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Coupons and Manufacturer Market Shares: A Brand-Level Analysis of the Ready-to-Eat Breakfast Cereal Market

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This study builds on a theory-consistent demand system, namely the Almost Ideal Demand System, utilizing the Nielsen Homescan Panel data on household purchases, and models potential effects of coupons on market shares of related ready-to-eat breakfast cereal brands. The results emerging from this brand-level analysis reveal an important link between coupons and brand market shares. Specifically, based on the coupon elasticities of market shares derived in this study, coupons are found to have contributed to expanding national brand market shares, while not affecting those for private labels.

Key words: Almost Ideal Demand System, Coupons, National Brands, Private Label, Ready-to-Eat Breakfast Cereal

Coupons have emerged as an increasingly popular sales promotion tool contributing to firm revenue enhancement. They have found remarkable acceptance among both manufacturers and retailers, and are second only to shelf price reductions (Sethuraman and Mittelstaedt, 1992). Specifically, the annual value of coupons for consumer-packaged goods distributed among consumers peaked at an all-time high of $329 billion in 2013, $3.7 billion of which was actually redeemed (Inmar Inc., 2014). Despite this relatively low redemption rate, according to a survey conducted by Inmar in 2014, around 94% of consumers redeem coupons for a number of reasons. The two major categories of coupons are manufacturer coupons and store coupons, which are distributed to customers in a variety of methods such as mobile, paper, online, and electronically. Manufacturer coupons are issued by producers with a goal of promoting their own brand sales at different retail stores. In contrast, store coupons tend to be store-specific and can apply to both manufacturer and store brands (Montaldo, 2017). Despite the overarching goal of promoting sales and enhancing revenues, coupons can also be utilized for more specific purposes such as price discrimination (Narasimhan, 1984); brand switching (Haugh, 1983); brand loyalty (Dodson, Tybout, and Sternhal, 1978); and increased awareness for new products (Blattberg, Eppen, and Lieberman, 1981).

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The recent rise in coupons sparked considerable interest among various participants of the food marketing system, policy makers, and researchers alike. Ample interest in research circles has focused on the effectiveness of coupons in promoting product sales, expanding customer base, and increasing product market shares (Lee and Brown, 1985; Neslin, 1990; Sethuraman and Mittelstaedt, 1992; Raju, Dhar, and Morrison, 1994; Cotterill and Haller, 1997; Cotterill, Putsis, and Dhar, 2000; Dong and Kaiser, 2005; Bouhlal and Capps, 2012). Despite the colossal research effort devoted to studying the importance of coupons, there is a lack of evidence as to how *brand-level* market shares may be impacted by coupons. What makes the brand-level effects important is the changing competitive retail landscape with private labels (products manufactured for sale under a retailer's own brand name i.e., Great Value as a private label brand of Walmart) posing a potent threat to national brands across many industries. In the consumer-packaged goods market, for example, private labels reached 16.6% of the $725 billion total sales in 2014 after a remarkable growth in recent years (Information Resources, Inc. (IRI), 2015). The importance of inter-brand competition cannot be overstated given the potential beneficial effects thereof on price levels, product variety, and, ultimately, consumer welfare (Volpe, 2011).

As is revealed by a recent IRI survey, coupon effectiveness is closely related to consumer perceptions of private labels relative to national brands. Specifically, 70% of consumers surveyed indicate a strong desire for private labels because of their more affordable prices and the general perception of qualitative equivalence between the former and national brands. However, coupons have a great potential to steer consumers toward national brands (IRI, 2015). In fact, almost 98% of coupons have been redeemed when purchasing national brands of cereal 2012-14 (Kilts Center for Marketing, 2016). The current study has three distinguishing characteristics. First, it provides an empirical investigation of the relationship between coupons and brand-level market shares in ready-to-eat (RTE) breakfast cereal market, with allowance made for potential differential effects across national brand and private label cereals. Second, our empirical framework draws on a theory-plausible demand system, namely the Almost Ideal Demand System (AIDS), with coupons embedded therein. The AIDS demand specification has a particular appeal in expressing the explained variables in terms of brand-specific market shares, an analytical convenience when deriving coupon elasticities. Third, potential cross-brand effects of coupons are incorporated into our model, which allows for the evaluation of the competitive atmosphere through cross-brand coupon elasticities.

The results emerging from a brand-level analysis reveal an important link between coupons and brand market shares. Specifically, the coupon elasticities of market shares are shown to have contributed to expanding national-brand market shares, while leaving

those for private labels unaffected.

The remainder of this study is structured as follows. The next section provides the methodology for estimating the effects of coupons on brand market shares and derives coupon elasticity of brand market shares. The subsequent section briefly discusses the Nielsen Homescan Panel data on household purchases underlying the empirical analysis, followed by the estimation procedure and the results. The final section provides concluding remarks along with recommendations for future research.

