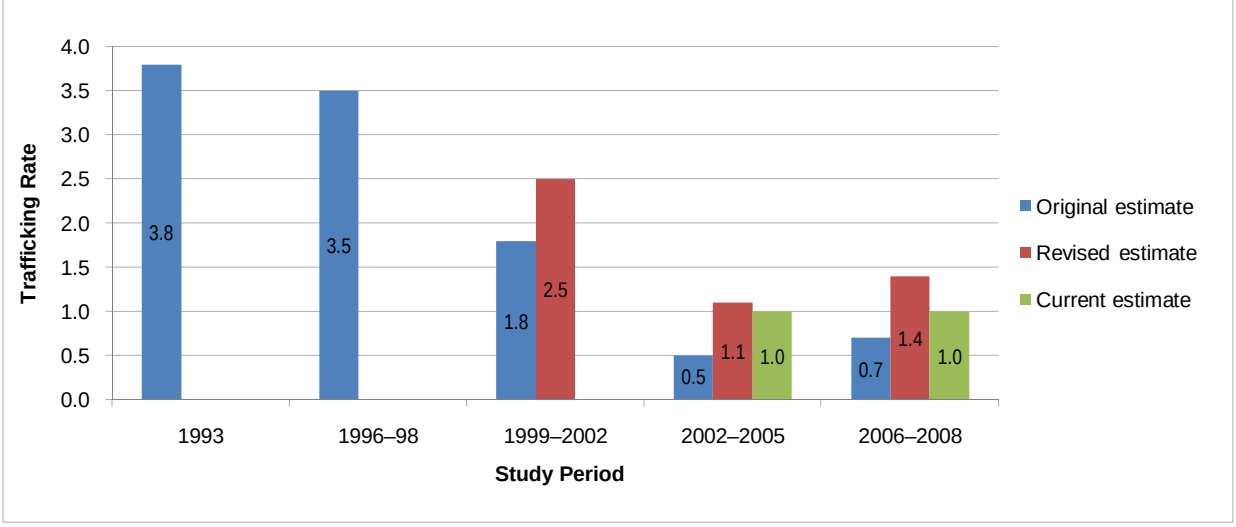
[4] It should be noted that redemptions also rose between the 1998–2002 and 2002–2005 periods, but trafficked redemptions fell. It is speculated that the introduction of EBT suppressed trafficking during the latter period.

Exhibit E-1: Amount of Trafficking, by Study Period and Data Source



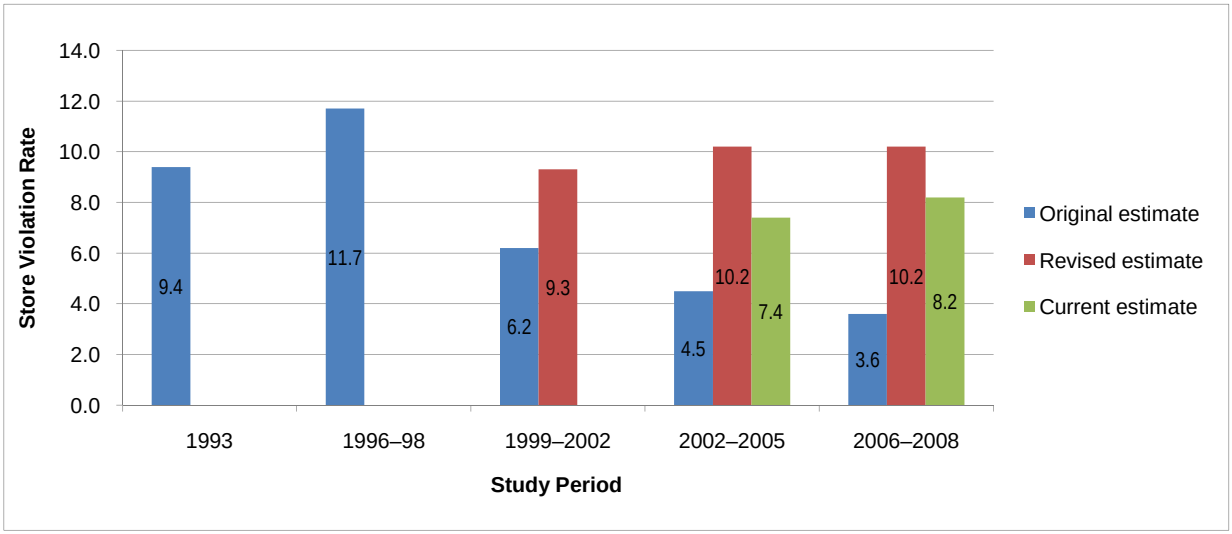
NOTE: Trafficking totals have been annualized.

Exhibit E-2: Trafficking Rate, by Study Period and Data Source



NOTE: Trafficking rate = percentage of total benefit redemptions trafficked.

Exhibit E-3: Store Violation Rate, by Study Period and Data Source



1. INTRODUCTION

1.1. BACKGROUND AND PURPOSE

The Food and Nutrition Service (FNS) administers the Supplemental Nutrition Assistance Program (SNAP), which in fiscal year 2008 issued about $34.6 billion in benefits to almost 28.4 million low-income participants per month to help them obtain a nutritious diet.[1]

SNAP benefits can be used only to purchase eligible food items from authorized food retailers. When individuals sell benefits for cash, both program intent and law are violated. The practice of trafficking compromises the program's mission and undermines public perception of the program's integrity.

While individuals can illegally sell their benefits for a cash discount on the street, only authorized retailers can redeem benefits for cash from the Federal Government. FNS is responsible for authorizing and managing retailer participation. As part of this responsibility, FNS maintains monitoring and investigations staff to identify and curb benefits trafficking. These efforts, which include covert investigations as well as ongoing review of SNAP food purchase data, are sometimes supplemented by investigations initiated by the U.S. Department of Agriculture's (USDA) Office of the Inspector General (OIG), the U.S. Department of Justice, and State law enforcement bureaus. Although these activities can provide a general sense of trafficking patterns, they do not provide an accurate estimate of benefits diverted through trafficking. To remedy this, FNS has funded studies to statistically adjust the information provided by these administrative actions to provide more accurate estimates.

This is the fifth in a series of periodic reports[2] that provide updated estimates of the following:

- Total value of SNAP redemptions that were trafficked;
- Trafficking rate, or the proportion of SNAP redemptions that were trafficked; and
- Store violation rate, or the proportion of authorized stores that engaged in trafficking.

The estimates reflect redemption activity beginning on January 1, 2006, and ending on December 31, 2008.

1.2. APPROACH

Ideally an estimate of SNAP trafficking would be based on the redemption practices of a national, randomly selected sample of food retailers. This approach would provide an unbiased

[1] The 2008 figures are much lower than those for 2009, in which more than $50 billion was distributed to 33 million participants monthly; program participation continued to grow through 2010. Source: http://www.fns.usda.gov/pd/SNAPsummary.htm.

[2] Previous estimates are reported in Macaluso, T. 1995. *The Extent of Trafficking in the Food Stamp Program;* Macaluso, T. 2000. *The Extent of Trafficking in the Food Stamp Program: An Update;* Macaluso, T. 2003. *The Extent of Trafficking in the Food Stamp Program: 1999–2002;* and Mantovani, R. E., and C. Olander. 2006. *The Extent of Trafficking in the Food Stamp Program: 2002–2005.* These reports are available from FNS.

estimate with a known degree of precision.[3] However, conducting such a study would require diverting limited resources from identifying and investigating retailers with suspicious redemption practices.

Consequently, since the initial study was completed in 1993, FNS trafficking estimates have been generated from a systematic analysis of the best available data on redemption monitoring and investigations of authorized retailers. This systematic analysis recognized that a somewhat biased perspective on SNAP trafficking would result from using investigative and administrative data sources without adjustment, one that could potentially overestimate its extent. In contrast, even with statistical adjustment, investigations and monitoring activities do not catch all instances of trafficking, thereby introducing some downward bias in the estimates. On balance, the analysis and approach adopted err on the side of overestimation. (See Appendix A for a discussion of sources of overestimation and underestimation.)

1.3. REPORT OVERVIEW

Chapter 2 provides an overview of the procedures used to estimate trafficking, along with descriptions of their key strengths and limitations.

Chapter 3 provides best estimates of trafficking indicators for calendar years 2006–2008. With the nationwide implementation of the Electronic Benefit Transfer (EBT) screening system, the sources of information used to identify and record trafficking expanded, and current trafficking estimates, beginning with the 2002–2005 estimates, made use of these additional sources of data. Chapter 3 also presents the results of some subgroup analyses comparing types of stores and store locations.

Chapter 4 examines trafficking trends over time using estimates based on procedures used previously to ensure comparability.

[3] There is the matter of measurement error, however, particularly with regard to uncovering instances of trafficking where retailers are reluctant to participate with unfamiliar individuals.

2. METHODS

2.1. GENERAL APPROACH

The estimates presented in this report were generated using the same strategy as in the previous four studies. This approach is based on identifying trafficking retailers from among those retailers that were investigated or from among those subject to additional monitoring and then translating trafficking violations among these retailers into the number of violating stores and the dollar amount of trafficked redemptions in the retailer population as a whole.

Information on trafficking came from two sources:

- **Investigations—**These are covert activities pursued by FNS, the USDA OIG, the U.S. Department of Justice, the States, and others. Investigations target stores with suspicious behavior and identify stores in this group that manifest trafficking behavior.
- **EBT data-based cases—**These are stores considered to be suspicious as a result of screening EBT transaction records. Such cases are resolved through an administrative process in which specific transactions are identified as being in violation (indicative of trafficking).

This information was used to define a trafficking rate. (See Appendix B for more details on these sources and Appendix G for statistics on the investigations and EBT data-based cases.) The denominator in the rate consists of all stores that were investigated or charged with a violation based on suspicious EBT redemption patterns, and the numerator includes stores that trafficked with an investigator or had been permanently disqualified based on an administrative (EBT) case.[4] As mentioned earlier, this rate overestimates trafficking in that it is based on stores that have exhibited suspicious behavior and thus does not take the characteristics of the entire population into account. To partially correct for this bias, we used a post-stratification raking approach to adjust the sample estimates to better represent the retailer population as a whole. The raking approach provides weights based on store characteristics that project the sample value to a population value. For example, if proportionately fewer supermarkets are in the sample than in the population, the supermarkets in the sample have larger weights than other stores. Because supermarkets have traditionally demonstrated a proportionately lower rate of trafficking in the sample, this lower rate would be translated to the population.

[4] Trafficking is defined as occurring when the retailer trades cash for benefits, and the penalty is permanent disqualification. Permanent disqualification occurs when a retailer's authorization to redeem SNAP benefits is revoked. Some stores (those that can prove that they had a robust, documented compliance training program in place prior to the violations and that the store owners did not benefit from the violations) may pay compensation in lieu of permanent disqualification. These stores are treated as permanently disqualified for the purposes of this study.

The post-stratification raking procedure weights sample stores to the population based on strata formed by variables that distinguish among stores that are under investigation or that have had an administrative (EBT) case opened. (See Appendix C for a description of the raking process.) For this and previous analyses, the following variables were used (see Appendix D for information on how these dimensions were defined):

- Store size and type (e.g., supermarket, grocery, convenience store),
- Ownership (public or private),
- Poverty level of the store's neighborhood,
- Urbanization level of the store's neighborhood, and
- SNAP redemption level.

The calculated weights were applied to information for each retailer in the sample to estimate the overall number of stores that trafficked and the total amount of trafficked redemptions in the population. Redemptions were further adjusted to account for legitimate SNAP sales that occur in trafficking stores.[5] The store violation rate and trafficking rate estimates were calculated as the percentage of all SNAP stores that trafficked and the proportion of all benefits that were trafficked, respectively. Estimates were calculated for various subgroups of stores (i.e., type of ownership, poverty level, and degree of urbanization).

2.2. LIMITATIONS

There are three key limitations associated with our approach. First, although post-stratification may reduce potential bias, it cannot eliminate it. Estimates of trafficking are based on the activities of *suspicious* retailers, and these estimates are extrapolated to the population. Estimates based on a sample of suspected retailers are likely to overstate the population value of trafficking. However, the post-stratification process works only as well as the variables used in the process. The variables used for identifying strata were identified as significantly related to trafficking in the 1993 study (based on FNS investigations) and have been carried forth in subsequent studies for consistency.

A second, related limitation concerns the definition of the strata within each of the variables. In particular the variables are defined by simple or ordered categories. These categories are critical to creating the strata used to calculate adjusted weights. For example, we use four levels of poverty to define the location of a store. The estimates might be different if we characterized poverty levels differently.[6] This becomes an important issue in this update because FNS has changed the way it defines stores. In June 2007 FNS revised existing store-type definitions so that they could be applied without ambiguity, ensure consistency, and improve FNS fraud

[5] Among stores that trafficked, 60 percent of all redemptions in large stores and 10 percent of all redemptions in small stores were assumed to have been legitimate sales. This is a potential source of overestimation if a larger portion of the redemptions represents legitimate transactions. However, it is consistent with the aim of creating conservative estimates.

[6] The variables and cut points were determined by an analysis performed as part of the 1993 estimates. As part of the sensitivity analyses for the last report (2002–2005), the effect of varying the cut points was examined. That examination showed that varying the cut points did not have a significant impact on estimates. Please see the 2002–2005 report for details.

detection capabilities.[7] From the original 22 store types and eight meal service designations, FNS compressed its definitions into 16 new store types and eight meal service designations. Although the new scheme still conforms roughly to the older classification scheme, there are some notable differences. Throughout this report, unless otherwise noted, all 2006–2008 trafficking estimates will be based on FNS new store-type definitions.

Third, the adjustment to account for legitimate redemptions in trafficking stores was set purposefully low to minimize the risk of underestimating the prevalence of trafficking. There is no empirical evidence that retailers that were caught trafficking or were permanently disqualified from the program trafficked at the rate that the adjustment would suggest.

2.3. CONSISTENT METHODS WITH IMPROVED DATA

In order to remain consistent with previous analyses, this study is based on data sources that allow us to represent a broader range of FNS trafficking-related activities. In addition to FNS investigations and EBT data-based cases, this study includes investigations conducted by OIG, the States, and other entities.

2.4. ESTIMATES

This report presents three measures of trafficking:[8]

- **Original estimate—**This estimate uses only FNS's Retailer Investigations Branch (RIB) investigations and corresponds to estimates generated in all four previous studies. Because it was first generated in the 1993 study, it allows us to examine trends in trafficking. As with the previous studies, the denominator includes all RIB investigations, and the numerator includes all retailers flagged as trafficking stores.[9]
- **Revised estimate—**For the 1999–2002 study, an additional and more comprehensive estimate was developed to include suspicious cases identified by analysis of EBT data. Replicating this measure for the current study and comparing the results with those from 1999–2002 and 2002–2005 provides an expanded measure of trafficking over three points in time. The denominator for this estimate is any store investigated by RIB or any store identified by EBT analysis that was sent a charge letter based on analysis of EBT transaction records. The numerator is any store in the denominator with a trafficking flag or any store permanently disqualified from the program or that paid a civil money penalty in lieu of permanent disqualification.
- **Current estimate—**For the last report and this update, we used a number of additional data sources to generate an estimate more reflective of all activities related to detecting trafficking. We augmented the denominator in two ways: by including closed cases on the Watch List (a prioritized list of suspicious stores identified by the Anti-fraud Locator using

[7] An examination of this change is included in Appendix K.
[8] See Appendix E for definitions.
[9] The trafficking flag is an indication that the retailer traded cash for benefits with the RIB investigator. This flag is used regardless of the final disposition of the case.

EBT Retailer Transactions (ALERT) system)[10] and by including retailers investigated by OIG, the U.S. Department of Justice, the States, and other entities. The numerator includes the retailers used in the numerator of the revised estimate and retailers found to be trafficking through investigations by OIG, the U.S. Department of Justice, and the States, and retailers that were not included in the revised estimate but that were otherwise permanently disqualified or paid a civil money penalty in lieu of permanent disqualification. The latter cases are designated by FNS after official review as being indicative of trafficking and thus they are included in the numerator.

Each set of estimates includes the following indicators:

- Total dollar amount of SNAP redemptions that are trafficked;
- Trafficking rate, or the proportion of SNAP redemptions that are trafficked; and
- Store violation rate, or the proportion of authorized stores that engaged in trafficking.

[10] The addition of closed Watch List case retailers broadens the definition of the denominator to any store that has been reviewed as a result of suspicious SNAP transaction patterns. Closed cases include stores for which the suspicious redemption patterns are explained as legitimate or result in disqualification or withdrawal.

3. SNAP TRAFFICKING IN 2006–2008

3.1. NATIONAL ESTIMATES

As noted in Chapter 2, we generated three sets of trafficking estimates for the years between 2006 and 2008. The most important set of estimates, from the perspective of using the full range of information currently available and SNAP coding standards, is the "current" estimate using the new store-type categories that were implemented after June 2007. With the use of current store-type categories, we lose comparability with the estimates made in previous reports.[11] We found the following:

- Trafficking diverted an estimated $330 million annually from SNAP benefits;
- Overall, one cent of each benefit dollar was trafficked; and
- About 8 percent of all authorized SNAP stores engaged in trafficking.

These figures are in the context of a program in which retailers redeemed an average of approximately $32 billion of benefits per year between 2006 and 2008. It should be noted that the reported figures for the relative amount trafficked and the proportion of SNAP retailers trafficking in the 2002–2005 report was one cent and seven percent, respectively.

3.2. TRAFFICKING BY STORE TYPE

Authorized SNAP retailers are presently classified into 16 different store-type categories. Consistent with previous reports, these store types were collapsed into seven more inclusive categories. As observed in previous studies, supermarkets[12] and large groceries were less likely to be involved in trafficking than other stores, with the exception of the combination/other store category. Supermarkets and large groceries accounted for 5.4 percent of the $330 million trafficked, although they redeemed 87.3 percent of SNAP redemptions (see Exhibit 1). The combination/other store type served as a catchall for stores not otherwise categorized. In fact, this category is, in part, composed of stores that transact a large volume of food sales, yet when compared with revenues derived from other products, their food sales are not substantial.[13] The contribution of these stores to the estimates presented in this report were minimal, constituting less than one percent of all trafficked redemptions and about 2.5 percent of all redemptions. Supermarkets and large groceries trafficked at a rate of 0.06 percent, compared with 7.7 percent for small stores. While only 0.3 percent of large stores were estimated to have trafficked,

[11] Estimates using the former store-type designations were subject to imputation error due to the influx after June 2007 of new stores, which did not receive an old store-type designation. A discussion of the impact of store type designation change and the imputation strategy used for these new stores is given in Appendix J, and a statistical comparison of the impact of this change is given in Appendix K.

[12] Superstores were classified along with supermarkets for the purposes of this study. Large stores identified as combination stores were not. These designations reflect the new FNS store-type classifications and are largely compatible with the old store-type designations.

[13] For example, a "box store" may sell a lot of food and conduct a large volume of SNAP transactions compared with other, smaller stores. However, when the box store's food revenues are compared with revenues derived from the sale of other products—appliances, clothes, etc.—the food revenues and SNAP transactions make up a relatively small percentage of total sales.

10.3 percent of small stores were estimated to have done so.[14] It should be noted that trafficking was most prevalent in convenience stores and small grocery stores. About 15 percent of stores in each of these two categories trafficked.

Exhibit 1: Trafficking Measures by Store Type, 2006–2008

Type of Store	Total Annualized Redemptions (000's)	Annualized Amount of Trafficking (000's)	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Large Stores						
Supermarkets	$27,363,347	$14,929	0.05%	39,249	57	0.15%
Large groceries	$662,136	$2,759	0.42%	3,963	54	1.35%
Subtotal	*$28,025,483*	*$17,688*	*0.06%*	*43,212*	*111*	*0.26%*
Small Stores						
Medium-sized groceries	$766,985	$31,026	4.05%	13,557	798	5.89%
Small groceries	$617,648	$97,741	15.82%	23,446	3,520	15.01%
Convenience	$1,299,915	$168,058	12.93%	78,681	12,209	15.52%
Specialty	$594,385	$12,947	2.18%	15,131	534	3.53%
Combination/other	$803,357	$2,621	0.33%	35,700	130	0.36%
Subtotal	*$4,082,290*	*$312,393*	*7.65%*	*166,515*	*17,191*	*10.32%*
All stores	**$32,107,772**	**$330,081**	**1.03%**	**209,727**	**17,302**	**8.25%**

3.3. TRAFFICKING BY STORE OWNERSHIP

Trafficking rarely occurred in publicly owned stores. Only one in every 700 publicly owned stores was estimated to have trafficked, for a trafficking rate close to 0.02 percent (see Exhibit 2). In contrast, about one out of nine privately owned stores (11 percent) was estimated to have trafficked. The redemption-based trafficking rate was close to 1.8 percent. When we divided the stores into large stores (supermarkets and large groceries) and small stores (i.e., stores other than supermarkets and large groceries), we found further distinctions between privately owned and publicly owned stores. The trafficking rate for small, privately owned stores was 8.5 percent. These stores accounted for just 8.9 percent of all SNAP redemptions but almost 80 percent of benefit dollars trafficked.

[14] The estimated average amount trafficked per store was $966 for large stores and $1,323 for small stores. Examining only the population of stores that trafficked, the average amounts were $43,410 for large stores and $14,297 for small stores.

Exhibit 2: Trafficking Measures by Store Ownership Type, 2006–2008

Store Ownership Type	Total Annualized Redemptions (000's)	Annualized Amount of Trafficking (000's)	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Privately owned stores	$18,640,413	$327,864	1.76%	156,882	17,230	10.98%
Publicly owned stores	$13,467,359	$2,217	0.02%	52,845	72	0.14%
All stores	**$32,107,772**	**$330,089**	**1.03%**	**209,727**	**17,302**	**8.25%**

3.4. TRAFFICKING AND POVERTY LEVEL OF STORE LOCATION

As in previous reports, trafficking was more likely to occur in poorer neighborhoods. Stores in the most impoverished areas (where more than 30 percent of households live in poverty) were estimated to have a trafficking rate of 3.5 percent of all redemptions, compared with stores in the least impoverished areas (10 percent or less of households live in poverty), which had a 0.27 percent trafficking rate (see Exhibit 3). About one-third of the trafficking, in redemption terms, derived from the approximately 10 percent of the stores in these highest poverty areas.

