Where and How: Low-Income Consumer Food Shopping Behavior

Abstract

This paper investigates the food purchase behavior of low-income households across two dimensions: the types of stores they choose to shop at and the frequency of coupon usage for food purchases. Expenditure share analysis shows little difference between income groups in terms of expenditure shares across store types. The main difference occurs between metro and non-metro households. Since metro areas tend to have more grocery stores and fewer supercenters, while rural, non-metro areas tend to have more supercenters, the key result from this section is that non-metro households spend a greater share of their food budget at supercenter and warehouse club stores. We then segment consumers into coupon users and nonusers in order to better understand coupon usage behavior in the ready-to-eat (RTE) cereal market. The results indicate that white, middle-income households with a college education are more prone to redeem coupons. Households in the low-income group are less likely to use coupons, as are households in rural, non-metro areas. Surprisingly, household size is not a significant variable for coupon use in our data, although this is usually an important determinant in the coupon usage literature. Our result is plausible, however, since we use a number of demographic variables as explanatory in this analysis and these other measures may be the true determinants of coupon usage, but may be correlated with household size.

Ephraim Leibtag
Food Markets Branch
Economic Research Service - USDA
eleibtag@ers.usda.gov

Kara Lynch
Texas A+M University and ERS-USDA
klynch@ers.usda.gov

Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Portland, Oregon, July 29-31, 2007

Where and How: Low-Income Consumer Food Shopping Behavior

Food purchase decisions often entail tradeoffs among taste, preference, nutrition, and quality factors to meet spending constraints. Low-income shoppers can stretch their food dollars in a number of ways: shopping in discount food stores, using coupons and other promotions to buy food for a lower price, or, perhaps, by buying and eating less food than higher income shoppers. Nutrition educators and those who manage food assistance programs benefit from knowing just how this economizing behavior occurs, and at what cost to low-income consumers.

This paper investigates the food purchase behavior of low-income households across two dimensions: household food expenditures across different food store types and the frequency of coupon usage for food purchases. There is much interest in where households shop for food since the choice of where to shop will impact both prices paid and products purchased. As the variety of store formats in the retail food industry has expanded, gaining a better understanding of who shops where will help both policymakers and industry analysts better understand consumer behavior. Does income effect channel choice? Do households in urban areas differ in shopping behavior when compared to those in rural areas? The purpose of our investigation into food shopping behavior is to determine whether differences in demographics and socioeconomic factors impact consumers' expenditure shares among channel types.

Coupons, vouchers entitling the holder to a discount, are special price promotions used extensively by food manufacturers and retailers to enhance consumer demand for food products. Coupons are also used as a promotional tool to encourage price-sensitive consumers to try new products or switch for their current brand of choice to an alternative brand. According to *Marketing News*, 79 percent of Americans use coupons. In 2002, 3.8 billion coupons, valued at $3 billion, were redeemed.

Is there a type of consumer who is more apt to use a coupon? What type of consumer is highly associated with sales promotion? We segment consumers into coupon users and nonusers in order to better understand coupon usage behavior in the ready-to-eat (RTE) cereal market using a unique data set that tracks consumer grocery shopping behavior over time and across stores. A better understanding of consumer behavior allows for better understanding of food choices, prices, and consumers' sensitivity to price changes.

Data

This study uses Nielsen Fresh Foods Homescan scanner panel data for 2002 and 2003. The Fresh Foods data are from a consumer panel consisting of about 8,500 households per year across the U.S. and includes purchase and demographic information for each household in the sample. Fresh Foods Homescan panelists record both their fixed weight, UPC-coded transactions, and their random-weight[1] (non-UPC coded) food purchases over the year(s) that they participate in the panel. This sample was used to

measure the entire market basket of household purchases of food for at-home consumption.

Homescan households record food purchases for food-at-home consumption with each household using an electronic home-scanning unit to scan in the purchases of food products that they buy from all retail outlets. The panel is recruited on a permanent basis, subject to turnover from normal attrition.[2] One of the unique features of the Homescan data is that panelists record food purchases across all outlet channels, including grocery, drug, mass, club, supercenter, and convenience stores. The panel is geographically dispersed and is demographically balanced so the sample profile matches the US population as closely as possible.

Household panel data allows for observation of the ongoing purchase habits and practices of household and demographic groups. Along with the description of each product, the information that is captured on a transaction level basis includes: date of purchase, store name and channel type identifier[3], store department identifier[4], item description, brand name, number of units purchased, price paid, promotions/sales/coupons used (if any).

Standard demographic information is collected on an annual basis from each household and each household's home market/city and census region is identified for stratification purposes. Each household is then assigned a projection factor (weight) based on its demographics in order to aggregate the data to be representative at the market, regional, and national level.[5] A stratified sample is used to ensure that the sample of households

matches Census-based demographic and geographic targets. There was no known or intentional clustering in the sample construction. The projection factor (weight) reflects the sample design and demographic distribution within the strata. National and regional level aggregates can be calculated using transaction data from households located in 50 U.S. markets as well as households in non-metro locations that are included in this data set.