Methodology

In this section, we provide a brief description of the methodology used to quantify the effects of coupons on brand market shares. It builds on the AIDS demand specification with own-brand coupons and those of related brands incorporated therein. Coupon elasticities of market shares derived from this framework can serve as a valuable tool for examining the effectiveness of this promotional tool in enhancing firm profits, as well as the competitive atmosphere between brands under study.

The Almost Ideal Demand System offered by Deaton and Muellbauer (1980) has been a workhorse model in consumer behavior analyses. The basic appeal of this specification is its simplicity in providing a first-order approximation to an arbitrary demand system representing utility-maximizing behavior. More specifically, consumer preferences are represented by the following indirect utility function, *lnV* (i.e., price independent and generalized logarithmic preferences):

$$\ln V = \frac{\ln(X) - \ln(P)}{b(p)}, \tag{1}$$

where *X* is the total consumer expenditures on the cereal brands under study, *ln(P)* and *b(p)* are translog and Cobb-Douglas price indices, respectively, with $\ln(P) = \alpha_0 + \sum_{j=1}^{n} \alpha_j \ln(p_j) + 0.5 \sum_{j=1}^{n} \sum_{i=1}^{n} \gamma_{ij} \ln(p_j) \ln(p_i)$ and $b(p) = \prod_{k=1}^{n} p_k^{\beta_k} = \exp\left(\sum_{k=1}^{n} \beta_k \ln(p_k)\right)$. Also, p_j denotes the price of the j^{th} RTE brand and α_j, γ_{ij}, and β_k are structural parameters. As is acknowledged by Deaton and Muellbauer (1980), in practice α_0 (i.e., the cost of minimum living standard) is plagued with identification issues. Therefore, we fix it at a predetermined value following a common practice in the empirical literature.

Application of the Roy's identity to the indirect utility function in equation (1) gives rise to $q_i = \frac{X}{p_i}\left(\alpha_i + \sum_{j=1}^{n}\gamma_{ij}\ln(p_j) + \beta_i \ln\left(\frac{X}{P}\right)\right)$, with q_i representing the quantity of the i^{th} RTE brand, i.e., the Marshallian demand functions in terms of cereal quantities, which are subsequently pre-multiplied by $\frac{p_i}{X}$ to generate the following budget share equations:

(2) $$w_i = \alpha_i + \sum_{j=1}^{n}\gamma_{ij}\ln(p_j) + \beta_i \ln\left(\frac{X}{P}\right) + \iota_i,$$

where w_i is the budget share for the i^{th} brand and ι_i is the error term. Theoretical restrictions of adding-up, homogeneity, and symmetry are derived as $\sum_{i=1}^{n}\alpha_i = 1, \sum_{i=1}^{n}\beta_i = 0, \sum_{j=1}^{n}\gamma_{ij} = 0,$ and $\gamma_{ij} = \gamma_{ji}\ \forall\ j \neq i$, and are imposed on the system in (2).

By imposing an additional restriction of $\sum_{j=1}^{n}\lambda_{ij} = 0$, we modify the AIDS budget share equation in (2) to incorporate the effects of coupons for own and related brands as follows:

(3) $$w_i = \alpha_i + \sum_{j=1}^{n}\gamma_{ij}\ln(p_j) + \beta_i \ln\left(\frac{X}{P}\right) + \sum_{j=1}^{n}\lambda_{ij}\ln\left(Coupon_j\right) + u_i, \qquad i = 1,\ldots,n,$$

where $Coupon_j$ reflects the brand-specific coupon value used in the purchase of the j^{th} brand of RTE cereals and is logarithmically transformed to allow for potential diminishing returns, and λ_{ij} captures own- and cross-brand effects of coupons.

A key concern that needs to be addressed in our empirical framework is autocorrelation, given the use of weekly time-series data. Autocorrelation can be present due to an incorrect demand functional form (Alston and Chalfant, 1991), or model misspecification induced by the omission of dynamic interactions (Blanciforti, Green, and King, 1986). Departing from a number of previous studies, we allow for an AR(1) error structure for the unobserved budget share determinants as follows:

(4) $$u_{it} = \rho_1 u_{it-1} + \xi_{it},$$

where at time period t, ρ_1, is the autocorrelation coefficient; u_{it-1} is the unobservable demand shifter lagged by one period; and ξ_{it} is a random error (*iid*). To embed this desirable error structure into the AIDS model, we subtract the product of one period-lagged version of equation (3) and ρ_1 from equation (3) as shown below:

$$(5)\quad w_{it} = \rho_1 w_{it-1} + \left[\alpha_i + \sum_{j=1}^{n}\gamma_{ij}\ \ln(p_{jt}) + \beta_i \ln\left(\frac{X}{P}\right) + \sum_{j=1}^{n}\lambda_{ij}\ln\left(Coupon_{jt}\right)\right] - \rho_1\left[\alpha_i + \sum_{j=1}^{n}\gamma_{ij}\ \ln(p_{jt-1}) + \beta_i \ln\left(\frac{X^*}{P^*}\right) + \sum_{j=1}^{n}\lambda_{ij}\ln\left(Coupon_{jt-1}\right)\right] + \xi_{it},$$

where X^* and P^* are one period-lagged counterparts of the previously defined variables/functions. Another important issue in our demand system is the expenditure endogeneity stemming from the simultaneous determination of the cereal expenditures (Summers, 1959; Lluch and Williams, 1975). We address this source of endogeneity by following a method proposed by Attfield (1983) as follows:

$$(6)\quad \ln(X_t) = \varphi_0 + \sum_{i=1}^{n}\varphi_i \ln\left(p_{it}\right) + \varphi_{n+1}\ln(Income_t) + \omega_t,\ i = 1,\ldots,\text{n},$$

where $Income_t$ represents average annual household income at time *t*. Finally, we incorporate an AR(1) error structure into the unobserved expenditure determinants ω_t as follows (Berndt and Savin, 1975):

$$(7)\quad \ln(X_t) = \rho_2 \ln(X_{t-1}) + \left[\varphi_0 + \sum_{i=1}^{n}\varphi_i \ln\left(p_{it}\right) + \varphi_{n+1}\ln(Income_t)\right] - \rho_2\left[\varphi_0 + \sum_{i=1}^{n}\varphi_i \ln\left(p_{it-1}\right) + \varphi_{n+1}\ln(Income_{t-1})\right] + \varsigma_{it},$$

where ρ_2 is the autocorrelation coefficient for the expenditure equation, and ς_{it} is a random error similar to the one in equation (4). Marshallian own- and cross-price elasticity formulas for the AIDS demand specification are derived by Green and Alston (1990) as follows:

$$(8)\quad e_{ij}^{M} = -\delta_{ij} + \frac{\gamma_{ij}}{w_i} - \frac{\beta_i w_j}{w_i},$$

where e_{ij}^{M} is the Marshallian own-price elasticity if $i = j$, and cross-price elasticity if $i \neq j$; δ_{ij} is the Kronecker delta with $\delta_{ij} = 1 \ \forall i = j$, and 0 otherwise; w_i and w_j represent the budget shares of brands *i* and *j*, respectively. The Hicksian price elasticities are then recovered from the Slutsky equation using the following identity:

$$e_{ij}^{H} = e_{ij}^{M} + e_i w_{j,} \tag{9}$$

where e_{ij}^{H} is the Hicksian own-price elasticity if $i = j$, and cross-price elasticity if $i \neq j$, and e_i is the expenditure elasticity computed based on the following formula derived by Green and Alston (1990):

$$e_i = 1 + \frac{\beta_i}{w_i}. \tag{10}$$

Finally, we derive coupon elasticity of brand market shares as follows:

$$e_{ij}^{c} = \frac{d\ln(w_i)}{d\ln(Coupon_j)} = \frac{d(w_i)}{d\ln(Coupon_j)}\frac{1}{w_i} = \frac{\lambda_j}{w_i}, \tag{11}$$

given that

$$\frac{d(w_i)}{d\ln(Coupon_j)} = \frac{de^{\ln(w_i)}}{d\ln(Coupon_j)}$$

$$= e^{\ln(w_i)}\frac{d\ln(w_i)}{d\ln(Coupon_j)}$$

$$= \frac{w_i \ d\ln(w_i)}{d\ln(Coupon_j)}.$$

Our expectation is that $e_{ii}^{c} > 0$ and $e_{ij}^{c} < 0$ for any pair of *i* and *j* constituting major competitors with coupons issued for brand *j* representing an important demand shifter for brand *i*.

Nielsen Homescan Panel Data

We use Homescan Panel data provided by the Nielsen Company[1] to perform an empirical assessment of coupon contribution to brand-level market shares of RTE cereals. These are weekly time-series data comprising 60,000 households from across the United States in a span of January 1, 2012, through December 27, 2014 (156 weeks). Households use special, in-home scanners to record their purchases that are later reported to the Nielsen Company along with household socio-economic characteristics such as household head's age, education, income, and number of children present in household.