In terms of the percentage of stores trafficking, there is a four-fold difference between stores estimated to have trafficked in the lowest poverty areas (4.0 percent) and those in the highest areas (16.0 percent)

Exhibit 3: Trafficking Measures by Neighborhood Poverty, 2006–2008

Percentage of Households in Poverty in ZIP Code Where Store Is Located	Total Annualized Redemptions (000's)	Annualized Amount of Trafficking (000's)	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$9,068,576	$24,544	0.27%	63,975	2,553	3.99%
11–20%	$13,833,228	$103,050	0.74%	86,407	6,546	7.58%
21–30%	$6,186,690	$96,756	1.56%	39,281	4,977	12.67%
More than 30%	$3,019,278	$105,730	3.50%	20,064	3,226	16.08%
All stores	**$32,107,772**	**$330,081**	**1.03%**	**209,727**	**17,302**	**8.25%**

3.5. TRAFFICKING AND POPULATION DENSITY OF STORE LOCATION

It has become apparent from evidence accumulated over the years that trafficking estimates vary by population density (urbanization) in a nonlinear, "U-shaped" fashion. That is, trafficking rates are highest in the most urban *and* the most rural areas, with rates decreasing in the areas between these two population density extremes. For example, the redemption-based trafficking rate was 0.82 percent in the areas that were least urbanized, declined to 0.35 percent for places with an intermediate level of urbanization, and climbed to

1.39 percent in highly urbanized areas (see Exhibit 4). This pattern is replicated for the store-based trafficking rate, which is just more than seven percent for stores in the least urbanized areas, less than six percent for the places with an intermediate level of urbanization, and almost 10 percent for the most urbanized areas.

Exhibit 4: Redemption Share and Trafficking by Population Density, 2006–2008

Percentage Urbanization of ZIP Codes Where Stores Are Located	Total Annualized Redemptions (000's)	Annualized Amount of Trafficking (000's)	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$1,368,021	$11,206	0.82%	23,578	1,694	7.19%
11–50%	$2,023,229	$7,115	0.35%	12,514	742	5.93%
51–90%	$8,545,679	$31,139	0.36%	46,818	2,446	5.22%
91–100%	$20,170,842	$280,620	1.39%	126,817	12,421	9.79%
All stores	**$32,107,772**	**$330,081**	**1.03%**	**209,727**	**17,302**	**8.25%**

4. TRAFFICKING TRENDS

Trends in trafficking could be an important indicator of program improvement either in investigative practices, changes in redemption practices, changes in the SNAP population, or selection of retailers. In previous studies, trafficking trends tended to be decidedly downward, perhaps reflecting the introduction of EBT. In the 2002–2005 study, all trend analyses were made using measures based on RIB investigations and administrative cases, because these were the only ones that had at least two data points. Meaningful comparisons require that the same approach be used to calculate estimates at each point in time. For this study, we have at least two estimates for each of the three measures (original, revised, and current).

4.1. APPROACH TO EARLIER ESTIMATES

There have been four previous trafficking reports: 1993, 1996–98, 1999–2002, and 2002–2005. Since 1993 the "original estimates" (from RIB investigations) have been generated, and they provide a long-term perspective on trafficking. It should be noted, however, that the RIB investigations alone may not provide a good basis for trend analysis because the conduct of these investigations was modified by the availability of administrative review activities.

As more States implemented EBT systems, administrative records of purchase transactions became an increasingly important tool for identifying SNAP trafficking. For the first time, the 1999–2002 study provided a set of estimates based on both EBT information and RIB investigations. This measure was used again to provide a separate estimate of trafficking for 2002–2005. The results are referred to as "revised estimates." Details on the data sources and calculation procedures for the original and revised estimates are provided in Appendices B and E, and trafficking results for each type of estimate are provided in Appendix F.

A third approach, denoted the "current estimate," was first introduced in the 2002–2005 report. It essentially added investigations concluded by OIG, those investigations conducted by the States, and other investigative actions in which RIB was not involved. It also added closed Watch List cases to the denominator. To be consistent, any trend lines should be interpreted from estimates produced by the same approach. The complicating factor in the 2006–2008 estimates is the reclassification of stores into store-type categories that differ somewhat from the 2002–2005 estimates.

4.2. THE EFFECTS OF STORE-TYPE RECLASSIFICATION

Thus far, we have cited estimates obtained using the new store-type classifications that were introduced in June 2007. The effect of using the new store types on the estimates could be significant from the standpoint of obtaining estimates very different from those that would have

been obtained had the old store classification system been used.[15] The introduction of this new classification system at the midpoint of the estimation period complicates any effort to obtain statistically valid comparisons, because stores authorized since June 2007 were without an old store-type designation, and stores that were not active were not reclassified according to the new classifications. In this section, we will focus on the extent to which estimates based on new and old store-type designations differ. In Appendix F, we describe how stores were classified, and a more detailed analysis of the differences in the trafficking estimates between new and old store-type estimates is provided.

Exhibit 5 presents total redemptions estimated to have been trafficked and the redemption-based and store-based trafficking rates for each of the three measures—original, revised, and current—using the new and old store-type classifications. In general, the information indicates that there is little difference between the estimates using the new and old store-based classifications, at least based on this exploratory effort. Because estimates based on the new and previous store-classification schemes are so close, we will continue to cite estimates based on the new store classification, even when comparing with previous values—values based on the previous store-classification scheme.

Exhibit 5: Comparison of Trafficking Estimates by Measure, Using the New and Old Store-Type Classifications, 2006–2008

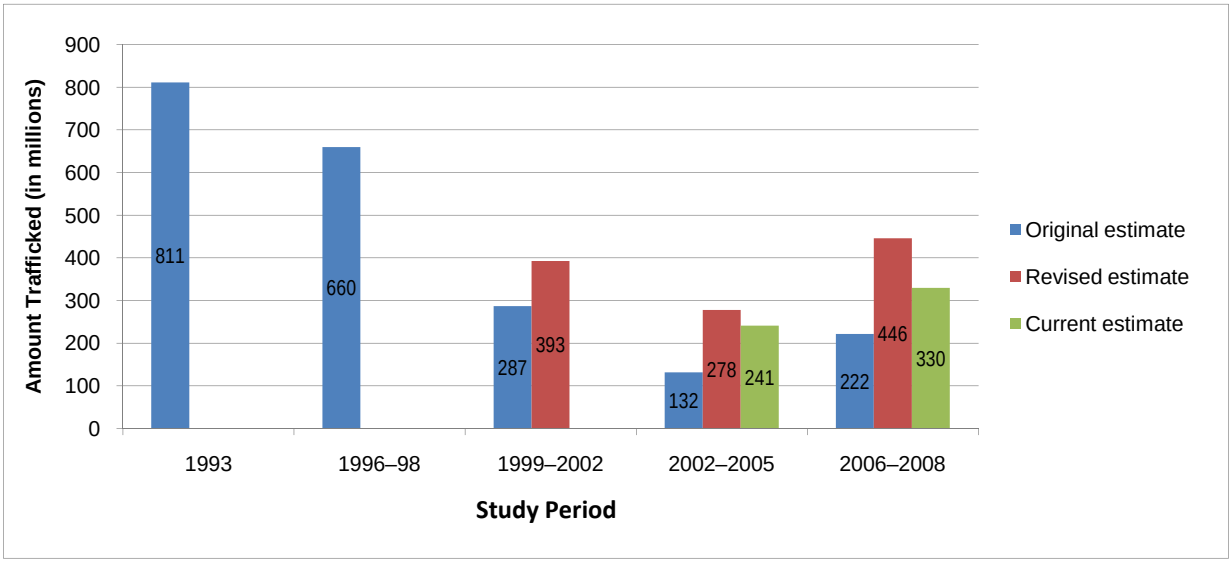
Measure	Total Annualized Amount of Redemptions Trafficked (in millions of dollars)		Redemption-Based Trafficking Rate		Store-Based Trafficking Rate	
	New	Old	New	Old	New	Old
Original	222	201	0.7	0.6	3.6	3.8
Revised	448	424	1.4	1.3	10.2	10.6
Current	330	311	1.0	1.0	8.2	8.2

4.3. TRENDS IN BENEFITS TRAFFICKED

Until this study period, the amount of trafficked benefits declined over time. However, regardless of measure, the amount trafficked has increased notably since the 2002–2005 period. For the current estimates, this amount turned out to be an increase of almost 37 percent (from $241 million to $330 million) (see Exhibit 6). Similar increases were observed for the other measures. For example, for the revised estimate the increase was 19 percent (from $278 million to $446 million). These increases reflect an overall increase in redemptions between the 2002–2005 and 2006–2008 study periods. Between the two periods, annualized redemptions increased from $25.1 billion to $32.1 billion, or an increase of 28 percent.

[15] For instance, if retailers previously classified as large grocery stores are now classified as small groceries, they might inherit a higher violation rate under the new classification. If this reclassification is a common occurrence, it may render those large groceries under the old system as more prone to violate thus increasing the contribution of those stores to trafficked redemption rates and totals.

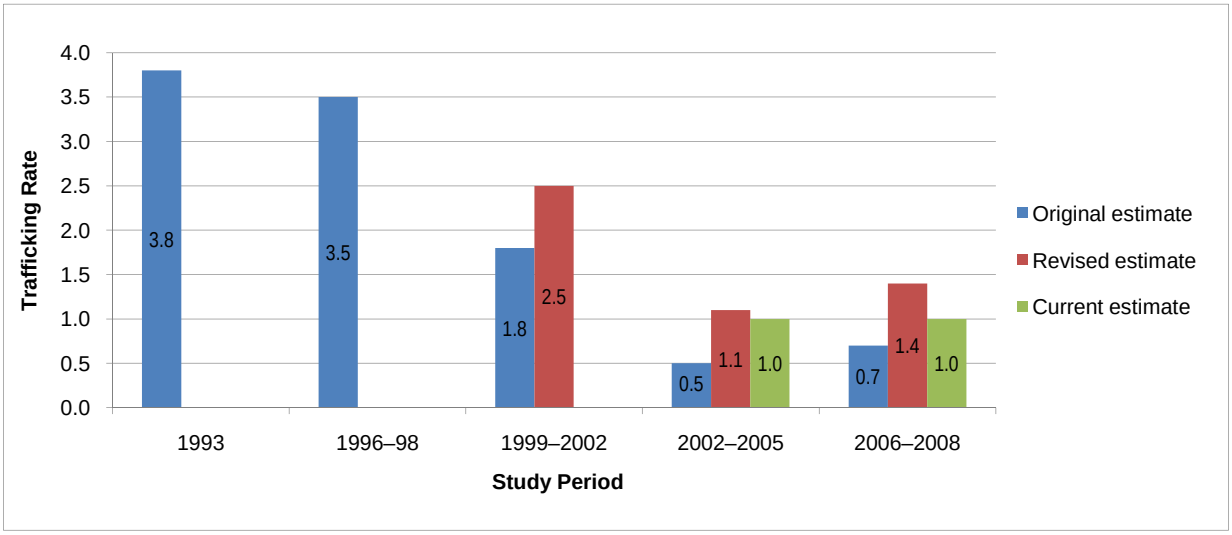
Exhibit 6: Amount of Trafficking, by Study Period and Data Source



NOTE: Trafficking totals have been annualized.

The proportion of redemptions trafficked remained about the same. This measure indicates the extent of trafficking, holding the total value of redemptions constant. Exhibit 7 presents trends in the trafficking rate using the original, revised, and current estimates. The data show an increase in the original and revised redemption-based rates and essentially no change for the current rate. Given the decline demonstrated across previous studies, the most recent data show that these rates have stabilized or may be on an upswing, but for the most part the data argue against a continuing decline in rates.

Exhibit 7: Trafficking Rate, by Study Period and Data Source

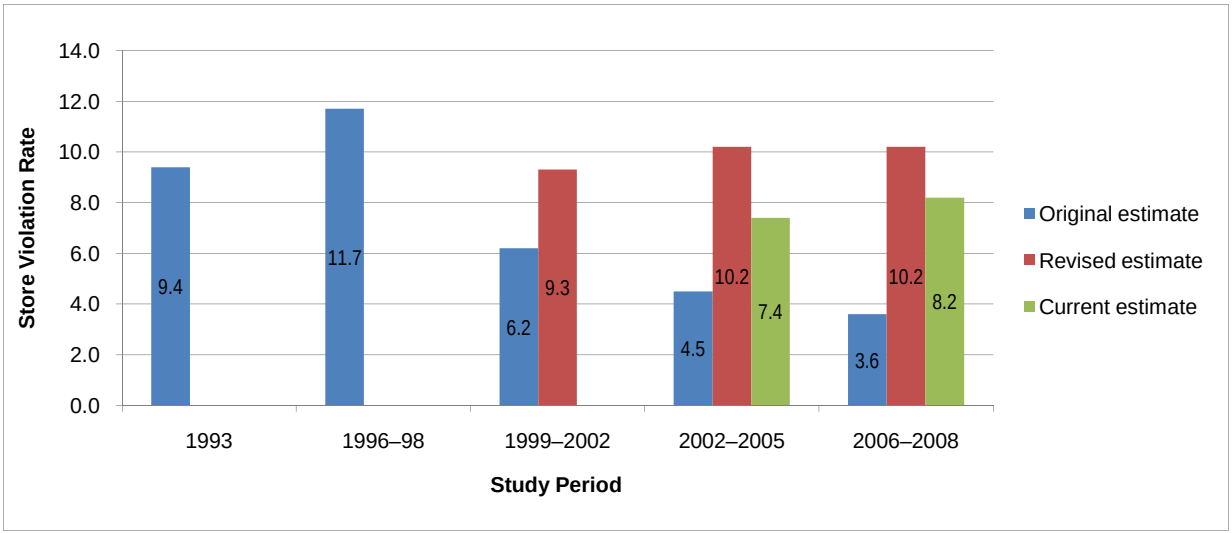


NOTE: Trafficking rate = percentage of total benefit redemptions trafficked.

4.4. STORE VIOLATIONS

Since the first study, no clear trend for store violation rates has emerged. The original estimate of the proportion of trafficking stores dropped throughout the study periods, while according to the current estimate this proportion increased from the last period (see Exhibit 8). In contrast, the revised estimates of store violators increased from 1999–2002 to 2002–2005, from 9.3 percent to 10.2 percent, where it remains for 2006–2008. This may result from differences in the retailer samples selected for RIB investigations and administrative reviews between 1999–2002 and 2002–2005.[16]

Exhibit 8: Store Violation Rate, by Study Period and Data Source



4.5. EXPLAINING THE CHANGE IN TRAFFICKING

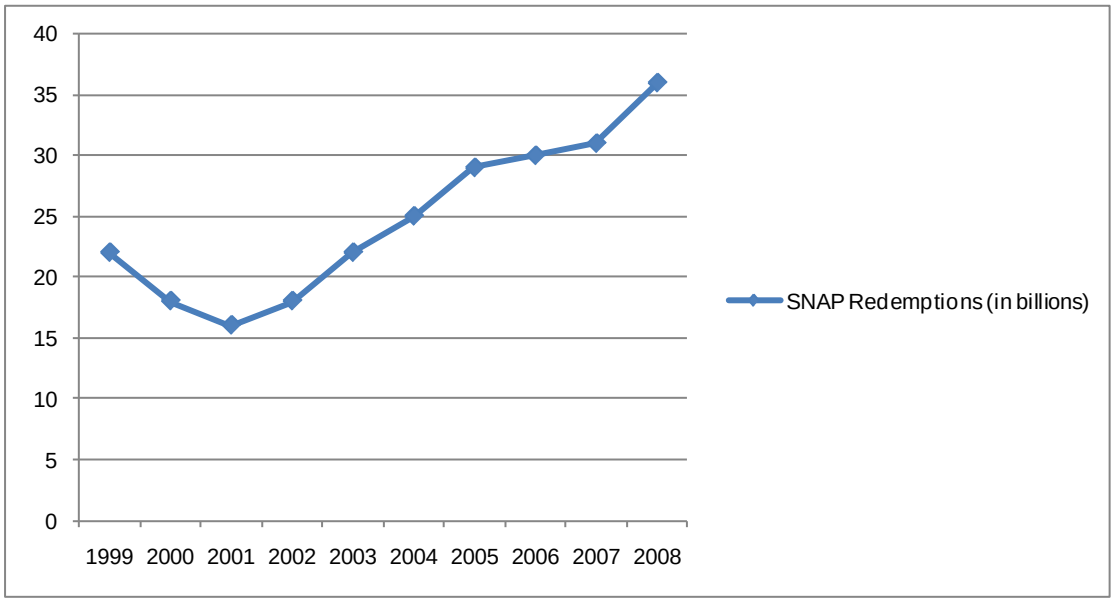
This study, in contrast to previous studies of SNAP retailer trafficking, shows a stabilization in the rates and a slight increase in the total magnitude of trafficking. In the previous study, we indicated that the decline in trafficking rates possibly reflected the implementation of EBT across the States because it was thought that electronic processing would make it more difficult to traffic. If indeed EBT had such an effect, it would have been fully accounted for when EBT was fully implemented. Thus, under this scenario and other external influences being equal, we would expect no additional change in the rates in this study period. However, particularly at the end of the 2006–2008 study period, the economic downturn resulted in increased SNAP participation, thus possibly changing the composition of the SNAP participant population, and perhaps trafficking patterns. Also, EBT data have proved useful to identify transaction patterns that are possibly indicative of trafficking. This may have affected the ability of FNS to successfully identify trafficking retailers.

[16] The revised estimate focused on retailers receiving charge letters. A new mechanism, the Watch List, was introduced and used during the 2002–2005 period to help identify which stores should receive charge letters. Activities related to screening out stores on the Watch List may have affected behaviors related to identifying retailers that should receive a charge letter. Therefore, stores receiving a charge letter may include a higher concentration of violators in 2002–2005 than in previous periods.

4.5.1. Size of the Supplemental Nutrition Assistance Program

Since 2001 there has been a relatively constant rise in SNAP redemptions (see Exhibit 9). In calendar year 2001 the amount redeemed was slightly more than $15 billion, rising to more than $35 billion in calendar year 2008.[17] Through 2005, increases in the amount of total SNAP benefits distributed were offset by decreases in the trafficking rate and in the amount of SNAP benefits trafficked. The reduction in the trafficking rate may be attributable to the steady but gradual implementation of EBT. In the present study period, with EBT fully implemented nationwide, the increase in benefits distributed, accompanied by a relatively stable trafficking rate, results in an increase in the total value of SNAP dollars trafficked.

Exhibit 9: Trends in SNAP Redemption Value (in Billions), by Calendar Year



4.5.2. Other Factors

The estimates discussed previously are subject to several types of variation, which can affect estimates within and across study periods. First, the violations sample compiled from investigations and administrative actions can be associated with sampling variation within and across periods of study. The sampling variation represents decisions to select some retailers for investigations or actions and not others. This means that, depending on the sample, the actual trafficking rates may vary to the point that a trend may exist both when the change seems nonexistent as well as when the change is statistically significant. In general, the estimates show a wide degree of variation in relative magnitude. (In Appendix I, we present confidence intervals at the fifth and ninety-fifth percentiles that allow us to assess how the estimates can vary.)

As previously discussed, the characterization of store type can be critical in the generation of the estimates. The last report presented trend information on the extent to which store type is critical

[17] This calendar-year amount, which is larger than the fiscal year amount cited on page 1, is calculated from STARS redemption figures and includes redemptions only from the 48 contiguous States and the District of Columbia.

to interpreting trends. Because of the change in characterizing store types in June 2007, it is difficult to assess the effect of the composition of the SNAP retailer community on trafficking trends. We do explore the relationships between the new and old store-type classification systems in Appendices J and K.

Finally, how trafficking is defined can affect the estimates and trends. This is reflected in the different values associated with the three trafficking measures (original, revised, and current) used in this report—especially in terms of changes in rates. To some extent these measures provide different results, especially when they are examined in terms of changes in rates. The trends among these three different measures demonstrate how trafficking can vary over time. There are certainly other ways to define trafficking than the three we have used. The effects of modifying what constitutes trafficking are explored in Appendix L.

APPENDIX A

ESTIMATION ERROR

The trafficking figures in this report are estimates and may be subject to multiple factors—some that understate and others that overstate actual trafficking rates.

SOURCES OF UNDERESTIMATION

Our procedures underestimate trafficking to the extent that the available data and detection procedures do not capture all instances of trafficking. Some violating retailers will traffic with strangers, while others restrict their illegal activities to known individuals. This latter type of behavior is known as network trafficking. Investigators can and do catch this type of trafficking, but it usually involves a more complicated investigation occurring over a longer period of time. Sustaining this type of investigation is difficult, particularly when resources are limited. As a result, some network trafficking may not be included in our original (investigations-only) estimates.

Electronic Benefit Transfer (EBT) data-based cases, which depend on the analysis of observed EBT transaction patterns, can have greater success at identifying network trafficking. Given the range of filters used to detect suspicious cases in the Anti-fraud Locator using EBT Retailer Transactions (ALERT) system, it is possible to identify potential traffickers without an onsite investigation. Thus, the addition of EBT data-based cases to the revised estimate decreases, but does not eliminate, concern about underestimating this form of trafficking.

SOURCES OF OVERESTIMATION

Our approach may also overestimate the prevalence of trafficking. One source of possible overestimation is the decision rule used to specify the relative amount of legitimate and illegitimate food sales among stores that traffic. Investigations and administrative data tell us only whether a store has trafficked, not the extent to which trafficking occurred. In establishing an estimate, we assumed that if a large store (i.e., a supermarket or large grocery) trafficked, 40 percent of all the store's redemptions were illegitimate (even if the trafficking involved only a single clerk away from the register area). Among small stores caught trafficking, we assumed that 90 percent of redemptions were trafficked. We therefore assumed throughout the study period that a retailer that was caught trafficking did so many times. While these figures are unrealistically high, we purposefully chose them because they serve the goal of minimizing the risk of understating the value of benefits diverted by trafficking.

A major source of overestimation may result from the nature of the stores in the investigative sample and how trafficking is inferred. Original estimates rely on in-store investigations to find fraud. Those estimates might decrease substantially if investigators selected a representative sample of cases from all stores, rather than intentionally targeting stores that raised suspicions. Likewise, the 2002–2005 revised estimate might be considerably smaller if the charge letters elicited from analysis of administrative data were sent to a representative sample of all stores, rather than just those identified by the screens for unusual EBT transaction patterns. This potential bias was somewhat remedied for the current estimates by including all closed cases on the Watch List as part of the denominator. Appendix H examines the distribution of stores in the current estimate denominator compared with the distribution of stores authorized to participate in the

Supplemental Nutrition Assistance Program. The larger list of retailers used in the denominator allowed us to incorporate stores with varying degrees of suspicious behavior. The resulting sample was not as selective as those used in previous studies. Still, store selection bias is arguably the one factor with the largest impact on our estimate.

Several other factors should be mentioned in terms of estimation:

- First, the weights, and therefore the estimates, are based on sampled stores within different strata and should be representative of the stores in similar strata in the population. The determination of the variables and the categorizations of strata are, therefore, important in developing unbiased estimates. If we have categorized retailers in a way in which one or more strata are affected by another unstated correlated factor, the weight obtained from the raking procedure will not adequately represent all retailers in that strata. To some extent this has been addressed by, for example, separating out convenience stores in urban areas from the same type of stores in rural areas. However, for example, it may also be important to distinguish stores in the convenience store strata that are relatively new to the program from those that are not, a factor that we did not take into account.