We group stores into three aggregate channels: 1) grocery stores, including conventional supermarkets, food/drug combination stores, and superstores[6], 2) supercenters, mass merchandisers, and club warehouse stores (SMCs), and 3) all other stores including drug stores, convenience stores, dollar stores, and military PX stores. Each household's food expenditure per channel is divided by the household's total food expenditure for the year to measure the percent of expenditures by aggregate channel per household total expenditure.

Expenditure Patterns

For a basic snapshot of consumer shopping behavior, we calculate the share of households who shop in each format per year (table 1). Not surprisingly, nearly all households shop in the grocery channel at least one time in a calendar year. The decrease in mass merchandiser penetration can be accounted in part by the replacement of some mass merchandiser stores with supercenters; and some in part to the closures of some mass merchandiser stores. The drug and club channels are relatively consistent between

the two years. A slight decrease in the convenience store channel may be due to the increased number of pay-at-the-pump services.

Table 1 Household Shopping Behavior by Channel

	2002	2003
Channel Type	**Share of households who shop at:**	**Share of households who shop at:**
Grocery	99.64%	99.67%
Drug	69.54%	69.32%
Mass Merchandiser	81.10%	76.96%
Supercenter	41.94%	42.15%
Club Stores	51.02%	50.91%
Convenience Stores	32.96%	30.18%
All Others	86.91%	87.81%

Do these food expenditure patterns differ across household income and location? We calculate expenditure shares by income group for both metro and non-metro households (table 2).[7] This preliminary analysis shows that there is little variation among income groups in channel shopping behavior, however, between metro and non-metro areas, there are noticeable differences in shopping behavior.

Table 2: Expenditure shares by income group by channel, 2003

Location, more than income, drives shopping behavior

Income	**Channel**	**Metro**	**Non-Metro**

Low Income	Grocery	73%	59%
	Drug and Convenience	6%	4%
	Supercenter and Warehouse Clubs	17%	31%
	All Other	10%	9%
Middle Income	Grocery	71%	58%
	Drug and Convenience	5%	5%
	Supercenter and Warehouse Clubs	19%	31%
	All Other	10%	10%
High Income	Grocery	71%	63%
	Drug and Convenience	5%	3%
	Supercenter and Warehouse Clubs	20%	30%
	All Other	9%	6%

Categorical variables are created in order to observe differences in demographics. Income and urbanization are separated as described above. Region is divided into east, west, central, and south. Households are divided into two groups, those with children under 18 years living in the household and those without children. Education is separated into three groups- households with at least one college degree, households with high school diplomas but no college degree, and households without high school diploma or equivalent (GED, general education development). Race is divided into African-American, Asian, Caucasian, Hispanic, and others. (If a household reports being of Hispanic descent, then that household is considered Hispanic, regardless of any other specifications.) Household size is identified numerically by the number of individuals

living in the household; there are nine variables total for household size. Table 3 lists the categorical variables. The variables concerning income and urbanization are studied in this analysis. All other variables are control variables.

Table 3: Variable Definitions

Variable	**Description**
East	Eastern region of the United States
West	Western region of the United States
Central	Central region of the United Stated
South*	Southern region of the United States
Low	Low income group
Middle	Medium income group
High*	High income group
Children	Presence of children under 18 in the household
Nochildren*	No children under 18 in the household
Rural	Rural, non-metro location for household
Metro	Household in one of eight major cities
Nonmajor*	Household in city, which is not a major concentration for data
College	Household has at least one college degree
Highsc	Household has at least one HS degree, no college degree
Nohighsc*	Household does not have a high school degree
Hispa	Hispanic origins, regardless of any other ethnic response
Whi	Caucasian, non-Hispanic ethnicity
Bla	African-American, non-Hispanic ethnicity
Asi	Asian, non-Hispanic ethnicity
Other*	Other non-Hispanic ethnicity

Oneh	One member household
Twoh	Two member household
Threeh	Three member household
Fourh	Four member household
Fiveh	Five member household
Sixh	Six member household
Sevenh	Seven member household
Eighth	Eight member household
Nineh*	Nine member household

* Indicates variable omitted to avoid singular matrix

Empirical Estimation of Expenditure Patterns

We estimate the following model for the grocery and SMC channels:

Expenditure share by channel per household = f(household size, region, income group, presence of children, urbanization, education level)

Specific hypotheses to be tested are:

H0: Low-income effect grocery = low-income effect SMC

H0: Middle income effect grocery = middle income effect SMC

H0: Rural urbanization effect grocery= rural urbanization effect SMC

H0: Metro urbanization effect grocery = metro urbanization effect SMC

These four hypotheses are tested for the expenditure data and an F test is used to test each joint hypothesis. The empirical analysis provides expected results for most of the

variables in the expenditure equations. Greater penetration of the SMC channel by households in non-metro areas was expected and is observed. Little variation among income groups is expected due to the preliminary analysis. This is also observed (table 4).