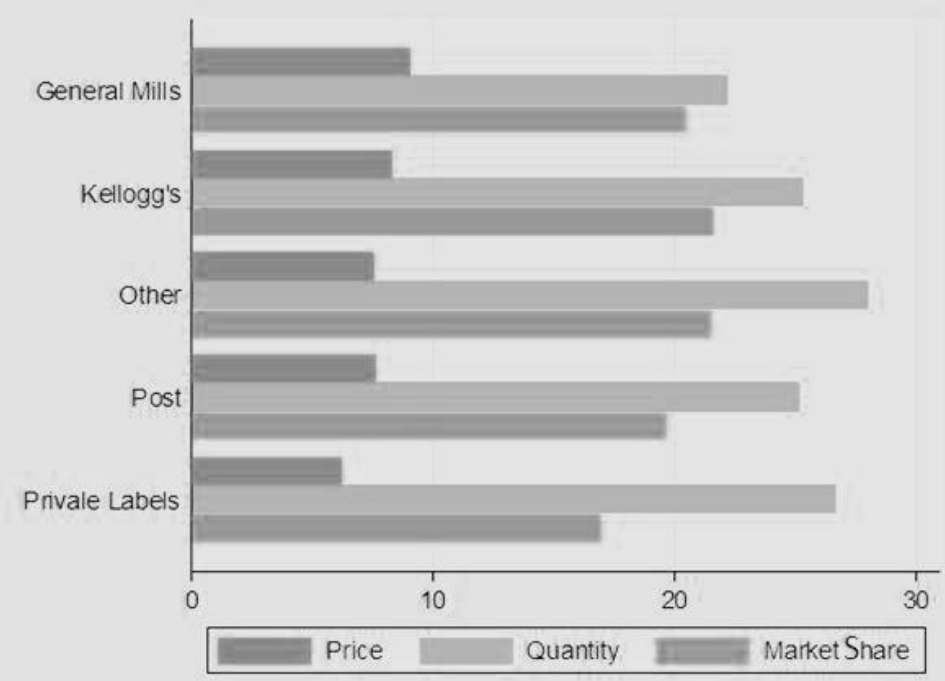
In this study, we utilize information on RTE cereal purchases, namely weekly total purchase amounts, prices (unit values), and the value of coupons provided by cereal manufacturers and food retailers. Cereal represents one of the top couponed food products (Kilts Center for Marketing, 2016) which makes it an interesting product to study. We conduct the analysis at a brand level by selecting the three most couponed national brands of cereal (General Mills, Kellogg's, and Post), which are supplemented by private labels and other brands. For the purpose of this analysis, we adjust unit values based on the Consumer Price Index (the 1982-84 average constitutes a base period) to account for inflation effects (U.S. Bureau of Labor Statistics, 2017).

Figure 1 presents a graphical illustration of RTE cereal unit prices, purchase quantities, and market shares by brand.

Private labels appear to be the least expensive cereal brands (6.2 cents/ounce), followed by cereals from other brands (7.5 cents/ounce), Post (7.6 cents/ounce), Kellogg's (8.3 cents/ounce), and General Mills (9.0 cents/ounce). Due in part to more attractive prices, other brands (28.0 ounces) and private labels (26.6) are also the most purchased RTE cereals, while the national brands fall behind in terms of sales amount. As far as revenue-based market shares, Kellogg's accounts for the largest share (21.6%), followed by other brands (21.5%), General Mills (20.4%), Post (19.6%), and private labels (16.9%), which is due, in no small part, to the relatively higher prices of the national brands in the analysis. A more complete picture of the distribution across brands of RTE cereal prices, purchase quantities, and market shares is provided in Table 1.

Figure 2 presents the descriptive statistics for coupons issued for the various national brands and private labels under study.

[1] The conclusions drawn from the Nielsen data are those of the researchers and do not reflect the views of Nielsen. Nielsen is not responsible for, had no role in, and was not involved in, analyzing and preparing the results reported herein.



Notes: a. Prices are measured as U.S. cents/ounce; quantity is measured in ounces; and market shares are measured in percentage. b. Calculated based on data from The Nielsen Company (U.S.), LLC and marketing databases provided by the Kilts Center for Marketing data center at The University of Chicago Booth School of Business.

Figure 1. RTE Cereal Average Prices, Purchase Quantities, and Market Shares by Brand.

It can be observed that private label coupons are concentrated around 5.0% of the cereal prices with a 1.5% standard deviation around the mean. A similar pattern is also detected for other brands with the mean share of coupons equaling 18.5% and a standard deviation of 4.3%. The national brand coupons, on the other hand, comprise a relatively higher percentage of cereal prices and manifest considerable variations in the sample period. More specifically, coupons for Post cereals (mean 31.7%, standard deviation 10.3%) demonstrate the most dispersion, while those for General Mills (mean 40.3%, standard deviation 7.1%) and Kellogg's cereals (mean 34.0%, standard deviation 7.9%) typically offer higher discounts.