- Second, we have assumed that a retailer in the sample and population is active throughout the estimation period. In reality, some stores are disqualified or leave the program for other reasons, and some retailers are authorized throughout the period. A vast majority of stores remain in the program throughout the period. The absence of stores throughout part of the estimation period, however, can affect the estimates. For example, a store that trafficks and is disqualified in the middle of the study period represents a lower amount of trafficked redemptions than if that store was present throughout the period. This is critical because the store's behavior is extrapolated through the raking process to the population, some of whom were present for the entire period.

- Third—and this is related to an issue addressed in this report—the definition of certain variables (such as store type) can affect the estimates, primarily because the retailers are placed in a stratum that may be different from that into which they would have been placed in a previous report. Thus, they may inherit a different weight for the estimation than they would have previously. We are confident, however, that this issue, associated with the change in the Food and Nutrition Service retailer classification scheme, has been well-addressed in this report. See Appendix H for a more in-depth discussion.

APPENDIX B

APPROACHES FOR DETECTING TRAFFICKING, DATA SOURCES, AND CREATION OF ANALYSIS FILES

APPROACHES FOR DETECTING TRAFFICKING

Trafficking occurs as a transaction between a retailer and an individual possessing an Electronic Benefit Transfer (EBT) card. It may be a one-time or infrequent occurrence, or it may represent a continuing relationship between a retailer and a customer. In either case, the transaction is generally private. The Food and Nutrition Service (FNS) has two ways of identifying actual or potential trafficking:

- **Investigations—**One approach to identifying trafficking is through covert activities that simulate a purchase. After receiving a request for an investigation from a field office or a tip or complaint about a store from an external entity, or after identifying a suspicious retailer in another manner, a Retailer Investigations Branch (RIB) investigator or confidential informant attempts to traffic with the retailer. Retailers caught trafficking by investigators are charged. Investigations of large-scale trafficking are handled by the Office of the Inspector General (OIG), which may work with a variety of partners and investigative strategies.
- **EBT data analysis cases—**With the growth in EBT redemptions, FNS introduced the Anti-fraud Locator using EBT Retailer Transactions (ALERT) system. The ALERT system analyzes EBT transaction data and identifies those transaction patterns that suggest fraud. FNS reviews the information, along with store characteristics. If after examination, the store is judged to be in violation, a charge letter is issued.

All stores charged with trafficking have an opportunity to respond prior to the Agency's determination. Following a formal trafficking determination, the store is permanently disqualified. Retailers may request an administrative review of the sanction action, followed by an opportunity for judicial review.

DATA SOURCES AND ESTABLISHING MASTER DATA FILES

The data used in deriving these estimates are from the Store Tracking and Redemption System (STARS) database, and Census 2000.

STARS

The primary source of data for this study was STARS. The data generated from STARS included retailer characteristics, redemption histories, and compliance activities.

Authorized Food Retailer Characteristics and Redemption Histories

STARS contains characteristics for all food retailers ever authorized under the Supplemental Nutrition Assistance Program (SNAP). Although this database file contains extensive information on authorized SNAP retailers, only a few data fields are relevant to this study. They include:

- **Store identification number—**This number is assigned by FNS to uniquely identify the retailer.
- **Store or business type—**Prior to June 2007, these categories were self-declared by the retailer according to categories specified on the SNAP application form and verified by an FNS Field Office worker. As of June 2007, a new business-type classification schema was established, and retailers were classified by FNS staff using multiple variables on the application form and a set of business rules. This change raised an issue regarding which classifications to use for this set of estimates—the older classifications would present a schema consistent with the last study but would not be applicable for future estimates. It was decided that estimates using both classification systems would be generated, and a comparison would be made to identify differences.
- **Location information (including ZIP Code)—**This is provided by the retailer on the application form. The information represents the actual location of the store, rather than the mailing address. This information is used to locate the retailer in a correct ZIP Code Tabulation Area (ZCTA) and link the information to the demographic characteristics of that area from Census data.
- **Ownership type (public or private)—**Retailers are required to indicate ownership type on the application form. One category allows the retailer to specify that the store is publicly owned. This is the categorical variable used to differentiate privately owned from publicly traded retailers.
- **Gross sales—**This field was used in prior studies to distinguish between supermarkets and very large stores, large groceries, and small groceries. It was used in this study to classify stores that had no explicit new or old store-type designations.

The location, ownership, and sales information are verified/updated when the store is reauthorized.

STARS also contains monthly redemption histories for all authorized stores. The unique store identification number allowed us to link the redemption information to the retailer characteristics information.

Investigations and Administrative Action Data

In studies prior to the 2002–2005 update, data files maintained by RIB were used for investigations. In general, these files offered the following data elements for each investigated case:

- Store identification number,
- Case number, and
- Outcome (trafficking/no trafficking).

For this and the prior study, the data on investigation-based and EBT data-based cases were maintained within STARS. Histories for all cases scrutinized by FNS are maintained and described by a series of event and outcome codes. The identification of trafficking can be inferred from the events, activities, and activity outcomes (see Appendix E for details).

Watch List

The Watch List includes authorized food retailers that exceeded an ALERT score threshold and met other criteria that trigger additional scrutiny. It was used in the denominator of the current trafficking estimate. Only closed Watch List cases were used for this analysis, and the store identification number was the single data element extracted.

CENSUS DATA

Data from the Census 2000 long form (SF3 file) were used for identifying the degree of poverty and urbanization associated with retailer locations. The geographic unit of focus for this study was the Census ZCTA, which closely corresponds to U.S. Postal Service ZIP Code areas. Although many SNAP retailers can be associated with a particular ZCTA through their locational ZIP Code information,[1] some cannot; therefore, a labor-intensive effort was undertaken to determine the ZCTA nearest to those stores.[2]

CREATION OF ANALYSIS FILES

A single analysis file was created from the data sources described above. The file was limited to all retailers that had positive redemptions between January 2006 and December 2008 and were located in the contiguous United States.[3] Also eliminated were military commissaries. Household poverty and urbanization levels associated with each retailer's Census ZCTA designation were

[1] The STARS system contains both the mailing and location addresses of the retailer. The mailing address could differ from the location since in the case of chains it usually refers to a national, regional, or local office and not to the store itself.

[2] The ZCTA areas had the aim of providing areas approximating postal ZIP Code areas and providing demographics for those areas. There are many business areas with their own ZIP Codes or smaller residential areas that are combined with other areas to form the ZCTA areas.

[3] There were a handful of retailers that had negative redemption amounts for this period. They were not included in the analysis file.

added. Edits were made to modify and collapse store-type and ownership fields. In addition, case data from STARS were added. These case data included:

- All investigations conducted by RIB during the timeframe;
- All investigations conducted by OIG, the States, or other authorities during the timeframe;
- All cases in which a charge letter was sent to the retailer during the timeframe;
- All cases in which there was a permanent disqualification or in which payment was made in lieu of permanent disqualification, and
- All cases on the Watch List that were closed during the timeframe.

The resulting case file is structured so that a particular retailer may be represented several times as the retailer enters and leaves particular action steps within the case-development process. The retailer may also be subjected to one or more of the above actions (e.g., a retailer may have trafficked with a RIB investigator and may have also received a charge letter).

To avoid multiple representations of a single retailer, we included only one case per retailer, selecting the case that represented a positive trafficking determination. Thus, if a retailer was represented in two cases, one with no finding of trafficking and one with a finding of trafficking, the latter was included.

Although we kept information on all circumstances in each of the categories described above, the final estimates were based on retailers that were represented only once across files. For example, the trafficking indicator was set to positive if a trafficking flag resulted from a RIB investigation, or if the store was permanently disqualified or paid compensation in lieu of permanent disqualification.

APPENDIX C

POST-STRATIFICATION ESTIMATION METHODOLOGY

KEY STEPS FOR USING POST-STRATIFICATION TO ESTIMATE TRAFFICKING

Estimates for 2006–2008 were based on the approach used in previous updates. The steps are as follows:

1. Retailers that were examined or investigated based on questionable transaction patterns were assigned to categories associated with five variables: type of store, type of ownership, level of Supplemental Nutrition Assistance Program (SNAP) redemption, population density associated with the store's ZIP Code, and poverty level associated with the store's ZIP Code. Each store was counted only once. The same procedure was applied to the corresponding amount of SNAP redemptions transacted by each of these retailers. This activity produced two five-dimensional tables—one for retailers and one for redemptions.

2. All stores and the dollar value of SNAP benefits redeemed during the 2006–2008 timeframe were aggregated by the five variables described in step 1 to create five separate marginal distributions, each corresponding to a particular dimension as defined in step 1.

3. An analytic procedure known as raking was used to create weights for each category of store type and location. Raking is an iterative process by which the cell frequencies from the sample (the tables generated in step 1) are adjusted to the population marginal frequencies (the product of step 2). Weights were obtained separately for stores and redemptions.

4. The weights produced in step 3 were applied to the file of SNAP retailers examined or investigated during the 2006–2008 timeframe in order to estimate the total number of stores engaging in trafficking and the amount of benefits redeemed that were trafficked.

5. Adjustments were made to the estimated dollar value of trafficked benefits because even among violating stores, it is unlikely that all SNAP sales are trafficked. We made the assumption that 90 percent of redemptions in violating small stores were trafficked, and 40 percent in violating large stores were trafficked.

6. The trafficking rate (i.e., the percentage of all redemptions estimated to be trafficked) and store violation rate (i.e., the percentage of stores trafficking) were calculated.

See Appendix L for details of the sensitivity analyses that were conducted with respect to some of the methodological decisions and assumptions associated with these procedures.

APPENDIX D

VARIABLES EMPLOYED IN THE RAKING MODEL

The five dimensions we employed consist of three that categorize stores (type of store, ownership type, and amount of Supplemental Nutrition Assistance Program (SNAP) redemptions) and two that categorize the ZIP Codes in which stores were located (degree of urbanization and percentage of households below the poverty level). Specific definitions are provided in the following sections.

TYPE OF STORE

Experience, backed up by years of research, has indicated that type of store is an important differentiator in trafficking. In particular, and according to these analyses, larger stores do not traffic as much as smaller stores. Prior to this update, store type was based on each retailer's self-reported store type on the Food and Nutrition Service (FNS) application form. The indicated store types were collapsed into the following categories:

- **Supermarket—**Any store identifying itself as a superstore, supermarket, or grocery with gross annual sales of more than $2 million;
- **Large grocery—**Any store identifying itself as a superstore, supermarket, or grocery with gross annual sales of between $500,000 and $2 million;
- **Small grocery—**Any store identifying itself as a superstore, supermarket, or grocery with gross annual sales of less than $500,000;
- **Convenience—**Any store identifying itself by this title, regardless of gross sales;
- **Specialty—**Any store identifying itself by this title, regardless of gross sales. These stores conduct their *primary* business in a single product line and include meat markets, fish markets, and dairy stores;
- **Gas/grocery—**Any store identifying itself by this title, regardless of gross sales; and
- **Other types—**Any store identifying itself by a title different from any of the preceding categories, regardless of gross sales. Examples include produce stands, general stores, combination grocery/other, health/natural food stores, and milk and/or bread routes.

In differentiating between supermarkets, large groceries, and small groceries, gross sales was used both as a validating field (in the case of supermarkets and large groceries) and a categorization field (in the case of small and large groceries).

In June 2007 FNS instituted a new store, or business type, classification scheme that used a set of business rules to classify retailers, instead of relying on retailer self-reports. We summarized retailers according to the new store-type codes, according to the following categories:

- Supermarkets,
- Large groceries,
- Medium-sized groceries,
- Small groceries,
- Convenience stores,
- Specialty food stores, and
- Other food stores.

The introduction of this new scheme resulted in two classification systems in the period of study that differ on a number of dimensions. First, the types of stores are somewhat different. In particular, groceries were divided into three categories in the new classification, whereas there were only two in the previous studies. Second, gas/grocery stores were eliminated as a separate category under the new classification scheme. Third, many stores were reclassified to represent a different store type in the new classification. This means that the same retailer might have been assigned different store types according the classification systems, even if the store did not change in format, size, or ownership. Finally, many stores were left unclassified by one or the other scheme due to the fact that they were either no longer active after June 2007 or were new to the program after June 2007. Because the new classification system is the one that is in current use and is expected to be the one in place in future years, it will be used for future updates to this study. The older classification scheme, however, provides evidence on the consistency of estimates for this period with previous estimates. This changeover required us to determine the effect of the new classifications on trafficking estimates and resolve issues related to missing retailer-type information. This is addressed in Appendix J.

OWNERSHIP TYPE

Ownership types as indicated on the FNS application form were collapsed into the following categories to ensure an adequate number of cases of each type:

- **Public—**Any store identifying itself as a public corporation (i.e., a retailer whose stock is publicly traded), and
- **Private—**Any store identifying itself as other than publicly owned. This includes private (i.e., closely held) corporations as well as partnerships, sole proprietorships, and co-ops.

AMOUNT OF SNAP REDEMPTIONS

Stores were categorized into deciles on the basis of SNAP redemptions. The purpose was statistical, rather than analytical, i.e., to ensure that large disparities in redemptions by stores did not distort results.

DEGREE OF URBANIZATION

The fourth variable, urbanization, which was based on U.S. Census data generated by the 2000 long-form data files, provided information on the population density of the area in which the retailer was located. The Census provides for each ZIP Code Tabulation Area (ZCTA) an estimate of the number of individuals in that ZCTA who could be considered living in an urban area. This was divided by the total number of individuals in that area, which was available from the same data source.

Four categories were used that reflected an analysis conducted in 1993 for the first trafficking study. Their selection reflects our attempt to distribute stores across a range of categories to achieve some balance as well as create meaningful distinctions. These categories were:

- 0–10 percent urban population,
- 11–50 percent urban population,
- 51–90 percent urban population, and
- More than 90 percent urban population.

PERCENTAGE OF HOUSEHOLDS BELOW THE POVERTY LEVEL

The percentage of households below the poverty level was based on U.S. Census data for the ZIP Code in which each store was located. Again, long-form information from the 2000 Census files was used. The total number of households in poverty within a ZCTA area was divided by the total number of households in that area. As with the urbanization categories, the poverty-level categories were established for the 1993 study. Again, we attempted to establish a meaningful range for describing neighborhoods by poverty level while creating some balance in store totals across categories. Four categories were used:

- 0–10 percent of the residential population below the poverty level,
- 11–20 percent of the residential population below the poverty level,
- 21–30 percent of the residential population below the poverty level, and
- More than 30 percent of the residential population below the poverty level.

APPENDIX E

ESTIMATE DEFINITIONS

The post-stratification procedures described in Appendix C were applied to generate all three sets of estimates. Producing the three types of estimates for 2006–2008 allowed us to:

- Provide consistency with all three previous estimates (original, revised, and current estimates); and
- Provide estimates that incorporate evidence from Office of the Inspector General (OIG) and State activities, in addition to Food and Nutrition Service (FNS) investigations and Electronic Benefit Transfer (EBT) data-based reviews (current estimate).

ORIGINAL ESTIMATE: RIB INVESTIGATIONS ONLY

This is the core estimate that has been published in all previous reports. It is based on covert purchases by Retailer Investigations Branch (RIB) investigators at the stores in question. For any case with a trafficking flag, the associated retailer was counted as a trafficker, and the previously described portion of redemptions was identified as trafficked.

The procedures for initiating an investigation changed over the years as FNS incorporated EBT data, Anti-fraud Locator using EBT Retailer Transactions (ALERT) system scans, and the Watch List to identify suspicious stores. Retailers that were formerly handled through RIB investigations may now be identified and sanctioned by relying on administrative records and actions. As a result, the original estimates calculated for 2002–2005 and 2006–2008 may not be fully comparable with earlier estimates based on investigations. However, it is still likely to be the one set of measures most consistent with prior estimates.

Unlike years prior to 2002, when data from the local investigator offices were used, this study relied on compliance activity tracking information from the Store Tracking and Redemption Systems (STARS) database. The following definitions were used:

- **Denominator—**All cases in which STARS Event Code = "03" (completed investigation) and Investigation Agency = "CB" (previously the Compliance Branch, now RIB), where the case was completed between January 1, 2006, and December 31, 2008. These codes define an investigation attempt.
- **Numerator—**Any case in the denominator for which the trafficking flag was "1" (indicating that the retailer trafficked with the investigator).

Because there may have been more than one case per retailer during the study period, we counted a retailer only once for both the denominator and numerator. Where the outcomes were different (i.e., no trafficking in one case and trafficking in another case), we included the trafficking case.

REVISED ESTIMATE: RIB INVESTIGATIONS AND EBT DATA-BASED CASES

For the 1999–2002 study, we added an estimate based on combining RIB and EBT data-based cases. At that time, suspicious activity was increasingly being identified by EBT data and ALERT scans. These cases were sometimes referred to RIB for investigation. In other cases, the

retailer was sent a charge letter, and a subsequent decision was sometimes made to permanently disqualify the retailer (an implicit indication of trafficking). With guidance from FNS, we defined denominators and numerators from STARS. The definitions for the denominator and numerator for the revised estimate were:

- **Denominator:**
    - All cases in which Event Code = "03" (completed investigation) and Investigation Agency = "CB" (i.e., RIB), plus
    - All cases that were identified with EBT as the basis of the request[1] and in which a charge letter was sent to the retailer.
- **Numerator:**
    - Any RIB case for which the trafficking flag was "1" (indicating that the retailer trafficked), or
    - Any EBT case in which a charge letter was issued, and the retailer was permanently disqualified or provided compensation in lieu of permanent disqualification.

Both the denominator and numerator were based on unduplicated lists of retailers meeting the relevant conditions. In other words, a retailer was counted only once.

CURRENT ESTIMATE: RIB AND EBT DATA-BASED CASES WITH OIG AND STATE ACTIVITY

The introduction of the Watch List had two effects. First, more retailers came under special systematic scrutiny (i.e., their status had to be resolved by field office staff). This increase resulted in a broader base of retailers subject to additional review (see the retailer distribution comparisons within the sensitivity analyses in Appendix L), and we expect that this larger population is less biased. Second, the Watch List created an interactive system among investigators and those conducting retailer reviews that may have influenced the kinds of cases that were referred for investigation. In other words, we suspect that cases referred for a RIB investigation may be more difficult, i.e., those that do not lend themselves to reliance on administrative data alone.

[1] The basis of request denotes the source that identifies the retailer for an action.

The current estimate included all currently available data sources for FNS investigations. It also included OIG investigations, State investigations, and investigations by other agencies. Key terms were defined as follows:

- **Denominator:**

  - All cases in which Event Code = "03" (completed investigation) and Investigation Agency = "CB," "OI," "SL," or "OT" (i.e., RIB, OIG, States, or other agency); or
  - All cases in which a retailer was sent a charge letter; or
  - All administrative (EBT) cases where the store was permanently disqualified or paid compensation in lieu of permanent disqualification; or
  - Any retailer on the Watch List with a status of closed, which are all cases that have been resolved by a determination.[2]

- **Numerator:**

  - Any case in which the Event Code = "03" (completed investigation) and Investigation Code = "CB" (i.e., RIB) and the trafficking flag is "1"; or
  - Any case in which the Event Code = "03" (completed investigation) and Investigation Code = "OI," "SL," or "OT" (i.e., OIG, States, or other agency) and the result is a positive violation; or
  - Any case in which the retailer was permanently disqualified or paid compensation in lieu of a permanent disqualification.[3]

Both the denominator and numerator come from unduplicated lists of retailers meeting one or more of these conditions. In other words, a retailer was counted only once, regardless of the number of times it was identified. In this and previous measures, a conservative approach was used that assumed that the retailer was counted in the numerator if there was any indication of permanent disqualification or trafficking at any point during the administrative or investigative process.

[2] Resolution involves any of the following statuses: 1) No Further Action (NFA), 2) Store Disqualified, 3) Store Withdrawn, 4) No Case Action (NCA), 5) Sanction Action, and 6) Other Adverse Action. The two statuses "NFA" and "NCA" are associated with determinations that for one reason or another, the store did not violate SNAP regulations.

[3] This includes stores that had an EBT (administrative) case and were permanently disqualified as well as those that received trafficking charge letters, but may not have been permanently disqualified in the end.

APPENDIX F

RAKING ESTIMATES

This appendix provides the final estimates upon which the reporting statistics in the main body of the report were based. The statistics were derived from a raking procedure that was previously described. Estimates are provided by the major raking variables using definitions for the original, revised, and current estimates. We also provide estimates using the new and old store-type classification systems. Subtotals and totals may be subject to small rounding errors due to the use of rates to calculate the number of trafficking stores.