All three regions, east, west, and central, are significant. The region of the United States in which the household is located has a positive impact on grocery expenditures and negative impact on supercenter/mass market merchandiser expenditure when compared to the south region. These results are not surprising given the concentration of supercenters in the south.

The metro versus non-metro variables are both significant. The non-metro (rural) variable has a negative impact on the grocery channel and a positive impact on SMC. The reverse is true for the metro (major markets) variable. This is expected. Metro areas tend to have more grocery stores and less mass merchandisers and supercenters. The rural, non metro areas tend to have more supercenters. Also, households may have to travel greater distances to retail stores, thus shopping at supercenters and mass merchandisers instead of grocery stores.

Table 4: Estimation results for household expenditures by channel

	Grocery Expenditures				SMC Expenditures			
	Estimate	Std Error	t value	p-value	Estimate	Std Error	t value	p-value
Intercept	1.562932	0.158338	9.87	<.0001	0.474158	0.100488	4.72	<.0001
East	0.156744	0.016645	9.42	<.0001	-0.12677	0.010563	-12	<.0001

West	0.095361	0.016591	5.75	<.0001	-0.03385	0.010529	-3.21	0.0013
Central	0.092876	0.017652	58.26	<.0001	-0.11599	0.011203	-10.35	<.0001
Low	-0.10251	0.018927	-5.42	<.0001	-0.05491	0.012012	-4.57	<.0001
Middle	-0.03968	0.015656	-2.53	0.0113	-0.00781	0.009936	-0.79	0.4318
Children	0.021805	0.02134	1.02	0.3069	-0.0199	0.013544	-1.47	0.1419
Rural	-0.04967	0.02145	-2.32	0.0206	0.082983	0.013613	6.1	<.0001
Metro	0.098117	0.015741	6.23	<.0001	-0.06709	0.00999	-6.72	<.0001
College	-0.14058	0.047575	-2.95	0.0031	-0.01429	0.030193	-0.47	0.636
Hisghsc	-0.12081	0.046905	-2.58	0.01	0.014007	0.029768	0.47	0.638
Hispa	-0.08057	0.049482	-1.63	0.1035	-0.01754	0.031403	-0.56	0.5764
Whi	0.045393	0.045403	1	0.3174	0.025289	0.028815	0.88	0.3802
Bla	-0.14858	0.047854	-3.1	0.0019	-0.08869	0.03037	-2.92	0.0035
Asi	-0.25495	0.057922	-4.4	<.0001	-0.04003	0.03676	-1.09	0.2762
Oneh	-0.98937	0.14369	-6.89	<.0001	-0.223	0.091192	-2.45	0.0145
Twoh	-0.69643	0.143318	-4.86	<.0001	-0.0916	0.090956	-1.01	0.3139
Threeh	-0.55444	0.142735	-3.88	0.0001	-0.01352	0.090586	-0.15	0.8813
Fourh	-0.4358	0.142561	-3.06	0.0022	0.04423	0.090476	0.49	0.625
Fiveh	-0.32261	0.143727	-2.24	0.0248	0.140719	0.091216	1.54	0.1229
Sixh	-0.30961	0.147402	-2.1	0.0357	0.116603	0.093548	1.25	0.2126
Sevenh	-0.13226	0.157753	-0.84	0.4018	0.192251	0.100117	1.92	0.0549
Eighth	-0.19719	0.183311	-1.08	0.2821	0.459676	0.116337	3.95	<.0001

The hypotheses tests are all significant at the one percent level for the expenditure equations (table 5). To interpret, reject the hypotheses that the low-income effect for groceries equals the low-income effect for the SMC. In other words, there are differences in household channel behavior based on income and based on urbanization.

Table 5: Results of hypotheses testing

Parameter		F-Value	P-value
Expenditure	Low	27.13	0.0001
	Middle	27.55	0.0001
	Rural	22.38	0.0001
	Metro	39.15	0.0001

Implications of Expenditure Analysis

Expenditure share analysis provides expected results for most of the demographic and geographic variables. What is surprising is that there is little difference between income groups in terms of expenditure shares across store types. Rather, the main difference occurs between metro and non-metro households. Since metro areas tend to have more grocery stores and fewer supercenters, while rural, non-metro areas tend to have more supercenters, the key result from this section is that non-metro households spend a greater share of their food budget at supercenter and warehouse club stores. This is one reason why these households pay lower prices, on average, for food as compared to metro households.

The analysis of the channel types and characteristics of households does present insight on the types of households that choose certain channels for food. Both income and urbanization have effects on choice of channel for the household.

Breakfast Cereal Coupon Usage

Our empirical analysis of coupon usage evaluates the binary choice of whether to buy RTE cereal, and for those who do buy cereal, the level (amount) of coupon usage for RTE cereal. A probit model for binary responses is used for the discrete choice in this analysis. The response probability is the standard normal cdf evaluated at a linear function of the explanatory variables (Wooldridge, 2003). In general form, the probit model is:

$$F(z) = \Phi(z) \equiv \int_{-\infty}^{z} \phi(v)dv$$

where $\phi(z) \equiv$ standard normal distribution.