Table 1. Descriptive Statistics of Quantities, Prices, and Market Shares of Cereal Brands.

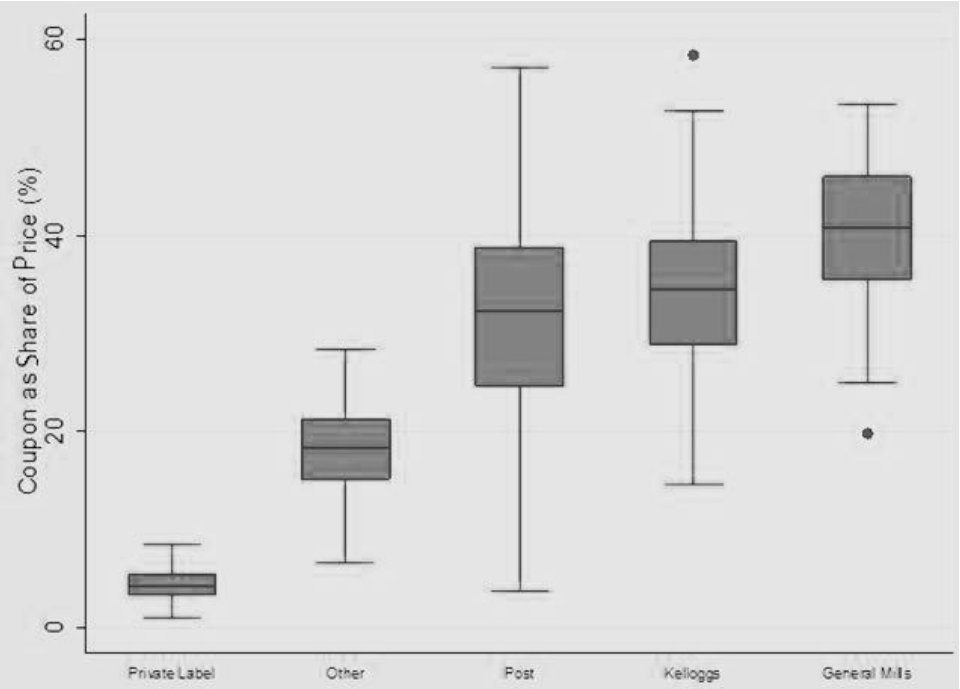
Variable	Mean	Standard Deviation
Quantity (ounces) of		
General Mills	22.167	0.597
Kellogg's	25.26	1.016
Post	25.124	1.114
Other brands	27.972	0.885
Private labels	26.648	0.552
Price (U.S. $/ounce) of		
General Mills	0.09	0.004
Kellogg's	0.083	0.003
Post	0.076	0.003
Other brands	0.075	0.002
Private labels	0.062	0.002
Market share (%) of		
General Mills	20.417	0.006
Kellogg's	21.582	0.006
Post	19.605	0.006
Other brands	21.469	0.005
Private labels	16.927	0.006

Notes: a. Quantities and coupons reported are on per household basis. b. Calculated based on data from The Nielsen Company (U.S.), LLC and marketing databases provided by the Kilts Center for Marketing data center at The University of Chicago Booth School of Business.

Estimation Procedure and Results

Our complete system of equations comprising the modified AIDS specification in (5) and the expenditure equation in (7) are estimated via the Statistical Analysis System software package (version 9.3) with the theoretical restrictions imposed on the system and assuming predetermined levels of coupon values. To avoid singularity, one of the demand equations (private labels) is omitted from the estimation, the parameter estimates for which are recovered from the theoretical restrictions. The R^2 value for this omitted equation was calculated by squaring the correlation coefficient between the predicted and

actual values of the respective budget share, while the Durbin-Watson statistic was obtained as a ratio of the sum of squared differences in successive residuals to the sum of the residual squares (Durbin and Watson, 1951). The significance level chosen for this analysis is 5%.



Note: a. Calculated based on data from The Nielsen Company (U.S.), LLC and marketing databases provided by the Kilts Center for Marketing data center at The University of Chicago Booth School of Business.

Figure 2. Coupon Value as a Share of RTE Cereal Price by Brand, 2012-2014.

Our results indicate that the model provides a good fit of the data with the estimates of the coefficient of determination (R^2) ranging from 0.335 to 0.739 for the demand equations for other brands and General Mills cereals, respectively (Table 2).

Further, the Durbin-Watson statistic fluctuates around 2 for all the equations and, along with the statistically significant serial correlation coefficients (i.e., ρ_1, ρ_2), suggests that the issue of serial correlation is properly accounted for. More specifically, the autocorrelation coefficients for the demand and expenditure equations are 0.4293 and 0.4753 (Table 3), respectively.