The following provides an index to the tables:

I. Estimates Using the New Retailer-Classification System

A. Original Trafficking Estimates

B. Revised Trafficking Estimates

C. Current Trafficking Estimates

II. Estimates Using the Old Retailer-Classification System

A. Original Trafficking Estimates

B. Revised Trafficking Estimates

C. Current Trafficking Estimates

Exhibit F1: Original Trafficking Estimates for Redemptions and Stores by Store Type (New Classification)

Type of Store	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Large Stores						
Supermarkets	$27,363,347,036	$117,316,967	0.43%	39,249	488	1.24%
Large groceries	$662,135,720	$1,492,304	0.23%	3,963	44	1.10%
Subtotal	$28,025,482,757	$118,809,271	0.42%	43,212	532	1.23%
Small Stores						
Medium-sized groceries	$766,984,797	$10,190,019	1.33%	13,557	503	3.71%
Small groceries	$617,648,182	$41,186,518	6.67%	23,446	2,403	10.25%
Convenience stores	$1,299,914,559	$41,524,812	3.19%	78,681	3,424	4.35%
Specialty foods	$594,384,662	$9,109,742	1.53%	15,131	423	2.79%
Combination/other	$803,357,396	$1,335,362	0.17%	35,700	289	0.81%
Subtotal	$4,082,289,595	$103,346,453	2.53%	166,515	7,042	4.23%
All stores	**$32,107,772,352**	**$222,155,724**	**0.69%**	**209,727**	**7,573**	**3.61%**

Exhibit F2: Original Trafficking Estimates for Redemptions and Stores by Store Ownership Type (New Classification)

Store Ownership Type	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Privately owned stores	$18,640,413,120	$210,575,644	1.13%	156,882	7,162	4.57%
Publicly owned stores	$13,467,359,231	$11,580,080	0.09%	52,845	411	0.78%
All stores	**$32,107,772,352**	**$222,155,724**	**0.69%**	**209,727**	**7,573**	**3.61%**

Exhibit F3: Original Trafficking Estimates for Redemptions and Stores by Poverty Rate in Retailer's Neighborhood (New Classification)

Percentage of Households in Poverty in ZIP Code Where Store Is Located	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$9,068,575,929	$21,903,881	0.24%	63,975	1,866	2.92%
11–20%	$13,833,227,605	$118,735,131	0.86%	86,407	2,934	3.40%
21–30%	$6,186,690,404	$8,174,208	0.13%	39,281	1,357	3.45%
More than 30%	$3,019,278,414	$73,342,504	2.43%	20,064	1,417	7.06%
All stores	**$32,107,772,352**	**$222,155,724**	**0.69%**	**209,727**	**7,574**	**3.61%**

Exhibit F4: Original Trafficking Estimates for Redemptions and Stores by Urbanization Level in Retailer's Neighborhood (New Classification)

Percentage Urbanization of ZIP Codes Where Stores Are Located	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$1,368,021,450	$3,547,701	0.26%	23,578	486	2.06%
11–50%	$2,023,229,143	$2,293,453	0.11%	12,514	132	1.06%
51–90%	$8,545,679,474	$27,619,945	0.32%	46,818	1,100	2.35%
91–100%	$20,170,842,285	$188,694,625	0.94%	126,817	5,855	4.62%
All stores	**$32,107,772,352**	**$222,155,724**	**0.69%**	**209,727**	**7,573**	**3.61%**

Exhibit F5: Revised Trafficking Estimates for Redemptions and Stores by Store Type (New Classification)

Type of Store	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Large Stores						
Supermarkets	$27,363,347,036	$117,005,948	0.43%	39,249	461	1.18%
Large groceries	$662,135,720	$2,440,208	0.37%	3,963	169	4.25%
Subtotal	$28,025,482,757	$119,446,157	0.43%	43,212	630	1.46%
Small Stores						
Medium-sized groceries	$766,984,797	$28,450,902	3.71%	13,557	966	7.13%
Small groceries	$617,648,182	$111,100,261	17.99%	23,446	4,828	20.59%
Convenience stores	$1,299,914,559	$135,560,276	10.43%	78,681	12,318	15.66%
Specialty foods	$594,384,662	$23,670,859	3.98%	15,131	1,371	9.06%
Combination/other	$803,357,396	$29,344,202	3.65%	35,700	1,209	3.39%
Subtotal	$4,082,289,595	$328,126,500	8.04%	166,515	20,692	12.43%
All stores	**$32,107,772,352**	**$447,572,657**	**1.39%**	**209,727**	**21,322**	**10.17%**

Exhibit F6: Revised Trafficking Estimates for Redemptions and Stores by Store Ownership Type (New Classification)

Store Ownership Type	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Privately owned stores	$18,640,413,120	$431,864,713	2.32%	156,882	20,767	13.24%
Publicly owned stores	$13,467,359,231	$15,707,944	0.12%	52,845	555	1.05%
All stores	**$32,107,772,352**	**$447,572,657**	**1.39%**	**209,727**	**21,322**	**10.17%**

Exhibit F7: Revised Trafficking Estimates for Redemptions and Stores by Poverty Rate in Retailer's Neighborhood (New Classification)

Percentage of Households in Poverty in ZIP Code Where Store Is Located	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$9,068,575,929	$62,874,688	0.69%	63,975	4,000	6.25%
11–20%	$13,833,227,605	$220,698,073	1.60%	86,407	8,251	9.55%
21–30%	$6,186,690,404	$31,914,868	0.52%	39,281	5,388	13.72%
More than 30%	$3,019,278,414	$132,085,028	4.37%	20,064	3,683	18.35%
All stores	**$32,107,772,352**	**$447,572,657**	**1.39%**	**209,727**	**21,322**	**10.17%**

Exhibit F8: Revised Trafficking Estimates for Redemptions and Stores by Urbanization Level in Retailer's Neighborhood (New Classification)

Percentage Urbanization of ZIP Codes Where Stores Are Located	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$1,368,021,450	$14,658,050	1.07%	23,578	2,553	10.83%
11–50%	$2,023,229,143	$14,653,272	0.72%	12,514	1,131	9.04%
51–90%	$8,545,679,474	$126,048,951	1.48%	46,818	4,664	9.96%
91–100%	$20,170,842,285	$292,212,385	1.45%	126,817	12,973	10.23%
All stores	**$32,107,772,352**	**$447,572,657**	**1.39%**	**209,727**	**21,322**	**10.17%**

Exhibit F9: Current Trafficking Estimates for Redemptions and Stores by Store Type (New Classification)

Type of Store	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Large Stores						
Supermarkets	$27,363,347,036	$14,928,689	0.05%	39,249	57	0.15%
Large groceries	$662,135,720	$2,759,257	0.42%	3,963	54	1.35%
Subtotal	$28,025,482,757	$17,687,946	0.06%	43,212	111	0.26%
Small Stores						
Medium-sized groceries	$766,984,797	$31,026,080	4.05%	13,557	798	5.89%
Small groceries	$617,648,182	$97,740,878	15.82%	23,446	3,520	15.01%
Convenience stores	$1,299,914,559	$168,058,115	12.93%	78,681	12,209	15.52%
Specialty foods	$594,384,662	$12,946,541	2.18%	15,131	534	3.53%
Combination/other	$803,357,396	$2,621,333	0.33%	35,700	130	0.36%
Subtotal	$4,082,289,595	$312,392,948	7.65%	166,515	17,191	10.32%
All stores	**$32,107,772,352**	**$330,080,894**	**1.03%**	**209,727**	**17,302**	**8.25%**

Exhibit F10: Current Trafficking Estimates for Redemptions and Stores by Store Ownership Type (New Classification)

Store Ownership Type	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Privately owned stores	$18,640,413,120	$327,863,552	1.76%	156,882	17,230	10.98%
Publicly owned stores	$13,467,359,231	$2,217,341	0.02%	52,845	72	0.14%
All stores	**$32,107,772,352**	**$330,080,894**	**1.03%**	**209,727**	**17,302**	**8.25%**

Exhibit F11: Current Trafficking Estimates for Redemptions and Stores by Poverty Rate in Retailer's Neighborhood (New Classification)

Percentage of Households in Poverty in ZIP Code Where Store Is Located	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$9,068,575,929	$24,543,717	0.27%	63,975	2,553	3.99%
11–20%	$13,833,227,605	$103,050,487	0.74%	86,407	6,546	7.58%
21–30%	$6,186,690,404	$96,756,347	1.56%	39,281	4,977	12.67%
More than 30%	$3,019,278,414	$105,730,342	3.50%	20,064	3,226	16.08%
All stores	**$32,107,772,352**	**$330,080,894**	**1.03%**	**209,727**	**17,302**	**8.25%**

Exhibit F12: Current Trafficking Estimates for Redemptions and Stores by Urbanization Level in Retailer's Neighborhood (New Classification)

Percentage Urbanization of ZIP Codes Where Stores Are Located	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$1,368,021,450	$11,206,483	0.82%	23,578	1,694	7.19%
11–50%	$2,023,229,143	$7,114,991	0.35%	12,514	742	5.93%
51–90%	$8,545,679,474	$31,139,221	0.36%	46,818	2,446	5.22%
91–100%	$20,170,842,285	$280,620,199	1.39%	126,817	12,421	9.79%
All stores	**$32,107,772,352**	**$330,080,894**	**1.03%**	**209,727**	**17,302**	**8.25%**

Exhibit F13: Original Trafficking Estimates for Redemptions and Stores by Store Type (Old Classification)

Type of Store	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Large Stores						
Supermarkets	$27,833,033,583	$104,376,349	0.38%	41,032	636	1.55%
Large groceries	$977,209,933	$3,810,539	0.39%	13,570	364	2.68%
Subtotal	$28,810,243,516	$108,186,887	0.38%	54,602	1,000	1.83%
Small Stores						
Small groceries	$991,299,329	$56,956,403	5.75%	36,190	3,199	8.84%
Convenience	$621,660,926	$16,566,109	2.66%	44,097	1,834	4.16%
Specialty	$661,374,175	$5,876,572	0.89%	14,212	329	2.31%
Gas/grocery	$292,620,644	$9,506,990	3.25%	21,431	805	3.76%
Other types	$730,573,762	$4,030,561	0.55%	39,195	814	2.08%
Subtotal	$3,297,528,836	$92,936,635	2.82%	155,125	6,980	4.50%
All stores	**$32,107,772,352**	**$201,123,522**	**0.63%**	**209,727**	**7,980**	**3.81%**

Exhibit F14: Original Trafficking Estimates for Redemptions and Stores by Store Ownership Type (Old Classification)

Store Ownership Type	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Privately owned stores	$18,640,413,120	$192,319,025	1.03%	156,882	7,487	4.77%
Publicly owned stores	$13,467,359,231	$8,804,497	0.07%	52,845	493	0.93%
All stores	**$32,107,772,352**	**$201,123,522**	**0.63%**	**209,727**	**7,980**	**3.81%**

Exhibit F15: Original Trafficking Estimates for Redemptions and Stores by Poverty Rate in Retailer's Neighborhood (Old Classification)

Percentage of Households in Poverty in ZIP Code Where Store Is Located	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$9,068,575,929	$18,269,425	0.20%	63,975	2,243	3.51%
11–20%	$13,833,227,605	$103,983,174	0.75%	86,407	2,898	3.35%
21–30%	$6,186,690,404	$13,787,501	0.22%	39,281	1,433	3.65%
More than 30%	$3,019,278,414	$65,083,421	2.16%	20,064	1,406	7.01%
All stores	**$32,107,772,352**	**$201,123,522**	**0.63%**	**209,727**	**7,980**	**3.81%**

Exhibit F16: Original Trafficking Estimates for Redemptions and Stores by Urbanization Level in Retailer's Neighborhood (Old Classification)

Percentage Urbanization of ZIP Codes Where Stores Are Located	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$1,368,021,450	$2,965,581	0.22%	23,578	409	1.73%
11–50%	$2,023,229,143	$2,145,755	0.11%	12,514	126	1.01%
51–90%	$8,545,679,474	$23,006,119	0.27%	46,818	1,092	2.33%
91–100%	$20,170,842,285	$173,006,067	0.86%	126,817	6,353	5.01%
All stores	**$32,107,772,352**	**$201,123,522**	**0.63%**	**209,727**	**7,980**	**3.81%**

Exhibit F17: Revised Trafficking Estimates for Redemptions and Stores by Store Type (Old Classification)

Type of Store	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Large Stores						
Supermarkets	$27,833,033,583	$119,529,473	0.43%	41,032	1,029	2.51%
Large groceries	$977,209,933	$8,974,154	0.92%	13,570	940	6.93%
Subtotal	$28,810,243,516	$128,503,627	0.45%	54,602	1,969	3.61%
Small Stores						
Small groceries	$991,299,329	$153,367,936	15.47%	36,190	7,145	19.74%
Convenience	$621,660,926	$63,027,192	10.14%	44,097	6,854	15.54%
Specialty	$661,374,175	$17,070,168	2.58%	14,212	1,214	8.55%
Gas/grocery	$292,620,644	$19,748,043	6.75%	21,431	2,324	10.85%
Other types	$730,573,762	$41,940,534	5.74%	39,195	2,818	7.19%
Subtotal	$3,297,528,836	$295,153,872	8.95%	155,125	20,356	13.12%
All stores	**$32,107,772,352**	**$423,657,499**	**1.32%**	**209,727**	**22,325**	**10.64%**

Exhibit F18: Revised Trafficking Estimates for Redemptions and Stores by Store Ownership Type (Old Classification)

Store Ownership Type	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Privately owned stores	$18,640,413,120	$410,119,161	2.20%	156,882	21,665	13.81%
Publicly owned stores	$13,467,359,231	$13,538,338	0.10%	52,845	660	1.25%
All stores	**$32,107,772,352**	**$423,657,499**	**1.32%**	**209,727**	**22,325**	**10.64%**

Exhibit F19: Revised Trafficking Estimates for Redemptions and Stores by Poverty Rate in Retailer's Neighborhood (Old Classification)

Percentage of Households in Poverty in ZIP Code Where Store Is Located	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$9,068,575,929	$56,534,981	0.62%	63,975	4,336	6.78%
11–20%	$13,833,227,605	$211,462,051	1.53%	86,407	8,470	9.80%
21–30%	$6,186,690,404	$35,004,978	0.57%	39,281	5,455	13.89%
More than 30%	$3,019,278,414	$120,655,488	4.00%	20,064	4,063	20.25%
All stores	**$32,107,772,352**	**$423,657,499**	**1.32%**	**209,727**	**22,325**	**10.64%**

Exhibit F20: Revised Trafficking Estimates for Redemptions and Stores by Urbanization Level in Retailer's Neighborhood (Old Classification)

Percentage Urbanization of ZIP Codes Where Stores Are Located	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$1,368,021,450	$13,171,019	0.96%	23,578	2,430	10.31%
11–50%	$2,023,229,143	$12,411,358	0.61%	12,514	1,148	9.18%
51–90%	$8,545,679,474	$115,837,958	1.36%	46,818	4,685	10.01%
91–100%	$20,170,842,285	$282,237,164	1.40%	126,817	14,061	11.09%
All stores	**$32,107,772,352**	**$423,657,499**	**1.32%**	**209,727**	**22,325**	**10.64%**

Exhibit F21: Current Trafficking Estimates for Redemptions and Stores by Store Type (Old Classification)

Type of Store	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Large Stores						
Supermarkets	$27,833,033,583	$18,821,990	0.07%	41,032	189	0.46%
Large groceries	$977,209,933	$10,172,775	1.04%	13,570	738	5.44%
Subtotal	$28,810,243,516	$28,994,765	0.10%	54,602	927	1.70%
Small Stores						
Small groceries	$991,299,329	$143,913,139	14.52%	36,190	5,509	15.22%
Convenience	$621,660,926	$93,473,068	15.04%	44,097	7,236	16.41%
Specialty	$661,374,175	$13,436,359	2.03%	14,212	549	3.87%
Gas/grocery	$292,620,644	$27,219,305	9.30%	21,431	2,565	11.97%
Other types	$730,573,762	$3,670,683	0.50%	39,195	340	0.87%
Subtotal	$3,297,528,836	$281,712,554	8.54%	155,125	16,199	10.44%
All stores	**$32,107,772,352**	**$310,707,319**	**0.97%**	**209,727**	**17,126**	**8.17%**

Exhibit F22: Current Trafficking Estimates for Redemptions and Stores by Store Ownership Type (Old Classification)

Store Ownership Type	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Privately owned stores	$18,640,413,120	$307,780,826	1.65%	156,882	17,033	10.86%
Publicly owned stores	$13,467,359,231	$2,926,492	0.02%	52,845	93	0.18%
All stores	**$32,107,772,352**	**$310,707,319**	**0.97%**	**209,727**	**17,126**	**8.17%**

Exhibit F23: Current Trafficking Estimates for Redemptions and Stores by Poverty Rate in Retailer's Neighborhood (Old Classification)

Percentage of Households in Poverty in ZIP Code Where Store Is Located	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$9,068,575,929	$25,964,966	0.29%	63,975	2,643	4.13%
11–20%	$13,833,227,605	$99,551,895	0.72%	86,407	6,530	7.56%
21–30%	$6,186,690,404	$91,810,609	1.48%	39,281	4,816	12.26%
More than 30%	$3,019,278,414	$93,379,849	3.09%	20,064	3,137	15.63%
All stores	**$32,107,772,352**	**$310,707,319**	**0.97%**	**209,727**	**17,126**	**8.17%**

Exhibit F24: Current Trafficking Estimates for Redemptions and Stores by Urbanization Level in Retailer's Neighborhood (Old Classification)

Percentage Urbanization of ZIP Codes Where Stores Are Located	Total Annualized Redemptions	Annualized Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$1,368,021,450	$9,110,273	0.67%	23,578	1,576	6.68%
11–50%	$2,023,229,143	$7,052,590	0.35%	12,514	727	5.81%
51–90%	$8,545,679,474	$28,434,189	0.33%	46,818	2,523	5.39%
91–100%	$20,170,842,285	$266,110,266	1.32%	126,817	12,300	9.70%
All stores	**$32,107,772,352**	**$310,707,319**	**0.97%**	**209,727**	**17,126**	**8.17%**

APPENDIX G

STATISTICS ON INVESTIGATIONS AND ADMINISTRATIVE ACTIONS RELATIVE TO ORIGINAL, REVISED, AND CURRENT DEFINITIONS

This appendix provides statistics for retailers defined by the original, revised, and current criteria for defining the denominator (a store that has been investigated or has faced an administrative review or was put on the Watch List). In other words, it defines the sample for each of the three definitions.

The following provides an index to the tables:

I. Original Estimates

II. Revised Estimates

III. Current Estimates

Exhibit G1: Redemptions, Retailer Count, and Trafficking Statistics for Retailers from 2006–2008 Identified by the Original Criteria for Inclusion into the Sample by Retailer Type (New Classification)

Type of Store	Total Redemptions	Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Large Stores						
Supermarkets	$478,536,079	$12,382,932	2.59%	277	6	2.17%
Large groceries	$400,841,320	$5,234,716	1.31%	515	8	1.55%
Subtotal	$879,377,399	$17,617,648	2.00%	792	14	1.77%
Small Stores						
Medium-sized groceries	$894,509,452	$18,699,070	2.09%	2,437	92	3.78%
Small groceries	$706,233,672	$60,097,726	8.51%	3,859	375	9.72%
Convenience stores	$840,593,412	$47,572,465	5.66%	7,093	374	5.27%
Specialty foods	$403,596,136	$8,639,981	2.14%	1,230	43	3.50%
Combination/other	$106,042,808	$610,878	0.58%	475	11	2.32%
Subtotal	$2,950,975,479	$135,620,120	4.60%	15,094	895	5.93%
All stores	**$3,830,352,878**	**$153,237,768**	**4.00%**	**15,886**	**909**	**5.72%**

Exhibit G2: Redemptions, Retailer Count, and Trafficking Statistics for Retailers from 2006–2008 Identified by the Original Criteria for Inclusion into the Sample by Ownership Type

Store Ownership Type	Total Redemptions	Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Privately owned stores	$3,768,951,649	$152,999,094	4.06%	15,613	906	5.80%
Publicly owned stores	$61,401,230	$238,674	0.39%	273	3	1.10%
All stores	**$3,830,352,878**	**$153,237,768**	**4.00%**	**15,886**	**909**	**5.72%**

Exhibit G3: Redemptions, Retailer Count, and Trafficking Statistics for Retailers from 2006–2008 Identified by the Original Criteria for Inclusion into the Sample by Poverty Level of Retailer's Neighborhood

Percentage of Households in Poverty in ZIP Code Where Store Is Located	Total Redemptions	Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$386,101,405	$7,163,307	1.86%	2,536	113	4.46%
11–20%	$1,260,225,165	$49,297,880	3.91%	5,961	324	5.44%
21–30%	$1,209,015,929	$40,835,845	3.38%	4,231	237	5.60%
More than 30%	$975,010,380	$55,940,736	5.74%	3,158	235	7.44%
All stores	**$3,830,352,879**	**$153,237,768**	**4.00%**	**15,886**	**909**	**5.72%**

Exhibit G4: Redemptions, Retailer Count, and Trafficking Statistics for Retailers from 2006–2008 Identified by the Original Criteria for Inclusion into the Sample by Urbanization Level of Retailer's Neighborhood

Percentage Urbanization of ZIP Codes Where Stores Are Located	Total Redemptions	Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$159,367,673	$1,780,447	1.12%	1,124	27	2.40%
11–50%	$73,410,092	$994,054	1.35%	468	11	2.35%
51–90%	$332,433,363	$4,293,730	1.29%	1,799	49	2.72%
91–100%	$3,265,141,751	$146,169,537	4.48%	12,495	822	6.58%
All stores	**$3,830,352,878**	**$153,237,768**	**4.00%**	**15,886**	**909**	**5.72%**

Exhibit G5: Redemptions, Retailer Count, and Trafficking Statistics for Retailers from 2006–2008 Identified by the Original Criteria for Inclusion into the Sample by Retailer Type (Old Classification)

Type of Store	Total Redemptions	Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Large Stores						
Supermarkets	$622,351,470	$15,848,544	2.55%	474	10	2.07%
Large groceries	$967,028,964	$15,404,696	1.59%	2,119	48	2.27%
Subtotal	$1,589,380,434	$31,253,239	1.97%	2,593	58	2.23%
Small Stores						
Small groceries	$1,124,580,344	$85,424,802	7.60%	5,905	513	8.68%
Convenience stores	$329,982,049	$22,362,333	6.78%	3,664	212	5.78%
Gas/grocery	$501,849,754	$7,647,957	1.52%	1,322	37	2.80%
Specialty foods	$146,620,873	$2,911,963	1.99%	1,587	52	3.25%
Other	$137,939,425	$3,637,473	2.64%	815	38	4.69%
Subtotal	$2,240,972,445	$121,984,529	5.44%	13,293	851	6.40%
All stores	**$3,830,352,879**	**$153,237,768**	**4.00%**	**15,886**	**909**	**5.72%**

Exhibit G6: Redemptions, Retailer Count, and Trafficking Statistics for Retailers from 2006–2008 Identified by the Revised Criteria for Inclusion into the Sample by Retailer Type (New Classification)

Type of Store	Total Redemptions	Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Large Stores						
Supermarkets	$479,469,642	$12,382,932	2.58%	280	6	2.14%
Large groceries	$406,024,981	$8,245,157	2.03%	526	14	2.66%
Subtotal	$885,494,623	$20,628,089	2.33%	806	20	2.48%
Small Stores						
Medium-sized groceries	$925,763,933	$54,566,924	5.89%	2,556	205	8.02%
Small groceries	$788,226,145	$169,629,212	21.52%	4,353	918	21.09%
Convenience	$941,179,171	$166,194,571	17.66%	8,328	1,596	19.16%
Specialty	$423,192,670	$22,628,037	5.35%	1,304	104	7.98%
Combination/ other	$112,665,886	$6,572,183	5.83%	518	43	8.30%
Subtotal	$3,191,027,805	$419,590,927	13.15%	17,059	2,866	16.80%
All stores	**$4,076,522,428**	**$440,219,016**	**10.80%**	**17,865**	**2,886**	**16.15%**

Exhibit G7: Redemptions, Retailer Count, and Trafficking Statistics for Retailers from 2006–2008 Identified by the Revised Criteria for Inclusion into the Sample by Ownership Type

Store Ownership Type	Total Redemptions	Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Privately owned stores	$4,014,101,132	$439,282,395	10.94%	17,587	2,879	16.37%
Publicly owned stores	$62,421,296	$936,621	1.50%	278	7	2.52%
All stores	**$4,076,522,428**	**$440,219,016**	**10.80%**	**17,865**	**2,886**	**16.15%**

Exhibit G8: Redemptions, Retailer Count, and Trafficking Statistics for Retailers from 2006–2008 Identified by the Revised Criteria for Inclusion into the Sample by Poverty Level of Retailer's Neighborhood