The tobit procedure is used to account for the fact that coupon usage is censored in this data. It is necessary to account for consumers who do not use any coupons when purchasing RTE cereal. Because of this latent variable, the correction procedure of the tobit model is necessary. The actual estimated equation for the tobit model is:

$$Y_i = \alpha + \beta X_i + \varepsilon_i$$

The tobit model allows for the non-purchasing household observations to be used, and thus eliminates the zero-use selection bias (Pindyck and Rubinfeld, 1998). OLS would result in biased results. The tobit model fits a binary probit model for the probability that the dependent variable is positive and uncensored, and then uses that probability model to correct a regression model for the dependent variable (Elliot, Jr. 2003). The tobit model eliminates bias caused by censoring on the dependent variable.[8] A weakness of the tobit

model is that it assumes that the decision to consume is the same as the decision about how much to consume. This assumption is problematic because it may hamper the understanding of the true behavioral patterns.[9]

As is conventional with these procedures, the decomposition effects are also analyzed. According to McDonald and Moffit (1980), the tobit procedure can determine both changes in probability of being above the limit and changes in the values of the dependent variable.[10]

Our analysis, though similar to the analysis of Goodwin (1992), which also uses the tobit procedure, uses data contained in a single data set, containing information on a nationally representative set of households throughout the United States, including purchases from stores in all retail grocery channels. The tobit procedure is used in this analysis of a more extensive, more recent dataset to offer a broader scope and understanding of coupon usage.

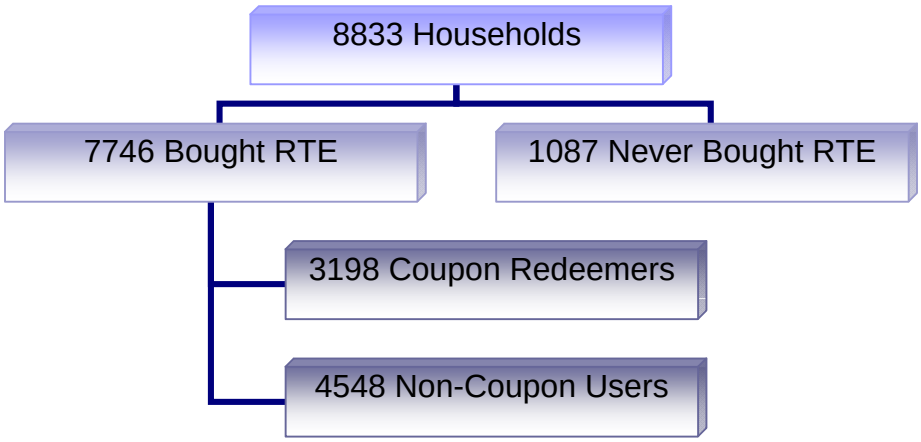
Coupon Data

Ready-to-eat cereal is the category of food used in this analysis and has been chosen because 93 percent of households purchase RTE cereal (Nielsen) and RTE cereal is the most highly couponed product. Both of these factors make it an ideal product to study for consumer purchase behavior and coupon usage. Figure 1 shows the breakdown of the

data by household consumers of RTE cereal and their use or non-use of coupons for cereal.

The ready-to-eat (RTE) cereal market is a highly concentrated oligopoly with the top four companies accounting for 84 percent of all RTE cereal sales[11] and offering about 200 varieties. It is one of the top five revenue-generating categories in the dry goods grocery industry (Dube, 2004). It is also one of the most heavily couponed products (Nevo and Wolfram, 2002), with company couponing expenditures averaging between 17 to 20 percent of sales (Price, 2000). Studies on consumer behavior and purchases of RTE cereal indicate that low-income shoppers purchase more private-label products than middle and high income groups and this may explain part of the difference in coupon usage across income groups since private label cereals may be lower priced and offer fewer coupons than branded cereal (Leibtag and Kaufman, 2003).

Figure 1: Cereal and Coupon Usage



Estimation Procedures

Categorical variables are created in order to observe differences in demographics as described above. Households are divided into two groups, those with children under 6 years living in the household and those without young children. It is hypothesized that households with young children do not use coupons due to the additional time restraints that the young children require. Households are classified as single-head or dual-head households. Similar to the hypothesis about young children, it is hypothesized that single head households are not as prone to coupon redemption due to additional time constraints. Households are also classified as employed or unemployed. If the household has two heads, then both heads must be unemployed in order for the household to be classified as unemployed. The dataset does not distinguish between unemployed and retired, so it is important to note that the unemployed households may be retired and receiving additional income from sources such as pensions. In order to help identify retired households, an age component is added. The household is classified as old if any member of the household is 65 years or older. The agemiddle group contains any house with a member between 45 and 65 years and the ageyoung category contains households in the typical child-rearing years up to 45 years of age (table 6).