Table 2. R^2s and Durbin-Watson Statistics from the AIDS Model for Cereal Brands.

Brand	R^2	Durbin-Watson Statistic
General Mills	0.739	1.719
Kellogg's	0.573	1.916
Post	0.524	1.938
Other brands	0.335	2.114
Private labels	0.725	2.475

Notes: a. The goodness-of-fit statistics (R^2) are computed for the demand system estimated. b. Calculated based on data from The Nielsen Company (U.S.), LLC and marketing databases provided by the Kilts Center for Marketing data center at The University of Chicago Booth School of Business.

Most of the coefficients in the budget share (market share) and expenditure equations are statistically significant and of the expected signs (Table 3). Most importantly, coupons are estimated to be effective for all cereal brands under study ($\lambda_{ij}, i = 1,...,4$) with the exception of private labels (Table 3, top panel). Specifically, coupons for General Mills (0.0134), Kellogg's (0.0174), and Post (0.0076) are found to have statistically significant and positive impacts on the respective own-brand market shares, while those for other brands and private label cereals appear to be statistically insignificant. In the meantime, coupons for Post have statistically significant and negative effects on the budget shares (market shares) of General Mills (-0.0078) and Kellogg's (-0.0104) brands, and coupons for other brands have statistically significant and negative effects on the budget shares (market shares) of General Mills (-0.0054), Kellogg's (-0.0056), and Post (-0.0037) cereal brands. The remaining cross effects between coupons and market shares are found to be statistically insignificant. Finally, our results indicate that a majority of prices (0.1290, 0.0909, and 0.1129 for General Mills, Post, and private labels, respectively), and household income (0.0955) contribute to increases in household cereal expenditures, in line with prior expectations (Table 3, bottom panel).

The brand-level uncompensated own-price (main diagonal entries), cross-price (off-diagonal entries), and expenditure elasticities are provided in Table 4.

Table 3. Coefficients and Standard Errors from the AIDS Model for Cereal Brands.

(a) Demand System	General Mills	Kellogg's	Post	Other brands	Private labels
Intercept (α_i)	0.6415*	0.3626*	-0.225	-0.3302*	0.5511*
	(0.0986)	(0.1113)	(0.1294)	(0.1137)	(0.0936)
Real Income (β_i)	-0.0922*	-0.0305	0.0856*	0.1109*	-0.0738*
	(0.0201)	(0.0227)	(0.0264)	(0.0231)	(0.019)
Coupon (λ_{1j}) General Mills	0.0134*	0.0014	-0.0013	0.0004	0.0015
	(0.0021)	(0.0019)	(0.0012)	(0.0015)	(0.0011)
Coupon (λ_{2j}) Kellogg's	-0.0001	0.0174*	-0.0022	0.0008	-0.0021
	(0.0024)	(0.0022)	(0.0013)	(0.0016)	(0.0013)
Coupon (λ_{3j}) Post	-0.0078*	-0.0104*	0.0076*	-0.0037	-0.00001
	(0.0028)	(0.0025)	(0.0016)	(0.0019)	(0.0015)
Coupon (λ_{4j}) Other brands	-0.0054*	-0.0056*	-0.0037*	0.0029	0.0014
	(0.0024)	(0.0022)	(0.0013)	(0.0017)	(0.0013)
Coupon (λ_{5j}) Private labels	-0.0002	-0.0027	-0.0005	-0.0004	-0.0008
	(0.002)	(0.0018)	(0.0011)	(0.0013)	(0.001)
Price (γ_{1j}) General Mills	0.0798*	-0.0278*	-0.0139	0.0305	-0.0686*
	(0.0208)	(0.0129)	(0.0188)	(0.0183)	(0.012)
Price (γ_{2j}) Kellogg's		0.0649*	-0.0122	0.0261	-0.0509*
		(0.0141)	(0.0148)	(0.0163)	(0.0101)
Price (γ_{3j}) Post			0.0563*	-0.0533*	0.023
			(0.0256)	(0.017)	(0.0146)
Price (γ_{4j}) Other brands				-0.0184	0.015
				(0.0279)	(0.0158)
Price (γ_{5j}) Private labels					0.0814*
					(0.0145)
Autocorrelation (ρ_1)			0.4293*		
			(0.038)		

(b) Expenditure Equation	General Mills	Kellogg's	Post	Other brands	Private labels
Price (ϕ_j, j= 1,…,5)	0.1290*	0.0735	0.0909*	0.0582	0.1129*
	(0.0389)	(0.0388)	(0.0359)	(0.0469)	(0.0381)
Constant (φ_0)			2.5622*		
			(0.2309)		
Income (φ_6)			0.0955*		
			(0.0133)		
Autocorrelation (ρ_2)			0.4753*		
			(0.0697)		

*Notes: a. The standard errors are in parenthesis. b. * identifies parameter estimates that are statistically significantly different from zero at the 0.05 significance level. c. Calculated based on data from The Nielsen Company (U.S.), LLC and marketing databases provided by the Kilts Center for Marketing data center at The University of Chicago Booth School of Business.*

Table 4. Uncompensated (Marshallian) Price and Expenditure Elasticities of Demand for Cereal Brands.