Percentage of Households in Poverty in ZIP Code Where Store Is Located	Total Redemptions	Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$401,631,805	$21,218,331	5.28%	2,728	273	10.01%
11–20%	$1,334,209,037	$126,896,693	9.51%	6,636	964	14.53%
21–30%	$1,277,248,200	$128,942,938	10.10%	4,820	855	17.74%
More than 30%	$1,063,433,386	$163,161,054	15.34%	3,681	794	21.57%
All stores	**$4,076,522,428**	**$440,219,016**	**10.80%**	**17,865**	**2,886**	**16.15%**

Exhibit G9: Redemptions, Retailer Count, and Trafficking Statistics for Retailers from 2006–2008 Identified by the Revised Criteria for Inclusion into the Sample by Urbanization Level of Retailer's Neighborhood

Percentage Urbanization of ZIP Codes Where Stores Are Located	Total Redemptions	Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$174,908,833	$11,008,624	6.29%	1,322	170	12.86%
11–50%	$82,296,800	$7,447,834	9.05%	566	90	15.90%
51–90%	$362,823,911	$26,982,734	7.44%	2,070	271	13.09%
91–100%	$3,456,492,884	$394,779,824	11.42%	13,907	2,355	16.93%
All stores	**$4,076,522,428**	**$440,219,016**	**10.80%**	**17,865**	**2,886**	**16.15%**

Exhibit G10: Redemptions, Retailer Count, and Trafficking Statistics for Retailers from 2006–2008 Identified by the Revised Criteria for Inclusion into the Sample by Retailer Type (Old Classification)

Type of Store	Total Redemptions	Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Large Stores						
Supermarkets	$626,442,765	$18,542,232	2.96%	481	16	3.23%
Large groceries	$985,744,338	$31,980,520	3.24%	2,209	131	5.93%
Subtotal	$1,612,187,103	$50,522,753	3.13%	2,690	146	5.44%
Small Stores						
Small groceries	$1,245,146,980	$248,986,701	20.00%	6,678	1,359	20.35%
Convenience stores	$379,114,584	$79,875,804	21.07%	4,311	847	19.66%
Gas/grocery	$525,017,172	$21,818,275	4.16%	1,417	105	7.44%
Specialty foods	$164,522,555	$22,709,853	13.80%	1,857	307	16.52%
Other	$150,534,034	$16,305,630	10.83%	913	121	13.25%
Subtotal	$2,464,335,325	$389,696,263	15.81%	15,175	2,740	18.05%
All stores	**$4,076,522,428**	**$440,219,016**	**10.80%**	**17,865**	**2,886**	**16.15%**

Exhibit G11: Redemptions, Retailer Count, and Trafficking Statistics for Retailers from 2006–2008 Identified by the Current Criteria for Inclusion into the Sample by Retailer Type (New Classification)

Type of Store	Total Redemptions	Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Large Stores						
Supermarkets	$7,046,258,567	$15,448,398	0.22%	2,978	8	0.27%
Large groceries	$1,526,939,152	$15,575,851	1.02%	1,758	19	1.08%
Subtotal	$8,573,197,719	$31,024,249	0.36%	4,736	27	0.57%
Small Stores						
Medium-sized groceries	$1,470,534,506	$64,366,714	4.38%	4,233	238	5.62%
Small groceries	$998,962,647	$186,539,073	18.67%	6,474	1,017	15.71%
Convenience	$1,408,707,369	$201,999,822	14.34%	11,622	1,848	15.90%
Specialty	$1,153,124,787	$26,966,389	2.34%	4,352	121	2.78%
Combination/other	$1,106,022,411	$9,493,550	0.86%	6,695	51	0.76%
Subtotal	$6,137,351,720	$489,365,549	7.97%	33,376	3,275	9.81%
All stores	**$14,710,549,438**	**$520,389,798**	**3.54%**	**38,112**	**3,302**	**8.66%**

Exhibit G12: Redemptions, Retailer Count, and Trafficking Statistics for Retailers from 2006–2008 Identified by the Current Criteria for Inclusion into the Sample by Ownership Type

Store Ownership Type	Total Redemptions	Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Privately owned stores	$12,817,109,304	$519,453,177	4.05%	32,107	3,295	10.26%
Publicly owned stores	$1,893,440,134	$936,621	0.05%	6,005	7	0.12%
All stores	**$14,710,549,438**	**$520,389,798**	**3.54%**	**38,112**	**3,302**	**8.66%**

Exhibit G13: Redemptions, Retailer Count, and Trafficking Statistics for Retailers from 2006–2008 Identified by the Current Criteria for Inclusion into the Sample by Poverty Level of Retailer's Neighborhood

Percentage of Households in Poverty in ZIP Code Where Store Is Located	Total Redemptions	Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$2,616,820,573	$30,688,214	1.17%	8,599	313	3.64%
11–20%	$5,812,326,527	$144,420,591	2.48%	14,996	1,102	7.35%
21–30%	$3,814,049,454	$156,759,583	4.11%	8,747	998	11.41%
More than 30%	$2,467,352,884	$188,521,410	7.64%	5,770	889	15.41%
All stores	**$14,710,549,439**	**$520,389,798**	**3.54%**	**38,112**	**3,302**	**8.66%**

Exhibit G14: Redemptions, Retailer Count, and Trafficking Statistics for Retailers from 2006–2008 Identified by the Current Criteria for Inclusion into the Sample by Urbanization Level of Retailer's Neighborhood

Percentage Urbanization of ZIP Codes Where Stores Are Located	Total Redemptions	Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
0–10%	$1,098,446,714	$14,412,052	1.31%	3,732	208	5.57%
11–50%	$794,548,518	$8,482,545	1.07%	1,967	106	5.39%
51–90%	$2,657,765,940	$35,297,356	1.33%	6,877	318	4.62%
91–100%	$10,159,788,267	$462,197,845	4.55%	25,536	2,670	10.46%
All stores	**$14,710,549,439**	**$520,389,798**	**3.54%**	**38,112**	**3,302**	**8.66%**

Exhibit G15: Redemptions, Retailer Count, and Trafficking Statistics for Retailers from 2006–2008 Identified by the Current Criteria for Inclusion into the Sample by Retailer Type (Old Classification)

Type of Store	Total Redemptions	Amount of Trafficking	Trafficking Rate	Total Stores	Trafficking Stores	Store Violation Rate
Large Stores						
Supermarkets	$8,220,414,633	$22,356,351	0.27%	3,910	19	0.48%
Large groceries	$1,908,471,773	$50,550,243	2.65%	4,165	165	3.97%
Subtotal	$10,128,886,406	$72,906,594	0.72%	8,074	184	2.28%
Small Stores						
Small groceries	$1,595,163,473	$276,480,643	17.33%	9,739	1,529	15.70%
Convenience stores	$477,318,185	$96,693,561	20.26%	5,723	987	17.24%
Gas/grocery	$1,310,501,293	$29,431,388	2.25%	4,234	122	2.89%
Specialty foods	$220,091,587	$25,775,064	11.71%	2,563	344	13.44%
Other	$978,588,496	$19,102,547	1.95%	7,779	136	1.74%
Subtotal	$4,581,663,033	$447,483,204	9.77%	30,038	3,118	10.38%
All stores	**$14,710,549,438**	**$520,389,798**	**3.54%**	**38,112**	**3,302**	**8.66%**

APPENDIX H

STATISTICS ON COMPARISONS BETWEEN INVESTIGATIONS AND ADMINISTRATIVE ACTIONS BASED ON REVISED AND CURRENT DEFINITIONS OF THE POPULATIONS OF RETAILERS

In order to judge how biased the sample is, distributions by retailer type, ownership type, poverty level, and urbanization were generated. The statistics in these tables represent activity over the three-year period (as opposed to annual figures presented in other parts of the report), and for the most part, they show that the sample derived using the current definition is closer to the total population statistics than the revised estimate. For example, when we look at Exhibit H1, we see that supermarkets composed 11.9 percent of redemptions for all stores that were investigated or received charge letters (revised definition), while they composed 47.9 percent of redemptions in those stores selected by the current definition standard. When the population was considered, supermarkets accounted for 85.2 percent of all redemptions.

The following provides an index to the tables:

I. Redemptions

II. Retailers

Exhibit H1: Distribution of Redemptions for the Entire Retailer Population and for Samples Using the Revised and Current Definitions by Store Type (New Classification) (Amounts Represent Three-Year Totals)

Type of Store	Total Redemptions Population		Redemptions for Investigative Sample Used for Revised Estimate		Redemptions for Investigative Sample Used for Current Estimate	
	Amount	Pct.	Amount	Pct.	Amount	Pct.
Large Stores						
Supermarkets	$82,090,041,109	85.22%	$479,469,642	11.87%	$7,046,258,567	47.90%
Large groceries	$1,986,407,161	2.06%	$404,556,609	10.01%	$1,526,939,152	10.38%
Subtotal	84,076,448,270	87.29%	$884,026,251	21.88%	$8,573,197,719	58.28%
Small Stores						
Medium-sized groceries	$2,300,954,390	2.39%	$922,571,068	22.83%	$1,470,534,506	10.00%
Small groceries	$1,852,944,546	1.92%	$783,584,040	19.39%	$998,962,647	6.79%
Convenience	$3,899,743,676	4.05%	$919,245,783	22.75%	$1,408,707,369	9.58%
Specialty	$1,783,153,985	1.85%	$421,680,504	10.44%	$1,153,124,787	7.84%
Combination/ other	$2,410,072,189	2.50%	$109,746,827	2.72%	$1,106,022,411	7.52%
Subtotal	$12,246,868,786	12.71%	$3,156,828,222	78.12%	$6,137,351,720	41.72%
All stores	**$96,323,317,055**	**100.00%**	**$4,040,854,473**	**100.00%**	**$14,710,549,438**	**100.00%**

Exhibit H2: Distribution of Redemptions for the Entire Retailer Population and for Samples Using the Revised and Current Definitions by Store Ownership Type (Amounts Represent Three-Year Totals)

Store Ownership Type	Total Redemptions Population		Redemptions for Investigative Sample Used for Revised Estimate		Redemptions for Investigative Sample Used for Current Estimate	
	Amount	Pct.	Amount	Pct.	Amount	Pct.
Privately owned stores	$55,921,239,361	58.06%	$3,978,433,177	98.46%	$12,817,109,304	87.13%
Publicly owned stores	$40,402,077,694	41.94%	$62,421,296	1.54%	$1,893,440,134	12.87%
All stores	**$96,323,317,055**	**100.00%**	**$4,040,854,473**	**100.00%**	**$14,710,549,438**	**100.00%**

Exhibit H3: Distribution of Redemptions for the Entire Retailer Population and for Samples Using the Revised and Current Definitions by Poverty Level in Retailer's Neighborhood (Amounts Represent Three-Year Totals)

Percentage of Households in Poverty in ZIP Code Where Store Is Located	Total Redemptions Population		Redemptions for Investigative Sample Used for Revised Estimate		Redemptions for Investigative Sample Used for Current Estimate	
	Amount	Pct.	Amount	Pct.	Amount	Pct.
0–10%	$27,205,727,788	28.24%	$395,875,677	9.80%	$2,616,820,573	17.79%
11–20%	$41,499,682,815	43.08%	$1,323,610,027	32.76%	$5,812,326,527	39.51%
21–30%	$18,560,071,212	19.27%	$1,265,612,515	31.32%	$3,814,049,454	25.93%
More than 30%	$9,057,835,242	9.40%	$1,055,756,255	26.13%	$2,467,352,884	16.77%
All stores	**$96,323,317,057**	**100.00%**	**$4,040,854,473**	**100.00%**	**$14,710,549,439**	**100.00%**

Exhibit H4: Distribution of Redemptions for the Entire Retailer Population and for Samples Using the Revised and Current Definitions by Urbanization Level in Retailer's Neighborhood (Amounts Represent Three-Year Totals)

Percentage Urbanization of ZIP Codes Where Stores Are Located	Total Redemptions Population		Redemptions for Investigative Sample Used for Revised Estimate		Redemptions for Investigative Sample Used for Current Estimate	
	Amount	Pct.	Amount	Pct.	Amount	Pct.
0–10%	$4,104,064,349	4.26%	$170,151,135	4.21%	$1,098,446,714	7.47%
11–50%	$6,069,687,429	6.30%	$80,280,811	1.99%	$794,548,518	5.40%
51–90%	$25,637,038,422	26.62%	$354,650,465	8.78%	$2,657,765,940	18.07%
91–100%	$60,512,526,856	62.82%	$3,435,772,062	85.03%	$10,159,788,267	69.06%
All stores	**$96,323,317,056**	**100.00%**	**$4,040,854,473**	**100.00%**	**$14,710,549,439**	**100.00%**

Exhibit H5: Distribution of Redemptions for the Entire Retailer Population and for Samples Using the Revised and Current Definitions by Store Type (Old Classification) (Amounts Represent Three-Year Totals)

Type of Store	Total Redemptions Population		Redemptions for Investigative Sample Used for Revised Estimate		Redemptions for Investigative Sample Used for Current Estimate	
	Amount	Pct.	Amount	Pct.	Amount	Pct.
Large Stores						
Supermarkets	$83,499,100,749	86.69%	$626,423,672	15.50%	$8,218,361,899	55.94%
Large groceries	$2,931,629,800	3.04%	$983,253,173	24.33%	$1,903,047,095	12.95%
Subtotal	$86,430,730,549	89.73%	$1,609,676,845	39.84%	$10,121,408,994	68.90%
Small Stores						
Small groceries	$2,973,897,988	3.09%	$1,233,035,174	30.51%	$1,586,780,261	10.80%
Convenience stores	$1,864,982,777	1.94%	$368,494,025	9.12%	$474,096,526	3.23%
Gas/grocery	$1,984,122,525	2.06%	$523,400,095	12.95%	$1,310,401,654	8.92%
Specialty foods	$877,861,931	0.91%	$158,856,503	3.93%	$219,483,765	1.49%
Other	$2,191,721,286	2.28%	$147,391,834	3.65%	$978,534,396	6.66%
Subtotal	$9,892,586,507	10.27%	$2,431,177,629	60.16%	$4,569,296,601	31.10%
All stores	**$96,323,317,056**	**100.00%**	**$4,040,854,473**	**100.00%**	**$14,690,705,595**	**100.00%**

Exhibit H6: Distribution of Retailers for the Entire Retailer Population and for Samples Using the Revised and Current Definitions by Store Type (New Classification) (Amounts Represent Three-Year Totals)

Type of Store	Total Retailers in Population		Retailers in Investigative Sample Used for Revised Estimate		Retailers in Investigative Sample Used for Current Estimate	
	Stores	Pct.	Stores	Pct.	Stores	Pct.
Large Stores						
Supermarkets	39,249	18.71%	280	1.60%	2,978	7.81%
Large groceries	3,963	1.89%	524	3.00%	1,758	4.61%
Subtotal	43,212	20.60%	804	4.61%	4,736	12.43%
Small Stores						
Medium-sized groceries	13,557	6.46%	2,544	14.58%	4,233	11.11%
Small groceries	23,446	11.18%	4,300	24.65%	6,474	16.99%
Convenience	78,681	37.52%	8,004	45.88%	11,622	30.49%
Specialty	15,131	7.21%	1,291	7.40%	4,352	11.42%
Combination/ other	35,700	17.02%	504	2.89%	6,695	17.57%
Subtotal	166,515	79.40%	16,643	95.39%	33,376	87.57%
All stores	**209,727**	**100.00%**	**17,447**	**100.00%**	**38,112**	**100.00%**

Exhibit H7: Distribution of Retailers for the Entire Retailer Population and for Samples Using the Revised and Current Definitions by Store Ownership Type (Amounts Represent Three-Year Totals)

Store Ownership Type	Total Retailers in Population		Retailers in Investigative Sample Used for Revised Estimate		Retailers in Investigative Sample Used for Current Estimate	
	Stores	Pct.	Stores	Pct.	Stores	Pct.
Privately owned stores	156,882	74.80%	17,169	98.41%	32,107	84.24%
Publicly owned stores	52,845	25.20%	278	1.59%	6,005	15.76%
All stores	**209,727**	**100.00%**	**17,447**	**100.00%**	**38,112**	**100.00%**

Exhibit H8: Distribution of Retailers for the Entire Retailer Population and for Samples Using the Revised and Current Definitions by Poverty Level in Retailer's Neighborhood (Amounts Represent Three-Year Totals)

Percentage of Households in Poverty in ZIP Code Where Store Is Located	Total Retailers in Population		Retailers in Investigative Sample Used for Revised Estimate		Retailers in Investigative Sample Used for Current Estimate	
	Stores	Pct.	Stores	Pct.	Stores	Pct.
0–10%	63,975	30.50%	2,669	15.30%	8,599	22.56%
11–20%	86,407	41.20%	6,487	37.18%	14,996	39.35%
21–30%	39,281	18.73%	4,686	26.86%	8,747	22.95%
More than 30%	20,064	9.57%	3,605	20.66%	5,770	15.14%
All stores	**209,727**	**100.00%**	**17,447**	**100.00%**	**38,112**	**100.00%**

Exhibit H9: Distribution of Retailers for the Entire Retailer Population and for Samples Using the Revised and Current Definitions by Urbanization Level in Retailer's Neighborhood (Amounts Represent Three-Year Totals)

Percentage Urbanization of ZIP Codes Where Stores Are Located	Total Retailers in Population		Retailers in Investigative Sample Used for Revised Estimate		Retailers in Investigative Sample Used for Current Estimate	
	Stores	Pct.	Stores	Pct.	Stores	Pct.
0–10%	23,578	11.24%	1,247	7.15%	3,732	9.79%
11–50%	12,514	5.97%	530	3.04%	1,967	5.16%
51–90%	46,818	22.32%	1,982	11.36%	6,877	18.04%
91–100%	126,817	60.47%	13,688	78.45%	25,536	67.00%
All stores	**209,727**	**100.00%**	**17,447**	**100.00%**	**38,112**	**100.00%**

Exhibit H10: Distribution of Retailers for the Entire Retailer Population and for Samples Using the Revised and Current Definitions by Store Type (Old Classification) (Amounts Represent Three-Year Totals)

Type of Store	Total Retailers in Population		Retailers in Investigative Sample Used for Revised Estimate		Retailers in Investigative Sample Used for Current Estimate	
	Stores	Pct.	Stores	Pct.	Stores	Pct.
Large Stores						
Supermarkets	41,032	19.56%	481	2.75%	3,910	10.26%
Large groceries	13,570	6.47%	2,196	12.59%	4,165	10.93%
Subtotal	54,602	26.03%	2,677	15.34%	8,074	21.19%
Small Stores						
Small groceries	36,190	17.26%	6,571	37.66%	9,739	25.55%
Convenience stores	44,097	21.03%	4,142	23.74%	5,723	15.02%
Gas/grocery	14,212	6.78%	1,402	8.03%	4,234	11.11%
Specialty foods	21,431	10.22%	1,762	10.10%	2,563	6.73%
Other	39,195	18.69%	894	5.12%	7,779	20.41%
Subtotal	155,125	73.97%	14,770	84.66%	30,038	78.81%
All stores	**209,727**	**100.00%**	**17,447**	**100.00%**	**38,112**	**100.00%**

APPENDIX I

CONFIDENCE INTERVALS

The estimates provided in the main body of the report were generated using the data raking algorithm on the complete set of cases selected for the original, revised, and current estimates. Because in all instances the cases constitute a sample, there is some basis for examining how the estimate could vary if the cases chosen for investigation or for administrative followup were different. To simulate this variation, and to establish boundaries around the estimates, we generated bootstrap estimates. The process involved selecting a random sample of 3,000 retailers from the larger sample and using the raking algorithm to provide 2,000 different estimates. The 2,000 values were then processed to provide mean values (for store and redemption values and rates) and fifth and ninety-fifth percentile values for each of the variables. Overall, the average of these bootstrapped results, as seen in the following table, were relatively close to the estimates presented in the main body of the report. Percentiles were calculated by ordering the bootstrapped results and then reporting the cut points for the lowest five percent and highest 95 percent of values.

Comparison of Raked-Only Value versus Bootstrapped Value

Set of Trafficking Estimates	Redemptions		Stores	
	Annualized Amount (in millions)	Rate	Number	Rate
Current				
Raked-only value	$330	1.03	17,302	8.25
Bootstrapped value	$332	1.03	17,407	8.30
Revised				
Raked-only value	$448	1.39	21,322	10.16
Bootstrapped value	$514	1.60	21,215	10.12
Original				
Raked-only value	$222	0.69	7,573	3.61
Bootstrapped value	$243	0.76	7,593	3.62

In addition to those produced for the national estimates, confidence intervals were also produced on the basis of store type, ownership type, poverty level, and urbanization. The values provide rough indications of how the estimates for each level of these variables would have been affected if different stores were selected for investigation or administrative review. However, care should be taken in the interpretation and use of these confidence intervals. They are derived from smaller samples and are thus subject to the vagaries of the sampling process.

It should also be noted that the amounts representing the fifth and ninety-fifth percentiles are not necessarily reflected in the rates. The procedure estimated the fifth and ninety-fifth percentiles for amounts and rates separately. This resulted in different values for rates than would occur if the amounts divided by total annualized redemptions. Nevertheless, the values should approximate the rates for the most part were amounts used.