Table 6: Variable Definitions

Variable	**Description**
East	Eastern region of the United States

West*	Western region of the United States
Central	Central region of the United Stated
South	Southern region of the United States
Incl	Low income group
Incm	Medium income group
Inch*	High income group
Young	Presence of children under 6 in the household
Noyoung*	No children under 6in the household
Non-metro	Rural, non-metro location for household
Metro	Household in one of eight major cities
Nonmajor*	Household in city, which is not a major concentration for data
College	Household has at least one college degree
Highsc	Household has at least one HS degree, no college degree
Nohighsc*	Household does not have a high school degree
Hispa	Hispanic origins, regardless of any other ethnic response
Whi	Caucasian, non-Hispanic ethnicity
Bla	African-American, non-Hispanic ethnicity
Asi	Asian, non-Hispanic ethnicity
Other*	Other non-Hispanic ethnicity
Oneh	One member household
Twoh	Two member household
Threeh	Three member household
Fourh	Four member household
Fiveh	Five member household
Sixh	Six member household
Sevenh	Seven member household
Eighth	Eight member household

Nineh*	Nine member household
Single	Single head of household
Unemp	Unemployed and/or retired
Old	Head of house 65 years or older
Agemiddle*	Head of house between 45 and 65 years of age
Ageyoung	Head of house 44 and younger

* Reference variable; Indicates variable omitted to avoid singular matrix

The probit model is estimated, using the equation:

RTE cereal = f(region, presence of young children, urbanization, income, education, household size, ethnicity, number of heads of household, employment status, age of head of house)

The results of the probit analysis generate predicted values for the probability of buying RTE cereal. These probabilities are calculated using the equation:

$$p = \Phi(\beta' x)$$

These predicted probabilities are used in the analysis of the tobit method. The probit model allows for all 8,833 households to be incorporated into the analysis. This is important because the data is weighted to be nationally representative of census data.

The tobit method is estimated with maximum likelihood using the equation:

Coupon use = f(region, presence of young children, urbanization, income, education, household size, ethnicity, , number of heads of household, employment status, age of head of house, predicted probability of purchasing RTE cereal)

The model assumes an asymptotically normal distribution.

Coupon Usage Results

The summary statistics show that 87 percent of the sample's households purchased RTE cereal at least once (table 7). Of the 87 percent who purchased RTE cereal, 41 percent (36 percent of the entire sample) used coupons on the RTE cereal purchases. Overall, the average household saves $4.00 per year through cereal coupon redemption, but this average includes all cereal buyers; for the households that redeem the coupons, the average is more than double— $10.11 per year.

For the households that do not purchase RTE cereal, there are more single person households and more households that fall into the 65+ age group. A study by the Gale Group reports that young singles under the age of 35 and childless couples under the age of 35 spend less on RTE cereal (Magelonsky, 1998). The households' sizes are smaller and fewer have young children than the households that do purchase cereal.

Table 7: Weighted descriptive statistics by RTE cereal and coupon use

	All		**RTE**		**No RTE**		**RTE**		**RTE No**

			Buy				Coup		Coup
Variable	**Mean**		**Mean**		**Mean**		**Mean**		**Mean**
Hhsize	2.5737		2.6906		1.7037		2.8174		2.6075
East	0.1907		0.1864		0.2228		0.2103		0.1708
Central	0.2328		0.2339		0.2247		0.2458		0.2261
South	0.3657		0.3716		0.3213		0.3396		0.3926
West	0.2108		0.2080		0.2312		0.2043		0.2105
Young	0.1218		0.1338		0.0320		0.1518		0.1220
Non-metro	0.2558		0.2560		0.2547		0.2217		0.2781
Metro	0.2642		0.2610		0.2883		0.2822		0.2470
Inch	0.1908		0.1946		0.1624		0.2154		0.1810
Incm	0.5181		0.5230		0.4815		0.5667		0.4944
Incl	0.2911		0.2824		0.3561		0.2179		0.3246
College	0.3392		0.3318		0.3946		0.3740		0.3042
Hichsc	0.6300		0.6397		0.5577		0.6040		0.6631
Noschool	0.0308		0.2849		0.0477		0.0220		0.0327
Whi	0.7571		0.7490		0.8176		0.8051		0.7122
Bla	0.1127		0.1188		0.0679		0.0859		0.1403
Asi	0.0196		0.1810		0.0307		0.0127		0.0216
Oth	0.0186		0.0191		0.0147		0.0137		0.0226
Hispa	0.0920		0.0950		0.0692		0.0825		0.1032
Couponsav	3.9982		3.9982		0		10.1065		0
Single	0.4676		0.4337		0.7198		0.3763		0.4713
Unemp	0.4821		0.4804		0.4943		0.4991		0.4683
Old	0.2085		0.1959		0.3023		0.2068		0.1887
Ageyoung	0.3397		0.3584		0.2007		0.3679		0.3522
Agemid	0.4518		0.4457		0.4969		0.4253		0.4591

Oneh	0.2619		0.2249		0.5370		0.1789		0.2550
Twoh	0.3243		0.3242		0.3253		0.3177		0.3284
Threeh	0.1643		0.1770		0.0697		0.1900		0.1685
Fourh	0.1419		0.1543		0.0493		0.1852		0.1341
Fiveh	0.0698		0.7780		0.0102		0.0947		0.0667
Sixh	0.0213		0.0236		0.0046		0.0217		0.0248
Sevenh	0.0088		0.0098		0.0016		0.0073		0.0115
Eighth	0.0055		0.0061		0.0011		0.0033		0.0080
Nineh	0.0022		0.0023		0.0013		0.0013		0.0030
n	8833		7746		1087		3198		4548

The households that use coupons have, on average, a larger number of young children, with higher education, and higher incomes. There are fewer coupon redeeming households in the western region.