	General Mills	Kellogg's	Post	Other brands	Private labels	Expenditure Elasticity
General Mills	-0.3164*	0.0275	-0.1657*	0.0053	-0.0991*	0.5484*
	(0.0541)	(0.0436)	(0.0457)	(0.05)	(0.0396)	(0.0983)
Kellogg's	-0.03737	-0.6481*	-0.0873	0.0756	-0.1616*	0.8587*
	(0.0425)	(0.0581)	(0.0475)	(0.0498)	(0.0417)	(0.105)
Post	-0.3540*	-0.2208*	-0.6181*	-0.1323*	-0.1117*	1.4369*
	(0.0502)	(0.0536)	(0.0725)	(0.0582)	(0.0472)	(0.1346)
Other brands	-0.1926*	-0.066	-0.1364*	-0.9206*	-0.2010*	1.5165*
	(0.0493)	(0.0503)	(0.0525)	(0.073)	(0.0468)	(0.1078)
Private labels	-0.1227*	-0.1423*	0.0418	-0.0504	-0.2902*	0.5638*
	(0.0454)	(0.0485)	(0.0494)	(0.0539)	(0.0594)	(0.1122)

*Notes: a. The standard errors are in parenthesis. b. * identifies parameter estimates that are statistically significantly different from zero at the 0.05 significance level. c. Calculated based on data from The Nielsen Company (U.S.), LLC and marketing databases provided by the Kilts Center for Marketing data center at The University of Chicago Booth School of Business.*

All own-price elasticities are estimated to be negative, statistically significant, and less than 1 in absolute value (i.e., inelastic demand). The finding that households are relatively insensitive to cereal price changes may well be because of the relatively small portion that cereal occupies in a consumer's budget. It may also be a result of our aggregation of cereal types to brand-level, which is motivated by the tractability of our empirical analysis. Further, all expenditure elasticities (Table 4, column 6) are estimated to be positive (i.e., cereal brands are normal goods) and statistically significant, with the respective estimates for General Mills (0.5484), Kellogg's (0.8587), and private labels (0.5638) suggesting that these brands are necessities, and those for Post (1.4369) and other brands (1.5165), suggesting that these brands are luxuries.

As shown in Table 5, most compensated cross-price elasticities are positive and statistically significant, reflecting the substitutability between the cereal brands analyzed.

Specifically, the strongest significant net substitution relationship was found between other brands and Kellogg's (0.2613), while the weakest significant net substitution relationship was found between other brands and General Mills (0.1170).

Coupon elasticities of market shares are presented in Table 6.

These estimates are calculated based on equation (11), and reflect the effects on a cereal brand market share of not only own brand-specific coupons but also those for competing brands. It can be observed that own brand-specific coupons have statistically significant effects only on national brand market shares, with the effects being positive (0.0656, 0.0804, and 0.0387 for General Mills, Kellogg's, and Post, respectively). Further, a 1% increase in coupons for General Mills and Kellogg's decreases market share of Post by 0.0395% and 0.0532%, respectively, indicating that General Mills and Kellogg's constitute potent competitors for Post. Also, a 1% increase in coupons for General Mills, Kellogg's, and Post leads to a 0.0249%, 0.0263%, and 0.0170% decrease

in market share of other brands, suggestive of the former three brands being rivals for other national brands of cereal. Interestingly, private-label cereals appear to be insensitive to coupons issued for both private labels and their competing brands.

Table 5. Compensated (Hicksian) Price Elasticities of Demand for Cereal Brands.