The following provides an index to the tables:

I. Original

II. Revised

III. Current

Exhibit I1: Confidence Intervals for Original Estimates of Annualized Redemption Dollars Trafficked and Retailers Trafficking for All Retailers

Store Type		Estimate and Confidence Intervals for Trafficked Redemptions			Estimate and Confidence Intervals for Trafficking Stores		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
All stores	Amt.	$242,984,012	$2,186,822	$686,875,648	7,593	5,765	9,612
	Rate	0.76%	0.01%	2.14%	3.62%	2.75%	4.58%

Exhibit I2: Confidence Intervals for Original Estimates of Annualized Redemption Dollars Trafficked and Retailers Trafficking by Store Type (New Classification)

Store Type		Estimate and Confidence Intervals for Trafficked Redemptions			Estimate and Confidence Intervals for Trafficking Stores		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
Supermarkets	Amt.	$158,313,033	$0	$547,135,951	526	0	1,439
	Rate	0.62%	0.00%	2.21%	1.34%	0.00%	3.67%
Large groceries	Amt.	$661,360	$0	$3,997,090	42	0	115
	Rate	0.10%	0.00%	0.61%	1.06%	0.00%	2.90%
Medium-sized groceries	Amt.	$7,153,643	$0	$24,767,029	504	257	863
	Rate	0.93%	0.00%	3.28%	3.72%	1.90%	6.36%
Small groceries	Amt.	$45,076,476	$0	$158,977,056	2,419	1,587	3,562
	Rate	7.69%	0.00%	28.22%	10.32%	6.77%	15.19%
Convenience	Amt.	$28,694,971	$0	$169,206,805	3,398	2,184	5,024
	Rate	1.80%	0.00%	10.05%	4.32%	2.78%	6.39%
Specialty	Amt.	$2,773,462	$0	$13,764,511	415	130	893
	Rate	0.45%	0.00%	2.30%	2.74%	0.86%	5.90%
Combination/ other	Amt.	$311,067	$0	$1,152,355	288	0	786
	Rate	0.04%	0.00%	0.14%	0.81%	0.00%	2.20%

Exhibit I3: Confidence Intervals for Original Estimates of Annualized Redemption Dollars Trafficked and Retailers Trafficking by Store Ownership Type

Store Ownership		Estimate and Confidence Intervals for Trafficked Redemptions			Estimate and Confidence Intervals for Trafficking Stores		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
Privately owned stores	Amt.	$214,115,158	$0	$622,067,687	7,422	4,431	11,182
	Rate	1.00%	0.00%	2.87%	4.73%	2.82%	7.13%
Publicly owned stores	Amt.	$28,868,855	$0	$174,616,614	581	0	4,271
	Rate	0.34%	0.00%	1.97%	1.10%	0.00%	8.08%

Exhibit I4: Confidence Intervals for Original Estimates of Annualized Redemption Dollars Trafficked and Retailers Trafficking by Poverty Level of Retailer's Neighborhood

Percentage of Households in Poverty in ZIP Code Where Store Is Located		Estimate and Confidence Intervals for Trafficked Redemptions			Estimate and Confidence Intervals for Trafficking Stores		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
0–10%	Amt.	$33,857,882	$0	$185,332,740	1,956	859	3,552
	Rate	0.39%	0.00%	2.14%	3.31%	1.34%	5.55%
11–20%	Amt.	$123,060,370	$0	$466,948,349	2,861	1,816	4,099
	Rate	0.92%	0.00%	3.52%	3.31%	2.10%	4.74%
21–30%	Amt.	$11,291,789	$0	$48,747,409	1,355	852	1,974
	Rate	0.18%	0.00%	0.82%	3.45%	2.17%	5.02%
More than 30%	Amt.	$74,773,971	$0	$288,487,505	1,420	804	2,181
	Rate	2.57%	0.00%	9.85%	7.08%	4.01%	10.87%

Exhibit I5: Confidence Intervals for Original Estimates of Annualized Redemption Dollars Trafficked and Retailers Trafficking by Urbanization Level of Retailer's Neighborhood

Percentage Urbanization in ZIP Code Where Store Is Located		Estimate and Confidence Intervals for Trafficked Redemptions			Estimate and Confidence Intervals for Trafficking Stores		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
0–10%	Amt.	$1,085,923	$0	$5,974,588	484	97	1,091
	Rate	0.08%	0.00%	0.44%	2.05%	0.41%	4.63%
11–50%	Amt.	$6,215,941	$0	$28,707,094	153	0	416
	Rate	0.38%	0.00%	1.49%	1.22%	0.00%	3.32%
51–90%	Amt.	$16,524,706	$0	$109,980,200	1,141	322	2,542
	Rate	0.20%	0.00%	1.37%	2.44%	0.69%	5.43%
91–100%	Amt.	$219,157,442	$6,481	$660,556,389	5,814	4,404	7,475
	Rate	1.09%	0.00%	3.33%	4.58%	3.47%	5.89%

Exhibit I6: Confidence Intervals for Revised Estimates of Annualized Redemption Dollars Trafficked and Retailers Trafficking for All Retailers

Store Type		Estimate and Confidence Intervals for Trafficked Redemptions			Estimate and Confidence Intervals for Trafficking Stores		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
All stores	Amt.	$513,739,999	$56,278,737	$1,319,348,179	21,215	18,073	24,657
	Rate	1.60%	0.18%	4.11%	10.12%	8.62%	11.76%

Exhibit I7: Confidence Intervals for Revised Estimates of Annualized Redemption Dollars Trafficked and Retailers Trafficking by Store Type (New Classification)

Store Type		Estimate and Confidence Intervals for Trafficked Redemptions			Estimate and Confidence Intervals for Trafficking Stores		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
Supermarkets	Amt.	$166,475,323	$0	$651,074,355	507	0	1,500
	Rate	0.66%	0.00%	2.54%	1.29%	0.00%	3.82%
Large groceries	Amt.	$1,015,598	$0	$5,756,366	160	0	729
	Rate	0.16%	0.00%	0.89%	4.03%	0.00%	18.38%
Medium-sized groceries	Amt.	$13,527,642	$0	$49,680,274	963	632	1,340
	Rate	1.75%	0.00%	6.65%	7.10%	4.66%	9.88%
Small groceries	Amt.	$208,023,315	$21,841	$700,640,281	4,842	3,711	6,270
	Rate	30.07%	0.00%	89.13%	20.65%	15.83%	26.74%
Convenience	Amt.	$47,467,878	$0	$196,923,272	12,185	9,958	14,505
	Rate	3.12%	0.00%	13.66%	15.49%	12.66%	18.43%
Specialty	Amt.	$52,286,951	$0	$341,420,231	1,383	500	2,614
	Rate	5.56%	0.00%	42.37%	9.14%	3.31%	17.28%
Combination/ other	Amt.	$24,943,293	$0	$96,191,992	1,176	287	2,828
	Rate	2.32%	0.00%	11.75%	3.29%	0.80%	7.92%

Exhibit I8: Confidence Intervals for Revised Estimates of Annualized Redemption Dollars Trafficked and Retailers Trafficking by Store Ownership Type

Store Ownership		Estimate and Confidence Intervals for Trafficked Redemptions			Estimate and Confidence Intervals for Trafficking Stores		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
Privately owned stores	Amt.	$333,424,161	$0	$975,237,369	20,575	17,590	23,752
	Rate	1.57%	0.00%	4.64%	13.11%	11.21%	15.14%
Publicly owned stores	Amt.	$180,315,839	$0	$826,871,436	641	0	2,221
	Rate	2.63%	0.00%	18.29%	1.21%	0.00%	4.20%

Exhibit I9: Confidence Intervals for Revised Estimates of Annualized Redemption Dollars Trafficked and Retailers Trafficking by Poverty Level of Retailer's Neighborhood

Percentage of Households in Poverty in ZIP Code Where Store Is Located		Estimate and Confidence Intervals for Trafficked Redemptions			Estimate and Confidence Intervals for Trafficking Stores		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
0–10%	Amt.	$63,804,424	$0	$308,570,293	4,043	2,305	6,483
	Rate	0.75%	0.00%	3.62%	9.29%	3.60%	10.13%
11–20%	Amt.	$285,686,890	$0	$864,061,436	8,027	6,148	10,096
	Rate	1.68%	0.00%	6.57%	9.29%	7.12%	11.68%
21–30%	Amt.	$153,194,803	$0	$612,480,920	5,451	4,016	7,057
	Rate	1.71%	0.00%	9.50%	13.88%	10.22%	17.96%
More than 30%	Amt.	$141,653,963	$0	$415,637,837	3,695	2,558	4,974
	Rate	3.83%	0.00%	13.99%	18.42%	12.75%	24.79%

Exhibit I10: Confidence Intervals for Revised Estimates of Annualized Redemption Dollars Trafficked and Retailers Trafficking by Urbanization Level of Retailer's Neighborhood

Percentage Urbanization in ZIP Code Where Store Is Located		Estimate and Confidence Intervals for Trafficked Redemptions			Estimate and Confidence Intervals for Trafficking Stores		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
0–10%	Amt.	$4,189,949	$0	$23,170,053	2,525	1,339	4,267
	Rate	0.31%	0.00%	1.71%	10.71%	5.68%	18.10%
11–50%	Amt.	$27,642,190	$0	$159,307,938	1,311	449	2,645
	Rate	1.53%	0.00%	8.65%	10.47%	3.59%	21.14%
51–90%	Amt.	$85,566,457	$0	$422,893,442	4,692	2,882	6,906
	Rate	1.07%	0.00%	5.26%	10.02%	6.15%	14.75%
91–100%	Amt.	$396,341,403	$29,654	$1,176,670,020	12,687	10,669	14,875
	Rate	1.96%	0.00%	5.92%	10.00%	8.41%	11.73%

Exhibit I11: Confidence Intervals for Current Estimates of Annualized Redemption Dollars Trafficked and Retailers Trafficking for All Retailers

Store Type		Estimate and Confidence Intervals for Trafficked Redemptions			Estimate and Confidence Intervals for Trafficking Stores		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
All stores	Amt.	$331,963,260	$276,763,218	$395,594,538	17,407	14,880	20,093
	Rate	1.03%	0.86%	1.23%	8.30%	7.09%	9.58%

Exhibit I12: Confidence Intervals for Current Estimates of Annualized Redemption Dollars Trafficked and Retailers Trafficking by Store Type (New Classification)

Store Type		Estimate and Confidence Intervals for Trafficked Redemptions			Estimate and Confidence Intervals for Trafficking Stores		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
Supermarkets	Amt.	$15,428,087	$0	$57,942,190	57	0	189
	Rate	0.06%	0.00%	0.21%	0.15%	0.00%	0.48%
Large groceries	Amt.	$2,783,990	$0	$9,015,496	53	0	258
	Rate	0.42%	0.00%	1.36%	1.34%	0.00%	6.52%
Medium-sized groceries	Amt.	$31,361,798	$15,579,536	$52,009,146	806	424	1,345
	Rate	4.09%	2.03%	6.78%	5.94%	3.13%	9.92%
Small groceries	Amt.	$98,888,840	$77,658,697	$121,806,301	3,526	2,578	4,513
	Rate	16.01%	12.57%	19.72%	15.04%	10.99%	19.25%
Convenience	Amt.	$167,920,867	$135,445,075	$201,668,247	12,298	9,996	14,713
	Rate	12.92%	10.42%	15.51%	15.63%	12.70%	18.70%
Specialty	Amt.	$13,058,735	$4,641,349	$23,546,907	540	167	1,114
	Rate	2.20%	0.78%	3.96%	3.57%	1.11%	7.36%
Combination/ other	Amt.	$2,520,943	$274,600	$6,986,109	127	21	367
	Rate	0.31%	0.03%	0.87%	0.36%	0.06%	1.03%

Exhibit I13: Confidence Intervals for Current Estimates of Annualized Redemption Dollars Trafficked and Retailers Trafficking by Store Ownership Type

Store Ownership		Estimate and Confidence Intervals for Trafficked Redemptions			Estimate and Confidence Intervals for Trafficking Stores		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
Privately owned stores	Amt.	$329,568,585	$0	$393,221,321	17,333	14,826	20,024
	Rate	1.77%	0.00%	2.11%	11.05%	9.45%	12.76%
Publicly owned stores	Amt.	$2,394,675	$0	$9,714,078	$0	$0	343
	Rate	0.02%	0.00%	0.07%	0.14%	0.00%	0.65%

Exhibit I14: Confidence Intervals for Current Estimates of Annualized Redemption Dollars Trafficked and Retailers Trafficking by Poverty Level of Retailer's Neighborhood

Percentage of Households in Poverty in ZIP Code Where Store Is Located		Estimate and Confidence Intervals for Trafficked Redemptions			Estimate and Confidence Intervals for Trafficking Stores		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
0–10%	Amt.	$23,778,862	$11,450,049	$41,033,323	2,599	1,446	3,928
	Rate	0.26%	0.13%	0.45%	7.62%	2.26%	6.14%
11–20%	Amt.	$92,070,483	$63,907,851	$145,935,545	6,583	4,972	8,238
	Rate	0.72%	0.46%	1.05%	7.62%	5.75%	9.53%
21–30%	Amt.	$93,172,814	$62,203,644	$143,331,627	4,984	3,654	6,418
	Rate	1.58%	1.01%	2.32%	12.69%	9.30%	16.34%
More than 30%	Amt.	$102,740,157	$60,290,373	$173,485,760	3,240	2,332	4,166
	Rate	3.66%	2.00%	5.75%	16.15%	11.62%	20.76%

Exhibit I15: Confidence Intervals for Current Estimates of Annualized Redemption Dollars Trafficked and Retailers Trafficking by Urbanization Level of Retailer's Neighborhood

Percentage Urbanization in ZIP Code Where Store Is Located		Estimate and Confidence Intervals for Trafficked Redemptions			Estimate and Confidence Intervals for Trafficking Stores		
		Estimate	Confidence Intervals		Estimate	Confidence Intervals	
			5th Percentile	95th Percentile		5th Percentile	95th Percentile
0–10%	Amt.	$11,505,243	$5,447,832	$19,716,962	1,708	915	2,678
	Rate	0.84%	0.40%	1.44%	7.25%	3.88%	11.36%
11–50%	Amt.	$7,844,284	$2,242,541	$16,945,566	749	266	1,419
	Rate	0.39%	0.11%	0.84%	5.98%	2.12%	11.34%
51–90%	Amt.	$31,072,143	$16,171,823	$50,635,815	2,455	1,344	3,740
	Rate	0.36%	0.19%	0.59%	5.24%	2.87%	7.99%
91–100%	Amt.	$281,541,590	$225,742,518	$346,695,886	12,494	10,413	14,724
	Rate	1.40%	1.12%	1.72%	9.85%	8.21%	11.61%

APPENDIX J

APPROACH FOR IMPUTING STORE-TYPE VARIABLES

Store type is a critical variable for developing trafficking estimates. Through its investigations the Food and Nutrition Service (FNS) has determined that supermarkets or larger stores have drastically lower trafficking rates than smaller stores. Prior to 2007, store type was a self-reported field on the retailer application form (Form 252). This self-reported field, with minor editing, was used in all previous trafficking update studies to classify stores into seven types. In 2007 FNS revised its approach for identifying store type in order to establish clearer definitions that could be applied without ambiguity, ensure consistency, and improve FNS fraud detection capabilities.[1] Rather than self-reported data, FNS used elements from the application form and a set of business rules to classify stores, and all active stores were reclassified. The new store-type classifications were not totally consistent with the old system, and certain categories of stores were eliminated, while others were added. For the most part, however, stores retained a classification similar to the one they reported under the old system.

The implication of the retailer store-type reclassification effort—occurring in the middle of the current trafficking estimation period—is that consistency with past estimates could be lost if the new classification system is used. We therefore generated two sets of trafficking estimates: 1) one that is based on the old store-type codes and that is consistent in definition with previous estimates, and 2) one that uses the new classifications that will be used in the future. The two estimates provide a needed bridge for understanding how the estimates using the new classification scheme align with those using the old classification scheme.

In total, the 22 store-type codes used prior to June 2007 (as were listed on the retailer application form) were converted to 16 under the new scheme. Historically, we combined the 22 store-type codes into seven types in order to provide statistically significant aggregations for the raking process. We did the same for the new classifications as well. Exhibit J1 shows the aggregated groups that have been used in previous estimates and ones used for combining the new classifications.

Exhibit J1: Groupings Established for the Raking Analysis

Groupings for the Old Classification System	Groupings for the New Classification System
• Supermarkets and superstores	• Supermarkets and superstores
• Large groceries	• Large groceries
• Small groceries	• Medium groceries
• Convenience stores	• Small groceries
• Gas/grocery stores	• Convenience stores
• Specialty goods	• Specialty foods
• Other stores	• Combination/other stores

[1] From the previously used 22 store types and eight meal service designations, FNS revised its definitions into 16 new store types and eight meal service designations.

Although there are some one-to-one mappings between the two classification schemes, the reclassification posed the following issues with regard to compatibility with previous studies:

- **Superstores, supermarkets, and grocery stores—**In previous studies these stores were separated into three groupings: supermarkets, large grocery stores, and small grocery stores. In the reclassification, there was an effort to distinguish grocery stores into large-, medium-, and small-sized food stores that offer both fresh and staple foods. While the new superstore and supermarket grouping is compatible with the old supermarket grouping, the old and new grocery store groupings are not compatible. In the old grouping, small groceries were defined as having less than $500,000 in gross sales; in the new grouping, they are defined as having less than $250,000 in staple food sales.
- **Convenience stores—**Although this category has not changed, in practice it now includes some stores that were previously classified as gas/grocery stores or in the "other" store category.
- **Gas/grocery stores—**The new list of categories eliminates this category. Stores of this type are now allocated most frequently to the convenience store category.
- **Combination/other stores—**These are stores that provide non-food items as well as food items. In many cases, this serves as a residual category for stores that are hard to fit into other categories.

Another issue that affects the estimates relates to the absence of new or old store-type information in the dataset. Stores that were active as of June 2007 and continued to be active after that time were provided with a store-type code consistent with the new classification scheme (See Exhibit J2). Of course, their type under the old classification system was retained. In total, there were 196,466 stores that were present both pre- and post-June 2007.

Some retailers, however, were new to the Supplemental Nutrition Assistance Program after June 2007. These stores had never been identified with an old store-type classification. In total, there were 54,194 of these stores.

A third group is those stores that were active only prior to June 2007. These retailers were not converted to the new codes by FNS; instead, their old codes were used if they were in any way compatible with the new codes, or they were classified as "unknown" if their old codes were not compatible.[2] There were 564 stores in this category.[3] Exhibit J2 summarizes the coding results for all stores authorized and active between calendar years 2006 and 2008.

[2] By compatible we mean that a store would have the same designation (supermarket, convenience store) in the new and old classification schemas. Incompatible stores would be those, for instance, in the gas/groceries combination store-type category, which was eliminated in the post-June 2007 store-type classification.

[3] This value represents the number of stores at a very early processing point in the editing process and therefore may not reflect the final number in the final data file used for the estimation.

Exhibit J2: Corresponding Store-Type Coding Under the New and Old Classification Systems by Retailer Authorization Status

Retailer Authorization Status	Old Classification	New Classification
1. Stores authorized after June 2007	Never coded	FNS-specified code
2. Store authorized prior to June 2007 and active after June 2007	Self-reported code	FNS-specified code
3. Stores authorized prior to and WD/DQ before June 2007 and had a store-type code that was eliminated	Self-reported code	FNS specified as "unknown."
4. Stores authorized prior to and WD/DQ before June 2007 and had a store-type code that was still valid	Self-reported code	FNS used self-reported code under old classification system.

There are two major strategies for obtaining the estimates, given the fact that not all stores were classified by the new and old schema. The first is to obtain separate estimates for the periods before and after June 2007 using only those cases that have the correct coding for each period. This would produce two estimates: a pre-June 2007 estimate using groups 2, 3, and 4, as defined by Exhibit J2, and a post-June 2007 estimate using groups 1 and 2. We would also obtain estimates for group 2 alone, which would allow us to compare the pre-June 2007 results with the post-June 2007 results. A second approach is to impute the values for store type when they are not available and generate the separate estimates using the old and new store-type groupings for the entire period. The latter strategy was selected. The following explains our approach for imputing store-type values.

IMPUTATION STRATEGY FOR STORES AUTHORIZED AFTER JUNE 2007

The 54,194 stores that were authorized after June 2007 are classified only by the post-June 2007 store-type scheme. Our approach was to estimate what the old store type would have been through imputation. We adopted an approach that establishes a relationship between the old store type and new store codes and from this relationship established a probability that a retailer would assume one or more of the old store-type codes. The relationship is dependent on store characteristic information submitted by these new retailers to establish the predicted probabilities of a store being associated with each of the seven old store-type codes. The procedure is defined as follows:

- The pool of 196,466 retailers that had values under the old and new classification systems were used to establish the prediction equations (group 2 in Exhibit J2). These prediction equations used the new classifications, and other size and food variety items supplied by the retailer, to assist with assigning a store to the seven aggregated old categories used in the raking algorithms.

  Exhibit J3 displays the variables that were used to generate the probabilities for each of the store types. The first set of variables was specified in terms of a series of dummy variables representing the new store type of the retailer. The store-type classifications were combined with those types represented in Exhibit J3. These new store-type variables were coded as dummy variables, with an "other" category being a value nested within the intercept term.

Level of food sales intended to represent the size of the retailer was coded into a set of dummy variables according to the following. The interval measures and cut points were used to be consistent with the values used in the FNS new store-classification business rules.

- High sales: sales >= 2,000,000,
- Medium-high sales: sales >= 1,000,000 and sales < 2,000,000,
- Medium-low sales: sales >= 250,000 and sales < 1,000,000, and
- Low sales: sales >= 0 and sales < 250,000.

The low sales figure is included in the intercept term. The cut points are consistent with the values used in FNS new store classification business rules.

Continuous variables included the number of staple food categories being provided by the store and the percentage of sales accounted for by eligible foods. Altogether, these variables were thought to provide information on the size and breadth of products provided by the retailer.

These variables were used within a logistic regression framework to identify the probability that any single store with a particular set of characteristics could be classified as any one of the old store types. Eight predictive equations were estimated. In specifying the equation for supermarkets, we found that because of the large size differences between superstores/ supermarkets and other smaller stores, it was necessary to derive separate probabilities for these two groupings. So the first equation included only superstores and supermarkets, which had a high probability of being classified as a supermarket, and the second equation included other stores, which had a much lower probability of being classified as a supermarket. Results of the logistic regressions are provided in a supplement to this appendix.

- The equations were then applied to the population of new retailers (group 1 in Exhibit J2), and seven probabilities were estimated for each store.[4] A particular retailer would have a set of values representing its probabilistic mapping into each of the older categories. Thus, a particular retailer could have the following profile:

  - 32 percent chance of being a supermarket,
  - 40 percent chance of being a large grocery,
  - 10 percent chance of being a small grocery,
  - Eight percent chance of being a convenience store,
  - Three percent chance of being a specialty food retailer,
  - 10 percent chance of being a gas/grocery combination store, and
  - Three percent chance of being another type of store.

  Thus, each of the 54,176 retailers for which probabilities could be estimated had seven records.

[4] There were eight equations. Two of the equations focused on predicting membership in the supermarket store type. The first of these prediction equations included only those stores coded as supermarkets or superstores, while the second included all other stores. These equations were used to generate values for each subpopulation, which then could be concatenated.

- Probabilities could not be estimated for 18 retailers because they lacked information for some dependent variable. These stores were classified using the old classifications by visually examining their records.
- To ensure that the stores with multiple probabilities do not exceed one, we reduced or increased the probabilities proportional to the sum of the estimated probabilities so that they totaled 100. In the profile above, the sum of the probabilities equals 106, thus to derive the adjusted probability for the supermarkets we divided 32 by 106.
- These retailers were added to retailers with a store type identified under the old classification system, which were assigned a value of one. The adjusted probability is applied to the redemptions so that each representation accounts for a particular proportion of redemptions.

IMPUTATION STRATEGY FOR STORES THAT HAD WITHDRAWN OR BEEN DISQUALIFIED PRIOR TO JUNE 2007

The 564 stores that were not active after June 2007 and did not have a new store-type code (group 3 in Exhibit J2) required conversion to a code consistent with the post-June 2007 classification system. Because FNS established explicit business rules that define the post-June 2007 store types, these rules were used to assign new classifications to these stores. Yet because the data elements could not support applying these rules as issued by FNS, we used proxy measures. In addition, each reclassification was examined, and, if needed, the store type was modified. Retailers whose store type under the new store-classification system could not be determined were assigned to the combination/other category.