Table 8: Tobit estimates

Variable	Normalized Coefficient	Asymptotic Std Error	Asymptotic t-ratio
East	0.3566	0.0403	8.8522**
Central	0.1260	0.0451	2.7965**
South	0.0697	0.0391	1.7826*
Young	-0.0462	0.0516	-0.8953
Non-Metro	-0.1628	0.0477	-3.4147**
Metro	0.0213	0.0343	0.6204
Incl	-0.1386	0.0484	-2.8617**
Incm	-0.0019	0.0327	-0.0584

College	0.2265	0.1093	2.0729**
Highsc	0.1364	0.1119	1.2187
Oneh	-0.2006	0.3202	-0.6266
Twoh	0.0736	0.3015	0.2442
Threeh	0.2265	0.3015	0.7520
Fourh	0.3813	0.3012	1.2669
Fiveh	0.4236	0.3009	1.3901
Sixh	0.4946	0.3116	1.5874
Sevenh	0.4272	0.3325	1.2848
Eighth	0.1163	0.3967	0.2930
Hispa	0.1450	0.1197	1.2110
Whi	0.4090	0.1074	3.8081**
Bla	0.0432	0.1126	0.3841
Asi	0.1319	0.1597	0.8257
Single	-0.0803	0.0560	-1.4352
Unemp	0.1252	0.0311	4.0276**
Old	0.0705	0.0391	1.8055*
Ageyoung	0.0249	0.0428	0.5826
Phat2	-0.2472	0.7460	-0.3314
Intercept	-1.0089	0.7574	-1.3321

**Indicates significance at the 1% level
*Indicates significance at the 10% level

The tobit parameter estimates for the probability of coupon use show that the East and Central regions, college education, white, and unemployed/retired/homemaker variables all have positive significance at the 1 percent level (table 8); South region and households 65 and older have positive significance at the 10 percent level. Non-metro and low-income households have negative significance at the 1 percent level.

The results indicate that white, college educated households are more likely to use coupons. When there is at least one unemployed individual in the house, the household is more likely to use coupons. The unemployed variable also includes retired and homemakers in this classification. Households with a head over the age of 65 are more likely to use coupons.

Households in the low-income group are less likely to use coupons, as are households in rural, non-metro areas. Households in the west are less likely to use coupons than households in other regions. Coupon usage is greatest for households in the east, followed by central and then south. Household size is not a significant factor in a household's coupon usage.

Coupon redemption seems most likely among older, white, college educated, and unemployed households in metro areas. Low-income households in non-metro areas are the least likely to redeem coupons. Other factors, which are not significant, that decrease the likelihood of coupon redemption are single headed households and households with young children.

The marginal effects show the impact of the demographic variables on coupon usage (table 9). The total change corresponds to the marginal effect of the entire sample and the change above the limit corresponds to the effect on only the households that redeem coupons. Note that the marginal effects show the expected yearly changes in coupon

redemptions for RTE cereal. A household residing in a non-metro (rural) area has an expected amount of coupon use that is $1.05 lower for the entire sample and $1.10 lower for those households which redeem coupons. A low-income household has an expected amount of coupon use that is $0.89 lower for the entire sample and $0.94 lower for those households which redeem coupons. A white household has an expected amount of coupon use that is $2.63 higher for the entire sample and $2.76 higher for those households that redeem coupons.

Table 9: Marginal changes for tobit estimations

VARIABLE	Total Change: All	Change above the Limit: Coupon Users
EAST	2.2908	2.4103
CENTRAL	0.8093	0.8515
SOUTH	0.4476	0.4709
YOUNG	-0.2966	-0.3121
NON-METRO	-1.0457	-1.1002
METRO	0.1368	0.1439
INCL	-0.8901	-0.9366
INCM	-0.0123	-0.0129
COLLEGE	1.4550	1.5309
HIGHSC	0.8760	0.9217
ONEH	-1.2886	-1.3558
TWOH	0.4729	0.4976

THREEH	1.4550	1.5309
FOURH	2.4489	2.5766
FIVEH	2.7208	2.8627
SIXH	3.1772	3.3429
SEVENH	2.7442	2.8873
EIGHTH	0.7467	0.7856
HISPA	0.9314	0.9799
WHI	2.6269	2.7638
BLA	0.2776	0.2921
ASI	0.8470	0.8911
SINGLE	-0.5158	-0.5427
UNEMP	0.8039	0.8459
OLD	0.4532	0.4768
AGEYOUNG	0.1602	0.1685
PHAT2	-1.5880	-1.6708
SIGMA	20.7740	
COUPONSAV	**431.57**	
z Tobit	-0.5245	
f(z) Tobit	0.3477	
F(z) Tobit	0.3092	
E(Y)	3.8540	
E(YSTAR)	12.4645	

Conclusion and Implications

Leibtag and Kaufman (2003) show that low-income households economize on food by buying some products on sale, a greater proportion of private-label products, and less expensive varieties of meats, fruits, and vegetables. However, low-income households do not seem to shop more frequently at discount-type stores after we control for other demographic and geographic characteristics. This result may be partly due to the grouping of both supercenters and warehouse clubs under the same category, while further analysis that separates these two categories may provide additional insight.