	General Mills	Kellogg's	Post	Other brands	Private labels
General Mills	-0.2044*	0.1458*	-0.0582	0.1231*	-0.0063
	(0.0509)	(0.0392)	(0.0411)	(0.0464)	(0.0333)
Kellogg's	0.1380*	-0.4628*	0.0811	0.2600*	-0.0162
	(0.0371)	(0.0553)	(0.0423)	(0.0453)	(0.0349)
Post	-0.0606	0.0893	-0.3364*	0.1762*	0.1315*
	(0.0428)	(0.0466)	(0.067)	(0.0521)	(0.0385)
Other brands	0.1170*	0.2613*	0.1609*	-0.5950*	0.0557
	(0.0442)	(0.0456)	(0.0475)	(0.0714)	(0.04)
Private labels	-0.0076	-0.0207	0.1523*	0.0706	-0.1948*
	(0.0402)	(0.0444)	(0.0446)	(0.0507)	(0.0521)

*Notes: a. The standard errors are in parenthesis. b. * identifies parameter estimates that are statistically significantly different from zero at the 0.05 significance level. c. Calculated based on data from The Nielsen Company (U.S.), LLC and marketing databases provided by the Kilts Center for Marketing data center at The University of Chicago Booth School of Business.*

These results shed an important light on the nature of competition in the U.S. RTE cereal industry. Specifically, national brand cereals appear to be immune to competition from private labels due most probably to strong consumer preference for name-brand cereals. This finding is also consistent with a recent survey conducted by Harris Interactive in 2014 which reveals that 62% of the respondents prefer name-brand cereals as opposed to only 26% who favor private label breakfast cereals. This is unlike many other product categories such as milk and over-the-counter drugs, for which consumers still prefer store brands (Hovhannisyan and Bozic, 2014; Harris Interactive, 2014). Nevertheless, this reality may change in the near future given that most breakfast cereal sales are driven by Matures (69+) and Millennials (18-37) (Harris Interactive, 2014).

Table 6. Coupon Elasticities of Market Shares for Cereal Brands.

	General Mills	Kellogg's	Post	Other brands	Private labels
General Mills	0.0656*	0.0067	-0.0065	0.0018	0.0073
	(0.0104)	(0.0095)	(0.0058)	(0.0071)	(0.0054)
Kellogg's	-0.0003	0.0804*	-0.01	0.0039	-0.0096
	(0.0111)	(0.0102)	(0.0062)	(0.0076)	(0.0058)
Post	-0.0395*	-0.0532*	0.0387*	-0.0186	-0.0002
	(0.0142)	(0.0128)	(0.0079)	(0.0097)	(0.0074)
Other brands	-0.0249*	-0.0263*	-0.0170*	0.0135	0.0064
	(0.0113)	(0.0104)	(0.0063)	(0.0077)	(0.0058)
Private labels	-0.0013	-0.0158	-0.0027	-0.0026	-0.0045
	(0.0116)	(0.0107)	(0.0065)	(0.0079)	(0.006)

*Notes: a. The standard errors are in parenthesis. b. * identifies parameter estimates that are statistically significantly different from zero at the 0.05 significance level. c. Calculated based on data from The Nielsen Company (U.S.), LLC and marketing databases provided by the Kilts Center for Marketing data center at The University of Chicago Booth School of Business.*

Concluding Remarks and Recommendations for Future Research

Coupons have emerged as an important marketing tool for promoting a wide range of product categories, including food. While the revenue-enhancing potential of coupons are widely recognized, there is still a paucity of evidence on the link between coupons and brand market shares, especially for certain foods such as RTE cereals. We fill this gap in the literature by performing an empirical investigation of the effects of coupons on national-brand and private-label market shares for RTE cereals in the United States.

Our empirical framework builds on a theory-consistent demand system; accounts for a series of econometric issues such as autocorrelation of unobserved share and expenditure determinants, and the endogeneity of RTE cereal expenditures; and allows for potential effects of coupons issued for competing brands. The results emerging from this brand-level analysis reveal an important link between coupons and brand market shares, while also shedding light on cross-brand effects. Based on the coupon elasticities of market shares derived in this study, coupons are found to have contributed to expanding national brand market shares, while leaving those for private labels unaffected. Our findings further illustrate the nature of competition in the U.S. RTE cereal industry based on cross-brand effects. Specifically, national brand cereals appear to be immune to competition from private labels due to a strong consumer preference for national brand cereals. Further, competition appears to be most intense among the three name brands in our sample.

The findings emerging from this study should be of interest to national brand manufacturers of RTE breakfast cereals. In particular, these results furnish empirical evidence that coupons can be effective in expanding market shares, thus signaling to

national brand manufacturers of breakfast cereals to consider couponing as part of their strategic decision-making. Another virtue of this study lies in its applicability to the evaluation of own- and cross-effects of coupons on demand for/market share of other products and brands, which contributes to improved decision-making concerning production, marketing, and competition in food markets.

Two recommendations for future research need to be noted. First, due to the unavailability of data, the present study did not distinguish between store and manufacturer coupons. As such, future research would benefit from isolating the effects of store and manufacturing coupons on market shares of food product brands. Second, future research would benefit from information on other types of promotion (displays, point of sale promotions, advertising).

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