Exhibit J3: Variables Used To Impute Store Type

Variables Used as Predictors	Equation to Predict Store Type							
	Supermarkets 1	Supermarkets 2	Large Groceries	Small Groceries	Convenience Stores	Specialty Foods	Combo Gas	Other
Superstores (ss2)	✓		✓	✓	✓	✓	✓	✓
Supermarkets (sm2)			✓	✓	✓	✓	✓	✓
Convenience Stores (cs2)		✓	✓	✓	✓	✓	✓	✓
Combination/Other Stores (CO2)		✓	✓	✓	✓	✓	✓	✓
Large Groceries (lg2)		✓	✓	✓	✓	✓	✓	✓
Medium-Sized Groceries (mg2)		✓	✓	✓	✓	✓	✓	✓
Small Groceries (sg2)		✓	✓	✓	✓	✓	✓	✓
Specialty Foods (sf2)		✓	✓	✓	✓	✓	✓	✓
Other Stores (other2)								
High_Sales					✓		✓	✓
Medium_High_Sales					✓		✓	✓
Medium_Low_Sales								
Number of Staple Food Types Provided (Number Staple)	✓	✓	✓	✓	✓	✓	✓	✓
Eligible Sales/Total Sales (Eligible Pct)	✓	✓	✓	✓	✓	✓	✓	✓

The following supplement contains the output of a SAS logistic regression procedure. In developing the models, we considered variables that were significant and the association of predicted probabilities and observed responses in deriving an optimal model.

Supplement to Appendix J:

Logistic Regression Results

Supermarket Model 1:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Supermarket From Stores That Were Classified Under the New Classification System as Superstores or Supermarkets

Model Information	
Dataset	WORK.SUPER1
Response Variable	super
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Number of Observations Read	38,556
Number of Observations Used	38,179

Response Profile		
Ordered Value	**super**	**Total Frequency**
1	1	36,884
2	2	1,295

Probability modeled is super=1.

Class-Level Information		
Class	**Value**	**Design Variables**
ss2	**1**	1
	2	-1

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	**Intercept Only**	**Intercept and Covariates**
AIC	11,311.547	10,693.647
SC	11,320.097	10,727.847
-2 Log L	11,309.547	10,685.647

R-Square	0.0162	**Max-rescaled R-Square**	0.0632

Supermarket Model 1:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Supermarket From Stores That Were Classified Under the New Classification System as Superstores or Supermarkets

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	623.9000	3	<.0001
Score	713.4564	3	<.0001
Wald	631.6941	3	<.0001

Type 3 Analysis of Effects			
Effect	**DF**	**Wald Chi-Square**	**Pr > ChiSq**
ss2	1	218.3873	<.0001
Number_staple	1	35.2731	<.0001
Eligible_pct	1	246.9530	<.0001

Analysis of Maximum Likelihood Estimates						
Parameter		**DF**	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Intercept		1	0.2663	0.3872	0.4732	0.4915
ss2	**1**	1	-0.4619	0.0313	218.3873	<.0001
Number_staple		1	0.5698	0.0959	35.2731	<.0001
Eligible_pct		1	0.0148	0.000941	246.9530	<.0001

Odds Ratio Estimates			
Effect	**Point Estimate**	**95% Wald Confidence Limits**	
ss2 1 vs 2	0.397	0.351	0.449
Number_staple	1.768	1.465	2.134
Eligible_pct	1.015	1.013	1.017

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	62.8	**Somers' D**	0.323
Percent Discordant	30.4	**Gamma**	0.347
Percent Tied	6.8	**Tau-a**	0.021
Pairs	47,764,780	**c**	0.662

Supermarket Model 1:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Supermarket From Stores That Were Classified Under the New Classification System as Superstores or Supermarkets

Partition for the Hosmer and Lemeshow Test					
Group	Total	super = 1		super = 2	
		Observed	Expected	Observed	Expected
1	3,969	3,554	3,586.54	415	382.46
2	3,461	3,416	3,276.48	45	184.52
3	4,080	3,731	3,902.05	349	177.95
4	3,312	3,259	3,190.10	53	121.90
5	3,163	3,054	3,067.86	109	95.14
6	4,186	4,157	4,102.48	29	83.52
7	7,106	7,033	6,983.37	73	122.63
8	6,134	6,043	6,042.48	91	91.52
9	2,768	2,637	2,732.64	131	35.36

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
647.7304	7	<.0001

Supermarket Model 2:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Supermarket From Stores That Were Not Classified Under the New Classification System as Superstores or Supermarkets

Model Information	
Dataset	WORK.SUPER2
Response Variable	super
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Number of Observations Read	157,910
Number of Observations Used	157,309

Response Profile		
Ordered Value	**super**	**Total Frequency**
1	1	2,647
2	2	154,662

Probability modeled is super=1.

Class-Level Information		
Class	**Value**	**Design Variables**
cs2	**1**	1
	2	-1
co2	**1**	1
	2	-1
mg2	**1**	1
	2	-1
lg2	**1**	1
	2	-1
sg2	**1**	1
	2	-1
sf2	**1**	1
	2	-1

Supermarket Model 2:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Supermarket From Stores That Were Not Classified Under the New Classification System as Superstores or Supermarkets

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	**Intercept Only**	**Intercept and Covariates**
AIC	26,876.060	19,502.625
SC	26,886.026	19,592.319
-2 Log L	26,874.060	19,484.625

R-Square	0.0459	**Max-rescaled R-Square**	0.2922

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	7,389.4352	8	<.0001
Score	21,614.4597	8	<.0001
Wald	6,786.0748	8	<.0001

Type 3 Analysis of Effects			
Effect	**DF**	**Wald Chi-Square**	**Pr > ChiSq**
cs2	1	117.5876	<.0001
co2	1	6.1467	0.0132
sg2	1	116.5287	<.0001
mg2	1	123.7255	<.0001
lg2	1	324.9221	<.0001
sf2	1	33.5191	<.0001
Number_staple	1	91.5096	<.0001
Eligible_pct	1	45.0565	<.0001

Supermarket Model 2:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Supermarket From Stores That Were Not Classified Under the New Classification System as Superstores or Supermarkets

Analysis of Maximum Likelihood Estimates						
Parameter		**DF**	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Intercept		1	-10.8153	0.5161	439.1696	<.0001
cs2	**1**	1	-0.8339	0.0769	117.5876	<.0001
co2	**1**	1	0.1971	0.0795	6.1467	0.0132
sg2	**1**	1	-2.5234	0.2338	116.5287	<.0001
mg2	**1**	1	-1.0930	0.0983	123.7255	<.0001
lg2	**1**	1	1.2692	0.0704	324.9221	<.0001
sf2	**1**	1	-0.5264	0.0909	33.5191	<.0001
Number_staple		1	0.8544	0.0893	91.5096	<.0001
Eligible_pct		1	0.00745	0.00111	45.0565	<.0001

Odds Ratio Estimates				
Effect		**Point Estimate**	**95% Wald Confidence Limits**	
cs2	**1 vs 2**	0.189	0.140	0.255
co2	**1 vs 2**	1.483	1.086	2.026
sg2	**1 vs 2**	0.006	0.003	0.016
mg2	**1 vs 2**	0.112	0.076	0.165
lg2	**1 vs 2**	12.659	9.606	16.683
sf2	**1 vs 2**	0.349	0.244	0.498
Number_staple		2.350	1.973	2.799
Eligible_pct		1.007	1.005	1.010

Supermarket Model 2:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Supermarket From Stores That Were Not Classified Under the New Classification System as Superstores or Supermarkets

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	83.3	**Somers' D**	0.712
Percent Discordant	12.1	**Gamma**	0.746
Percent Tied	4.6	**Tau-a**	0.024
Pairs	409,390,314	**c**	0.856

Partition for the Hosmer and Lemeshow Test					
Group	**Total**	**super = 1**		**super = 2**	
		Observed	**Expected**	**Observed**	**Expected**
1	13,124	4	2.85	13,120	13,121.15
2	15,989	8	10.35	15,981	15,978.65
3	15,316	236	53.42	15,080	15,262.58
4	11,527	55	47.90	11,472	11,479.10
5	13,713	45	61.36	13,668	13,651.64
6	19,044	77	95.07	18,967	18,948.93
7	13,441	24	75.22	13,417	13,365.78
8	17,172	13	108.93	17,159	17,063.07
9	14,676	214	333.03	14,462	14,342.97
10	23,307	1,971	1,858.88	21,336	21,448.12

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	**DF**	**Pr > ChiSq**
807.1329	8	<.0001

Large Grocery:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Large Grocery From All Stores

Model Information	
Dataset	WORKFILE.BOTH_PERIODS
Response Variable	large_grocery
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Number of Observations Read	196,466
Number of Observations Used	195,488

Response Profile		
Ordered Value	**Large grocery**	**Total Frequency**
1	1	12,427
2	2	183,061

Probability modeled is med_grocery=1.

Class-Level Information		
Class	**Value**	**Design Variables**
ss2	**1**	1
	2	-1
sm2	**1**	1
	2	-1
cs2	**1**	1
	2	-1
co2	**1**	1
	2	-1
mg2	**1**	1
	2	-1
lg2	**1**	1
	2	-1
sg2	**1**	1
	2	-1

Large Grocery:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Large Grocery From All Stores

Class-Level Information		
Class	**Value**	**Design Variables**
sf2	**1**	1
	2	-1

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	**Intercept Only**	**Intercept and Covariates**
AIC	92,537.099	65,029.421
SC	92,547.282	65,141.436
-2 Log L	92,535.099	65,007.421

R-Square	0.1314	**Max-rescaled R-Square**	0.3483

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	27,527.6787	10	<.0001
Score	45,805.9929	10	<.0001
Wald	21,084.4521	10	<.0001

Large Grocery:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Large Grocery From All Stores

Type 3 Analysis of Effects			
Effect	**DF**	**Wald Chi-Square**	**Pr > ChiSq**
ss2	1	142.3616	<.0001
sm2	1	67.7861	<.0001
cs2	1	33.8838	<.0001
co2	1	11.5552	0.0007
sg2	1	129.6216	<.0001
mg2	1	483.6354	<.0001
lg2	1	637.6675	<.0001
sf2	1	0.8222	0.3646
Number_staple	1	265.9765	<.0001
Eligible_pct	1	130.0369	<.0001

Analysis of Maximum Likelihood Estimates						
Parameter		**DF**	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Intercept		1	-6.4457	0.4757	183.6239	<.0001
ss2	**1**	1	-1.7047	0.1429	142.3616	<.0001
sm2	**1**	1	-0.6377	0.0775	67.7861	<.0001
cs2	**1**	1	0.4098	0.0704	33.8838	<.0001
co2	**1**	1	-0.2578	0.0759	11.5552	0.0007
sg2	**1**	1	-0.9579	0.0841	129.6216	<.0001
mg2	**1**	1	1.5259	0.0694	483.6354	<.0001
lg2	**1**	1	1.7871	0.0708	637.6675	<.0001
sf2	**1**	1	0.0694	0.0765	0.8222	0.3646
Number_staple		1	0.7051	0.0432	265.9765	<.0001
Eligible_pct		1	0.00630	0.000553	130.0369	<.0001

Large Grocery:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Large Grocery From All Stores

Odds Ratio Estimates				
Effect		**Point Estimate**	**95% Wald Confidence Limits**	
ss2	**1 vs 2**	0.033	0.019	0.058
sm2	**1 vs 2**	0.279	0.206	0.378
cs2	**1 vs 2**	2.270	1.722	2.991
co2	**1 vs 2**	0.597	0.444	0.804
sg2	**1 vs 2**	0.147	0.106	0.205
mg2	**1 vs 2**	21.152	16.115	27.763
lg2	**1 vs 2**	35.664	27.024	47.065
sf2	**1 vs 2**	1.149	0.851	1.551
Number_staple		2.024	1.860	2.203
Eligible_pct		1.006	1.005	1.007

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	85.4	**Somers' D**	0.729
Percent Discordant	12.4	**Gamma**	0.746
Percent Tied	2.2	**Tau-a**	0.087
Pairs	2,274,899,047	**c**	0.865

Large Grocery:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Large Grocery From All Stores

Partition for the Hosmer and Lemeshow Test					
Group	Total	med_grocery = 1		med_grocery = 2	
		Observed	Expected	Observed	Expected
1	20,095	125	31.39	19,970	20,063.61
2	19,763	13	101.87	19,750	19,661.13
3	19,566	142	149.69	19,424	19,416.31
4	19,728	113	218.55	19,615	19,509.45
5	19,772	381	290.59	19,391	19,481.41
6	22,405	918	969.81	21,487	21,435.19
7	18,926	853	1,003.20	18,073	17,922.80
8	21,625	1,494	1,298.45	20,131	20,326.55
9	19,553	2,049	1,890.75	17,504	17,662.25
10	14,055	6,339	6,472.70	7,716	7,582.30

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
515.7277	8	<.0001

Small Grocery:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Small Grocery From All Stores

Model Information	
Dataset	WORKFILE.BOTH_PERIODS
Response Variable	small_grocery
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Number of Observations Read	196,466
Number of Observations Used	195,488

Response Profile		
Ordered Value	**small_grocery**	**Total Frequency**
1	1	33,232
2	2	162,256

Probability modeled is small_grocery=1.

Class-Level Information		
Class	**Value**	**Design Variables**
ss2	**1**	1
	2	-1
sm2	**1**	1
	2	-1
cs2	**1**	1
	2	-1
co2	**1**	1
	2	-1
mg2	**1**	1
	2	-1
lg2	**1**	1
	2	-1
sg2	**1**	1
	2	-1

Small Grocery:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Small Grocery From All Stores

Class-Level Information		
Class	**Value**	**Design Variables**
sf2	**1**	1
	2	-1
med_low_sales	**1**	1
	2	-1

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	**Intercept Only**	**Intercept and Covariates**
AIC	178,239.52	108,212.75
SC	178,249.71	108,334.95
-2 Log L	178,237.52	108,188.75

R-Square	0.3012	**Max-rescaled R-Square**	0.5035

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	70,048.7749	11	<.0001
Score	74,835.2538	11	<.0001
Wald	31,661.5915	11	<.0001

Small Grocery:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Small Grocery From All Stores

Type 3 Analysis of Effects			
Effect	**DF**	**Wald Chi-Square**	**Pr > ChiSq**
ss2	1	149.1222	<.0001
sm2	1	252.8889	<.0001
cs2	1	446.4983	<.0001
co2	1	3.6947	0.0546
sg2	1	1,516.8865	<.0001
mg2	1	416.8061	<.0001
lg2	1	47.9915	<.0001
sf2	1	111.1041	<.0001
Number_staple	1	1,215.7978	<.0001
Eligible_pct	1	4,304.3521	<.0001
med_low_sales	1	13.7737	0.0002

Analysis of Maximum Likelihood Estimates						
Parameter		**DF**	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Intercept		1	-9.0198	0.4829	348.8871	<.0001
ss2	**1**	1	-1.8888	0.1547	149.1222	<.0001
sm2	**1**	1	-1.6081	0.1011	252.8889	<.0001
cs2	**1**	1	1.1901	0.0563	446.4983	<.0001
co2	**1**	1	-0.1268	0.0659	3.6947	0.0546
sg2	**1**	1	2.1794	0.0560	1,516.8865	<.0001
mg2	**1**	1	1.1539	0.0565	416.8061	<.0001
lg2	**1**	1	-2.0370	0.2940	47.9915	<.0001
sf2	**1**	1	0.6139	0.0582	111.1041	<.0001
Number_staple		1	0.8320	0.0239	1,215.7978	<.0001
Eligible_pct		1	0.0262	0.000400	4,304.3521	<.0001
med_low_sales	**1**	1	-0.0315	0.00848	13.7737	0.0002

Small Grocery:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Small Grocery From All Stores

Odds Ratio Estimates				
Effect		**Point Estimate**	**95% Wald Confidence Limits**	
ss2	**1 vs 2**	0.023	0.012	0.042
sm2	**1 vs 2**	0.040	0.027	0.060
cs2	**1 vs 2**	10.807	8.666	13.477
co2	**1 vs 2**	0.776	0.599	1.005
sg2	**1 vs 2**	78.162	62.767	97.332
mg2	**1 vs 2**	10.052	8.055	12.545
lg2	**1 vs 2**	0.017	0.005	0.054
sf2	**1 vs 2**	3.414	2.717	4.289
Number_staple		2.298	2.193	2.408
Eligible_pct		1.027	1.026	1.027
med_low_sales	**1 vs 2**	0.939	0.908	0.971

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	89.2	**Somers' D**	0.795
Percent Discordant	9.7	**Gamma**	0.804
Percent Tied	1.1	**Tau-a**	0.224
Pairs	5,392,091,392	**c**	0.898

Small Grocery:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Small Grocery From All Stores

Partition for the Hosmer and Lemeshow Test					
Group	Total	small_grocery = 1		small_grocery = 2	
		Observed	Expected	Observed	Expected
1	19,470	29	12.55	19,441	19,457.45
2	19,941	18	30.62	19,923	19,910.38
3	19,550	27	92.11	19,523	19,457.89
4	19,549	231	276.23	19,318	19,272.77
5	20,173	1,504	1,280.06	18,669	18,892.94
6	21,222	1,790	2,231.04	19,432	18,990.96
7	17,989	2,743	2,925.13	15,246	15,063.87
8	18,767	4,631	4,113.41	14,136	14,653.59
9	19,222	6,789	6,765.06	12,433	12,456.94
10	19,605	15,470	15,505.81	4,135	4,099.19

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
317.2923	8	<.0001

Convenience Store:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Convenience Store From All Stores

Model Information	
Dataset	WORKFILE.BOTH_PERIODS
Response Variable	conv_store
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Number of Observations Read	196,466
Number of Observations Used	195,488

Response Profile		
Ordered Value	**conv_store**	**Total Frequency**
1	1	41,693
2	2	153,795

Probability modeled is conv_store=1.

Class-Level Information		
Class	**Value**	**Design Variables**
ss2	**1**	1
	2	-1
sm2	**1**	1
	2	-1
cs2	**1**	1
	2	-1
co2	**1**	1
	2	-1
mg2	**1**	1
	2	-1
lg2	**1**	1
	2	-1

Convenience Store:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Convenience Store From All Stores

Class-Level Information		
Class	**Value**	**Design Variables**
sg2	**1**	1
	2	-1
sf2	**1**	1
	2	-1
high_sales	**1**	1
	2	-1
Med_high_sales	**1**	1
	2	-1
med_low_sales	**1**	1
	2	-1

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	**Intercept Only**	**Intercept and Covariates**
AIC	202,631.40	137,824.75
SC	202,641.59	137,967.32
-2 Log L	202,629.40	137,796.75

R-Square	0.2823	**Max-rescaled R-Square**	0.4374

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	64,832.6531	13	<.0001
Score	57,676.9703	13	<.0001
Wald	24,653.6865	13	<.0001

Convenience Store:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Convenience Store From All Stores

Type 3 Analysis of Effects			
Effect	**DF**	**Wald Chi-Square**	**Pr > ChiSq**
ss2	1	66.7982	<.0001
sm2	1	86.3782	<.0001
cs2	1	458.8307	<.0001
co2	1	23.6558	<.0001
sg2	1	118.4125	<.0001
mg2	1	97.1661	<.0001
lg2	1	10.3528	0.0013
sf2	1	6.6418	0.0100
Number_staple	1	111.4255	<.0001
high_sales	1	6.9446	0.0084
Med_high_sales	1	10.6987	0.0011
med_low_sales	1	300.5496	<.0001
Eligible_pct	1	33.3698	<.0001

Analysis of Maximum Likelihood Estimates						
Parameter		**DF**	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Intercept		1	-3.7180	0.6230	35.6212	<.0001
ss2	**1**	1	-1.3150	0.1609	66.7982	<.0001
sm2	**1**	1	-1.4372	0.1546	86.3782	<.0001
cs2	**1**	1	2.0559	0.0960	458.8307	<.0001
co2	**1**	1	0.4740	0.0975	23.6558	<.0001
sg2	**1**	1	1.0477	0.0963	118.4125	<.0001
mg2	**1**	1	0.9532	0.0967	97.1661	<.0001
lg2	**1**	1	0.3459	0.1075	10.3528	0.0013
sf2	**1**	1	-0.2839	0.1102	6.6418	0.0100
Number_staple		1	0.3371	0.0319	111.4255	<.0001
high_sales	**1**	1	-0.0373	0.0142	6.9446	0.0084
Med_high_sales	**1**	1	0.0368	0.0112	10.6987	0.0011
med_low_sales	**1**	1	0.1521	0.00878	300.5496	<.0001
Eligible_pct		1	0.00187	0.000323	33.3698	<.0001

Convenience Store:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Convenience Store From All Stores

Odds Ratio Estimates				
Effect		**Point Estimate**	**95% Wald Confidence Limits**	
ss2	**1 vs 2**	0.072	0.038	0.135
sm2	**1 vs 2**	0.056	0.031	0.103
cs2	**1 vs 2**	61.054	41.910	88.941
co2	**1 vs 2**	2.580	1.761	3.781
sg2	**1 vs 2**	8.128	5.573	11.855
mg2	**1 vs 2**	6.728	4.606	9.829
lg2	**1 vs 2**	1.997	1.310	3.044
sf2	**1 vs 2**	0.567	0.368	0.873
Number_staple		1.401	1.316	1.491
high_sales	**1 vs 2**	0.928	0.878	0.981
Med_high_sales	**1 vs 2**	1.076	1.030	1.125
med_low_sales	**1 vs 2**	1.356	1.310	1.403
Eligible_pct		1.002	1.001	1.003

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	84.8	**Somers' D**	0.709
Percent Discordant	13.9	**Gamma**	0.719
Percent Tied	1.4	**Tau-a**	0.238
Pairs	6,412,174,935	**c**	0.855

Convenience Store:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Convenience Store From All Stores

Partition for the Hosmer and Lemeshow Test					
Group	Total	conv_store = 1		conv_store = 2	
		Observed	Expected	Observed	Expected
1	19,484	11	14.67	19,473	19,469.33
2	19,611	21	19.98	19,590	19,591.02
3	18,656	154	160.63	18,502	18,495.37
4	18,651	824	587.60	17,827	18,063.40
5	18,113	1,102	1,157.08	17,011	16,955.92
6	18,390	2,118	2,053.15	16,272	16,336.85
7	20,256	5,826	6,316.31	14,430	13,939.69
8	20,009	9,236	9,266.98	10,773	10,742.02
9	17,141	8,845	8,599.22	8,296	8,541.78
10	25,177	13,556	13,517.37	11,621	11,659.63

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
174.3838	8	<.0001

Specialty Food Stores:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Specialty Food Store From All Stores

Model Information	
Dataset	WORKFILE.BOTH_PERIODS
Response Variable	spec_fds
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Number of Observations Read	196,466
Number of Observations Used	195,488

Response Profile		
Ordered Value	**spec_fds**	**Total Frequency**
1	1	13,709
2	2	181,779

Probability modeled is spec_fds=1.