Of the 87 percent of households who purchased breakfast cereal, 41 percent used coupons in their purchases. The average coupon-using household saved $10.11 per year and a key determinant of usage was the presence of young children in the household. Coupon users also have a college education, higher income, and at least one unemployed adult in the household. Households over the age of 65 are more likely to use coupons. Those least likely to redeem coupons are low-income households in non-metro areas.

Comparing across household location shows that a coupon-redeeming household in a non-metro area redeems $1.10 less in coupons than metro households, while low-income coupon-redeeming households redeems $0.94 less than middle-income households. Coupon redemption seems most likely among older, white, college educated, and unemployed households in metro areas. Low-income households in non-metro areas are the least likely to redeem coupons. Other factors, which are not significant, that decrease

the likelihood of coupon redemption are single headed households and households with young children.

The results indicate that white, middle-income households with a college education are more prone to redeem coupons. Households in the low-income group are less likely to use coupons, as are households in rural, non-metro areas. This implies that low-income households do not use coupons as a major cost-saving method, but rather find other methods for saving on their food purchases.

The results of this analysis build from previous work on coupon usage in the RTE cereal market, but provide more insight into the types of households who are coupon redeemers. White, middle income households with a college education are more prone to redeem coupons. This analysis shows that older households use more coupons. New information is gained about urbanization and region of the coupon users. Surprisingly, household size does not play a significant role in the use of coupons. This finding, though, makes sense given the wide range of other demographic variables used in the analysis that may not have been accounted for in previous studies.

The other noteworthy result is in terms of low-income households. In theory, low-income households would be expected to use coupons if they are more price sensitive due to budget constraints, however our results do not show this to be true. One explanation for this result is that low-income households purchase more private label products, thus reducing their coupon redemption since private label products are usually sold at a lower

price, but without coupons. Forty-three percent of low-income households purchase private-label cereal versus twenty-nine percent of middle-income households and this difference may explain our findings (table 10). Additional analysis of private label versus branded products and coupon redemption is an area for further study.

Table 10: Percent of RTE cereal purchased by income groups

	Low Income	Middle Income	High Income
Branded RTE cereal	78%	86%	83%
Private label RTE cereal	**43%**	**29%**	33%

Other areas for further research include investigating whether coupons are used when other price promotions, such as sales are in effect. If multiple promotions are used, this may indicate that retailers and producers coordinate coupon dispersion and sale promotions. Nevo and Wolfram (2002) suggest that coupons are means to induce repeat purchases of a product. The information on the type of consumers who use coupons can be combined with the data to validate Nevo's claim. With the improved datasets on consumer behavior, and the advances in scanner data technology at the retail and manufacturing level, the area of research in coupons is rich with additional questions that can enhance our understanding of consumer food shopping and purchase decisions.

References

Bawa, Kapil and Avijit Ghosh (1999). "A Model of Household Grocery Shopping Behavior." *Marketing Letters*, 10:2: 1999, p. 149-160.

Bawa. K. and R. W. Shoemaker (1987). "The Coupon-Prone Consume: Some Findings Based on Purchase Behavior Across Product Classes." *Journal of Marketing* 51 (October): 99-109.

Blattberg, B., *et al* (1978), "Identifying the Deal Prone Segment." *Journal of Marketing Research* 15 (August): 369-377.

Cotterill, R. and A. Franklin. The Urban Grocery Store Gap. Food Marketing Policy Center, University of Connecticut, 1995.

Department of Health and Human Services, Poverty Guidelines, http://aspe.hhs.gov/poverty/figures-fed-reg.shtml, viewed October 9, 2005.

Dong, D. S. and H. M. Kaiser (2005). "Coupon Redemption and Its Effect on Household Cheese Purchases." *American Journal of Agricultural Economics* **87**(3): 689-702.

Dube, J.P. (2004) Multiple Discreteness and Product Differentiation: Demand for Carbonated Soft Drinks, *Marketing Science*, 23(1), pp. 66-81.

Elliot, Jr., Frank. "Heckman's Two-Step Method: A Technique for Modeling with Censored Data." Fair Isaac Corporation, 2003.

Garretson J. A. and S. Burton (2003). "Highly Coupon and Sale Prone Consumers: Benefits Beyond Price Savings." *Journal of Advertising Research*, June: 162-172.

Gejdenson, S. and C. Schumer (1999). "Consumers in a Box: A Consumer Report on Cereal." *Agribusiness* 15(2): 207-218.

Goodwin, B. K. (1992). "An analysis of factors associated with consumers' use of grocery coupons." Journal of Agricultural and Resource Economics **17**(1): 110-120.

Johnston, J., and Dinardo, J. (1997). *Econometric Methods.* Fourth Edition. New York: McGraw-Hill

Kolodinsky, Jane and Michele Cranwell. "The Poor Pay More? They Don't Even Have a Store to Choose From: Bringing a Supermarket Back to the City." *Consumer Interests Annual*, 46: 2000.

Lancaster, Kelvin J. "A New Approach to Consumer Theory." *Journal of Political Economics*, 74(2): 1966, p. 132-157.

Leibtag, E. S. and P. R. Kaufman (2003). "Exploring Food Purchase Behavior of Low-Income Households: How Do They Economize?" *Current Issues in Economics of Food Markets*, Agriculture Information Bulletin No. 747-07, June.

Lempert, Phil, editor. "Mid-Year Channel Blurring Update - A Calm Before the Storm?" Facts, Figures, and the Future. Nielsen and FMI, November 2003.

Magelonsky, M. (1998) "Checkout Line: The Breakfast for Everyone- Cereal Buying, Consumption." *American Demographics* Feb.

McDonald, J.F. and R.A. Moffit (1980). "The Use of Tobit Analysis." *Review of Economics and Statistics.* 62:318-321.

Messinger, P.R. and C. Narasimhan. "Has Power Shifted in the Grocery Channel?" Marketing Science, Vol 14 (2): 1995, p. 189-223.

Montgomery, D. B. (1971). "Consumer Characteristics Associated With Dealing: An Empirical Example." *Journal of Marketing Research* 8(February): 118-20.

Narasimhan, C. (1984). "A Price Discrimination Theory of Coupons." *Marketing Science* 3(2):128-147.

Nevo, A. and C. Wolfram (2002). "Why do manufacturers issue coupons? An empirical analysis of breakfast cereals." *RAND Journal of Economics* 33(2): 319-339.

Nielsen, A. C. Jr. (1965). "The Impact of Retail Coupons." *Journal of Marketing* 29(4):11-15.

Park, K. and M. Gomez (2004). "The Coupon Report: A Study of Coupon Discount Methods." Food Industry Management: Cornell University, March.

Pindyck, R.S. and D.L. Rubinfeld (1998). *Econometric Models and Economics Forecasts, 4th ed.* Irwin McGraw-Hill. Boston, MA.

Price, G. K. (2000). "Cereal Sales Soggy Despite Price Cuts and Reduced Couponing." *Food Review* 23(2):21-28.

Reibstein, D. J. and P. A. Traver (1982), "Factors Affecting Coupon Redemption Rates." *Journal of Marketing* 46 (Fall):102-113.

Shaffer, G. and Z.J. Zhang (1995). "Competitive Coupon Targeting." *Marketing Science* 14(4): 395-416.

Shimp, T. A. and A. Kavas (1984). "The Theory of Reasoned Action Applied to Coupon Usage." *Journal of Consumer Research*, 11(December): 795-809.

Uhl, J. N. (1982). "Cents-Off Coupons - Boon or Boondoggel for Consumers." Journal of Consumer Affairs **16**(1): 161-165.

Webster, F.E. Jr. (1965). "The "Deal-Prone" Consumer." *Journal of Marketing Research* 11 (May): 186-189.

[1] An example of a fixed weight item is a box of cereal. An example of a random weight item is a pound of steak from the butcher department of the store.

[2] Households lost through attrition are replaced with others having similar demographic characteristics.

[3] Grocery, Drug, Mass Merchandiser, Supercenter, Club, Convenience, Other (including dollar stores, bakeries, military stores, online purchases, health food stores, and vending machines)

[4] Dry Grocery, Dairy, Frozen-Produce-Meat, Random Weight.

[5] Age, gender, education, occupation, of head(s) of household, number of household members, household income, household composition, race, and ethnicity.

[6] A larger version of a conventional supermarket with added services and departments.

[7] This table uses the weighted data. A projection factor is used which makes the data nationally representative of Census data.

[8] The Heckman method is a procedure used to correct for sample selection bias due to incidental truncation of nonrandom missing data. The Heckman method uses the Mills Ratio as the tool for controlling bias due to the censorship. The Heckman method removes the bias in regression weight calculation due to censorship (in this case, the non-coupon purchase of RTE cereal). Both the tobit and the Heckman procedures correct for bias resulting from the zero coupon usage. The Heckman method eliminates the bias caused by censoring on a variable correlated to the dependent variable. The structure of this analysis dictates the tobit as the appropriate procedure.

[9] Johnston and Dinardo (1997) offer that there is no consensus among analysts on the value of selectivity bias correction methods or when their use is appropriate.

[10] Due to the common practice of the procedures of McDonald and Moffit, they will not be discussed in this paper. See McDonald and Moffit (1980) for more detail.

[11] The top three companies control 77.1 percent of the market (Gejdenson and Schumer, 1999).