Class-Level Information		
Class	**Value**	**Design Variables**
ss2	**1**	1
	2	-1
sm2	**1**	1
	2	-1
cs2	**1**	1
	2	-1
co2	**1**	1
	2	-1
mg2	**1**	1
	2	-1
lg2	**1**	1
	2	-1

Specialty Food Stores:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Specialty Food Store From All Stores

Class-Level Information		
Class	**Value**	**Design Variables**
sg2	**1**	1
	2	-1
sf2	**1**	1
	2	-1

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	**Intercept Only**	**Intercept and Covariates**
AIC	99,297.199	41,527.021
SC	99,307.382	41,639.037
-2 Log L	99,295.199	41,505.021

R-Square	0.2559	**Max-rescaled R-Square**	0.6426

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	57,790.1781	10	<.0001
Score	109,493.871	10	<.0001
Wald	29,176.7727	10	<.0001

Specialty Food Stores:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Specialty Food Store From All Stores

Type 3 Analysis of Effects			
Effect	**DF**	**Wald Chi-Square**	**Pr > ChiSq**
ss2	1	21.1680	<.0001
sm2	1	4.2451	0.0394
cs2	1	8.2739	0.0040
co2	1	50.3967	<.0001
sg2	1	143.6181	<.0001
mg2	1	216.8383	<.0001
lg2	1	127.4104	<.0001
sf2	1	929.6304	<.0001
Number_staple	1	1,518.6174	<.0001
Eligible_pct	1	556.2489	<.0001

Analysis of Maximum Likelihood Estimates						
Parameter		**DF**	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Intercept		1	1.4939	0.5212	8.2157	0.0042
ss2	**1**	1	-0.6308	0.1371	21.1680	<.0001
sm2	**1**	1	-0.2058	0.0999	4.2451	0.0394
cs2	**1**	1	0.2524	0.0878	8.2739	0.0040
co2	**1**	1	0.6491	0.0914	50.3967	<.0001
sg2	**1**	1	1.0062	0.0840	143.6181	<.0001
mg2	**1**	1	1.2410	0.0843	216.8383	<.0001
lg2	**1**	1	1.0297	0.0912	127.4104	<.0001
sf2	**1**	1	2.4998	0.0820	929.6304	<.0001
Number_staple		1	-0.5310	0.0136	1,518.6174	<.0001
Eligible_pct		1	0.0173	0.000735	556.2489	<.0001

Specialty Food Stores:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Specialty Food Store From All Stores

Odds Ratio Estimates				
Effect		**Point Estimate**	**95% Wald Confidence Limits**	
ss2	**1 vs 2**	0.283	0.165	0.485
sm2	**1 vs 2**	0.663	0.448	0.980
cs2	**1 vs 2**	1.657	1.175	2.337
co2	**1 vs 2**	3.662	2.559	5.241
sg2	**1 vs 2**	7.481	5.383	10.397
mg2	**1 vs 2**	11.965	8.599	16.648
lg2	**1 vs 2**	7.842	5.484	11.213
sf2	**1 vs 2**	148.352	107.577	204.583
Number_staple		0.588	0.573	0.604
Eligible_pct		1.017	1.016	1.019

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	95.2	**Somers' D**	0.915
Percent Discordant	3.7	**Gamma**	0.924
Percent Tied	1.1	**Tau-a**	0.119
Pairs	2,492,008,311	**c**	0.957

Specialty Food Stores:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Specialty Food Store From All Stores

Partition for the Hosmer and Lemeshow Test					
Group	Total	spec_fds = 1		spec_fds = 2	
		Observed	Expected	Observed	Expected
1	17,945	22	24.11	17,923	17,920.89
2	19,680	86	55.55	19,594	19,624.45
3	16,958	28	59.99	16,930	16,898.01
4	17,972	67	77.33	17,905	17,894.67
5	18,180	64	97.52	18,116	18,082.48
6	19,971	73	125.59	19,898	19,845.41
7	20,898	87	162.84	20,811	20,735.16
8	18,632	454	425.55	18,178	18,206.45
9	19,717	713	988.19	19,004	18,728.81
10	25,535	12,115	11,692.32	13,420	13,842.68

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
215.5835	8	<.0001

Gas/Grocery Combination:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Gas/Grocery Combination Store From All Stores

Model Information	
Dataset	WORKFILE.BOTH_PERIODS
Response Variable	combo_gas
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Number of Observations Read	196,466
Number of Observations Used	195,488

Response Profile		
Ordered Value	**combo_gas**	**Total Frequency**
1	1	20,332
2	2	175,156

Probability modeled is combo_gas=1.

Class-Level Information		
Class	**Value**	**Design Variables**
ss2	**1**	1
	2	-1
sm2	**1**	1
	2	-1
cs2	**1**	1
	2	-1
co2	**1**	1
	2	-1
mg2	**1**	1
	2	-1
lg2	**1**	1
	2	-1

Gas/Grocery Combination:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Gas/Grocery Combination Store From All Stores

Class-Level Information		
Class	**Value**	**Design Variables**
sg2	**1**	1
	2	-1
sf2	**1**	1
	2	-1
high_sales	**1**	1
	2	-1
Med_high_sales	**1**	1
	2	-1
med_low_sales	**1**	1
	2	-1

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	**Intercept Only**	**Intercept and Covariates**
AIC	130,508.91	94,205.704
SC	130,519.10	94,348.269
-2 Log L	130,506.91	94,177.704

R-Square	0.1696	**Max-rescaled R-Square**	0.3482

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	36,329.2106	13	<.0001
Score	35,749.4857	13	<.0001
Wald	16,734.3293	13	<.0001

Gas/Grocery Combination:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Gas/Grocery Combination Store From All Stores

Type 3 Analysis of Effects			
Effect	**DF**	**Wald Chi-Square**	**Pr > ChiSq**
ss2	1	73.5864	<.0001
sm2	1	198.0099	<.0001
cs2	1	215.3651	<.0001
co2	1	3.7640	0.0524
sg2	1	14.9315	0.0001
mg2	1	24.2905	<.0001
lg2	1	11.7452	0.0006
sf2	1	41.8246	<.0001
Number_staple	1	25.3573	<.0001
high_sales	1	3,299.1927	<.0001
Med_high_sales	1	2,380.7497	<.0001
med_low_sales	1	878.4359	<.0001
Eligible_pct	1	790.7360	<.0001

Analysis of Maximum Likelihood Estimates						
Parameter		**DF**	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Intercept		1	-7.7638	0.6627	137.2682	<.0001
ss2	**1**	1	-3.1116	0.3627	73.5864	<.0001
sm2	**1**	1	-2.2668	0.1611	198.0099	<.0001
cs2	**1**	1	1.2139	0.0827	215.3651	<.0001
co2	**1**	1	-0.1630	0.0840	3.7640	0.0524
sg2	**1**	1	0.3359	0.0869	14.9315	0.0001
mg2	**1**	1	0.4208	0.0854	24.2905	<.0001
lg2	**1**	1	-0.3529	0.1030	11.7452	0.0006
sf2	**1**	1	-0.9253	0.1431	41.8246	<.0001
Number_staple		1	0.2347	0.0466	25.3573	<.0001
high_sales	**1**	1	1.0074	0.0175	3,299.1927	<.0001
Med_high_sales	**1**	1	0.7575	0.0155	2,380.7497	<.0001
med_low_sales	**1**	1	0.4196	0.0142	878.4359	<.0001
Eligible_pct		1	-0.0116	0.000413	790.7360	<.0001

Gas/Grocery Combination:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Gas/Grocery Combination Store From All Stores

Odds Ratio Estimates				
Effect		**Point Estimate**	**95% Wald Confidence Limits**	
ss2	**1 vs 2**	0.002	<0.001	0.008
sm2	**1 vs 2**	0.011	0.006	0.020
cs2	**1 vs 2**	11.335	8.196	15.676
co2	**1 vs 2**	0.722	0.519	1.003
sg2	**1 vs 2**	1.958	1.392	2.753
mg2	**1 vs 2**	2.320	1.660	3.243
lg2	**1 vs 2**	0.494	0.330	0.739
sf2	**1 vs 2**	0.157	0.090	0.275
Number_staple		1.265	1.154	1.386
high_sales	**1 vs 2**	7.500	7.001	8.033
Med_high_sales	**1 vs 2**	4.549	4.281	4.835
med_low_sales	**1 vs 2**	2.314	2.189	2.446
Eligible_pct		0.988	0.988	0.989

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	86.2	**Somers' D**	0.737
Percent Discordant	12.5	**Gamma**	0.746
Percent Tied	1.3	**Tau-a**	0.137
Pairs	3,561,271,792	**c**	0.868

Gas/Grocery Combination:

Results From a Logistic Analysis Predicting Whether the Old Classification Was a Gas/Grocery Combination Store From All Stores

Partition for the Hosmer and Lemeshow Test					
Group	Total	combo_gas = 1		combo_gas = 2	
		Observed	Expected	Observed	Expected
1	19,374	4	3.36	19,370	19,370.64
2	17,743	10	9.19	17,733	17,733.81
3	19,996	47	45.32	19,949	19,950.68
4	19,551	460	241.28	19,091	19,309.72
5	19,505	447	515.20	19,058	18,989.80
6	20,304	1,092	1,015.70	19,212	19,288.30
7	19,250	1,375	1,643.40	17,875	17,606.60
8	18,378	2,645	3,050.25	15,733	15,327.75
9	18,785	4,664	4,394.95	14,121	14,390.05
10	22,602	9,588	9,413.36	13,014	13,188.64

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
355.8529	8	<.0001

Other Retailers:

Results From a Logistic Analysis Predicting Whether the Old Classification Was an Other Retailer From All Stores

Model Information	
Dataset	WORKFILE.BOTH_PERIODS
Response Variable	other
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Number of Observations Read	196,466
Number of Observations Used	195,488

Response Profile		
Ordered Value	**other**	**Total Frequency**
1	1	34,564
2	2	160,924

Probability modeled is other=1.

Class-Level Information		
Class	**Value**	**Design Variables**
ss2	**1**	1
	2	-1
sm2	**1**	1
	2	-1
cs2	**1**	1
	2	-1
co2	**1**	1
	2	-1
mg2	**1**	1
	2	-1
lg2	**1**	1
	2	-1
sg2	**1**	1
	2	-1

Other Retailers:

Results From a Logistic Analysis Predicting Whether the Old Classification Was an Other Retailer From All Stores

Class-Level Information		
Class	**Value**	**Design Variables**
sf2	**1**	1
	2	-1
high_sales	**1**	1
	2	-1
Med_high_sales	**1**	1
	2	-1
med_low_sales	**1**	1
	2	-1

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	**Intercept Only**	**Intercept and Covariates**
AIC	182,400.07	84,010.122
SC	182,410.26	84,152.687
-2 Log L	182,398.07	83,982.122

R-Square	0.3956	**Max-rescaled R-Square**	0.6520

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	98,415.9513	13	<.0001
Score	117,111.917	13	<.0001
Wald	49,975.5486	13	<.0001

Other Retailers:

Results From a Logistic Analysis Predicting Whether the Old Classification Was an Other Retailer From All Stores

Type 3 Analysis of Effects			
Effect	**DF**	**Wald Chi-Square**	**Pr > ChiSq**
ss2	1	3,982.1657	<.0001
sm2	1	3,002.4899	<.0001
cs2	1	7,720.2638	<.0001
co2	1	387.4647	<.0001
sg2	1	5,459.2507	<.0001
mg2	1	4,414.1432	<.0001
lg2	1	2,334.5951	<.0001
sf2	1	2,970.9078	<.0001
Number_staple	1	29.2829	<.0001
high_sales	1	1,099.2517	<.0001
Med_high_sales	1	89.9047	<.0001
med_low_sales	1	173.1579	<.0001
Eligible_pct	1	2,961.9067	<.0001

Analysis of Maximum Likelihood Estimates						
Parameter		**DF**	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Intercept		1	-16.2510	0.2221	5,352.1089	<.0001
ss2	**1**	1	-2.4783	0.0393	3,982.1657	<.0001
sm2	**1**	1	-3.7121	0.0677	3,002.4899	<.0001
cs2	**1**	1	-3.2280	0.0367	7,720.2638	<.0001
co2	**1**	1	-0.7133	0.0362	387.4647	<.0001
sg2	**1**	1	-2.7680	0.0375	5,459.2507	<.0001
mg2	**1**	1	-2.6327	0.0396	4,414.1432	<.0001
lg2	**1**	1	-2.5653	0.0531	2,334.5951	<.0001
sf2	**1**	1	-1.9140	0.0351	2,970.9078	<.0001
Number_staple		1	-0.0796	0.0147	29.2829	<.0001
high_sales	**1**	1	-0.6530	0.0197	1,099.2517	<.0001
Med_high_sales	**1**	1	-0.1721	0.0181	89.9047	<.0001
med_low_sales	**1**	1	-0.1843	0.0140	173.1579	<.0001
Eligible_pct		1	-0.0235	0.000432	2,961.9067	<.0001

Other Retailers:

Results From a Logistic Analysis Predicting Whether the Old Classification Was an Other Retailer From All Stores

Odds Ratio Estimates				
Effect		Point Estimate	95% Wald Confidence Limits	
ss2	1 vs 2	0.007	0.006	0.008
sm2	1 vs 2	<0.001	<0.001	<0.001
cs2	1 vs 2	0.002	0.001	0.002
co2	1 vs 2	0.240	0.208	0.277
sg2	1 vs 2	0.004	0.003	0.005
mg2	1 vs 2	0.005	0.004	0.006
lg2	1 vs 2	0.006	0.005	0.007
sf2	1 vs 2	0.022	0.019	0.025
Number_staple		0.923	0.897	0.950
high_sales	1 vs 2	0.271	0.251	0.293
Med_high_sales	1 vs 2	0.709	0.660	0.761
med_low_sales	1 vs 2	0.692	0.655	0.731
Eligible_pct		0.977	0.976	0.978

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	91.1	Somers' D	0.830
Percent Discordant	8.1	Gamma	0.836
Percent Tied	0.8	Tau-a	0.241
Pairs	5,562,177,136	c	0.915

Partition for the Hosmer and Lemeshow Test					
Group	Total	other = 1		other = 2	
		Observed	Expected	Observed	Expected
1	20,119	70	50.44	20,049	20,068.56
2	18,975	533	329.53	18,442	18,645.47
3	20,250	676	538.46	19,574	19,711.54
4	18,908	1,151	637.75	17,757	18,270.25
5	21,310	882	859.79	20,428	20,450.21
6	19,073	751	948.98	18,322	18,124.02
7	19,627	866	1,249.75	18,761	18,377.25

Other Retailers:

Results From a Logistic Analysis Predicting Whether the Old Classification Was an Other Retailer From All Stores

Partition for the Hosmer and Lemeshow Test					
Group	Total	other = 1		other = 2	
		Observed	Expected	Observed	Expected
8	19,803	2,440	2,344.83	17,363	17,458.17
9	20,923	11,387	12,575.26	9,536	8,347.74
10	16,500	15,808	15,029.21	692	1,470.79

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
1,507.4775	8	<.0001

APPENDIX K

ANALYSIS OF OLD VERSUS NEW STORE-TYPE VARIABLES

The changeover from the old store-type classification system to the new classification system moved a substantial number of retailers into different store-type categories. The reclassification of stores has been documented both in this report and by the Food and Nutrition Service (FNS). In this appendix, we address whether this changeover had an effect on the estimates. The importance of this analysis is to estimate the degree to which the classifications under the new system can substitute for the old, thereby allowing the current estimate trends to continue without interruption. To determine whether the two classification systems result in different estimates, we reverted to using a bootstrapped permutation test. Our approach was as follows:

- A database was created of 178,022 retailers that had both the self-reported store type (old classification) and the FNS-determined store type (new classification).
- A sample database was created from those stores identified by criteria for the current estimate.
- An equiprobable subsample of 3,000 records was extracted from the sample database.
- The subsample was raked to population figures using the five dimensions, with store type being defined by the old store type.
- The same subsample was raked to population figures using the five dimensions, with store type being defined by the new store type.
- The mean was calculated for the new store type, and an interval was calculated as one-tenth of the mean. This interval provided a benchmark for accepting the value of the old store type as being equivalent to the new store-type mean.
- A flag was established to indicate whether the old store-type estimate was less or more than the new store-type mean plus or minus the interval.
- This procedure was repeated 4,000 times, and the following values were calculated:

    - Number and frequency where the new value exceeded the old value by more than 10 percent,
    - Number and frequency where the new value was within plus or minus 10 percent of the old value, and
    - Number and frequency were the new value failed to come within the old value by more than 10 percent.

These numbers provided the percentage of cases that fell outside an acceptable range. In theory, if we used a two-sided test, we would expect 90 percent or more of the differences to fall within plus or minus 10 percent of the mean value generated for the old store-type classification. Exhibit K1 shows the result for the current estimate.

Exhibit K1: Distribution of Differences for Current Redemptions and Store Measures Calculated With New and Old Store-Type Classifications

Type of Measure	Percentage of Values Exceeding Mean Value by 10 Percent	Percentage of Values Within Plus or Minus the Mean Value by 10 Percent	Percentage of Values That Fall Below 10 Percent of the Mean Value
Redemptions	6.28%	91.96%	1.76%
Stores	3.43%	85.29%	11.28%

The data indicate that there appears to be no difference between the means of the redemption estimates using new and old store-type distributions. But there seems to be a difference for the store-based estimates. It should be noted that the effect of size and confidence interval is rather generous, and both would have shown a difference had more restrictive parameters been selected. The fact that the store-based estimate actually shows a difference in which the old value is below the new value probably indicates that the overall shift of stores resulting from the reclassification meant that more stores were categorized in the older classification system into groups that were less likely to traffic. The opposite seems to be true for redemptions.

APPENDIX L

SENSITIVITY OF ESTIMATES TO VIOLATION DEFINITIONS

The estimates derived through the raking procedure for the population of Supplemental Nutrition Assistance Program (SNAP) retailers reflect the sample of suspicious cases. In the most straightforward approach, the sample constitutes all cases in which an undercover investigation was conducted by the Food and Nutrition Service (FNS). This is called the original estimate or approach. The revised estimate adds to the denominator retailers that received a charge letter and to the numerator those that received a permanent disqualification or a civil money penalty in lieu of permanent disqualification. The charge letter therefore defines the retailers in the denominator. The third approach, adopted for the 2002–2005 report, adds FNS Office of the Inspector General (OIG) and State law enforcement bureau (SLEB) cases to the denominator and positive outcomes associated with these investigations to the numerator. It also adds other permanent disqualifications or civil money penalties in lieu of permanent disqualification to both the numerator and denominator if the disqualifications or penalties were not captured in the revised estimates. Finally, to the denominator it adds all closed Watch List cases. The three measures provide estimates that use different assumptions; therefore, they are somewhat different from one another.

It is critical to note that there is some uncertainty about what types of cases should be defined as investigatory; therefore, the size of the denominator for the revised and current estimates could arguably be expanded or contracted. Similarly, the numerator for revised and current estimates is dependent on how trafficking is defined. Clearly, if a retailer traffics with an undercover FNS investigator, it is a violation. It is less clear that permanent disqualification or compensation in lieu of permanent disqualification after the retailer is given a charge letter constitutes trafficking. A case might also be made that any violation, including the selling of ineligible items, is at least a strong indication that the retailer would be willing to traffic and should be included in the numerator of the revised and current estimates.

In this appendix, we explore the sensitivity of trafficking estimates to such variations in definitions using three additional checks that employ differing criteria for inclusion in the numerator or denominator of the current estimate. Exhibit L1 provides the criteria for these checks.

The check labeled “All disqualifications” assumes that retailers that have transacted ineligible buys or otherwise violated SNAP regulations would be willing to traffic. This assumption, for example, infers that a retailer that sells beer or liquor to someone using SNAP benefits would in all likelihood traffic, if given a viable opportunity.

The check labeled “NFA (No Further Action) excepted” assumes that retailers with these designations are not being actively pursued and that there is no reason, after deliberation, to consider them suspicious and no chance to consider them as potential traffickers.

The final check assumes that even among the retailers that are given an NFA status, there is a substantial amount of trafficking occurring. The potential of denoting them as traffickers would never be realized. The assumption was that 18 percent of these retailers trafficked.

Exhibit L2 provides the outcomes of using these definitions in terms of redemptions trafficked and stores trafficking. As is indicated, the amount trafficked is higher in all cases than the current

amount, although the difference becomes notable when 18 percent of the retailers designated as NFA are assumed to have trafficked.[1] Except for that result, the estimates do not exceed two percent of total redemptions, nor are more than one of every eight retailers trafficking.

Exhibit L1: Criteria for Including Retailers as a Suspicious Case and a Violating Case by Estimate Type

Estimate Type	Violating Cases (Numerator)	Suspicious Cases (Denominator)
Original (present definition)	FNS Retailer Investigation Branch (RIB) investigations with a trafficking outcome	RIB investigation
Revised (present definition)	RIB investigation with a trafficking violation or a permanent disqualification or payment of compensation in lieu of permanent disqualification	RIB investigation or an Anti-fraud Locator using EBT Retailer Transactions (ALERT) system-derived case triggering the issuance of a charge letter
Current (present definition)	RIB investigation with a trafficking violation or a permanent disqualification or payment of compensation in lieu of permanent disqualification, or a positive trafficking outcome in an OIG or a SLEB case	RIB investigation or an ALERT system-derived case with the issuance of a charge letter, or an OIG or a SLEB case, or a closed Watch List case, or a permanent disqualification or payment of compensation in lieu of permanent disqualification, or a positive trafficking outcome
All disqualifications	Store disqualified, temporarily or permanently, on the Watch List	Same as current
NFA excepted	Same as current	Same as current except cases designated as NFA on the Watch List are omitted
Random selection of 18% of NFA Watch List retailers assumed trafficking	Same as current with the assumption that 18 percent of the NFA retailers trafficked	Same as current

Exhibit L2: Outcomes Using the Definition Relating to Selection of Retailers Into the Sample

Measure	Annualized Amount of Trafficking	Trafficking Rate	Trafficking Stores	Store Violation Rate
Current measure	$330,080,894	1.03%	17,302	8.25%
All disqualifications	$437,742,358	1.36%	25,545	12.18%
NFA excepted	$494,175,849	1.54%	21,882	10.44%
Random selection of 18% of NFA Watch List retailers assumed trafficking	$2,038,520,217	6.35%	34,980	16.68%

[1] We took three samples for the last random selection measure and averaged the three results. Redemption amounts are annualized.