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A comparative analysis of differential consumer response across supermarket and specialty store in the candy category

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ABSTRACT

Retailing industry has undergone tremendous change in its complexity and sophistication over the past few years. Globally we are witnessing the evolution of retailing industry from traditionally micro-managed small retail formats like mom and pop store to modern corporate-managed large retail formats like supermarkets. Consumers are also shopping across these various store formats even for the products in similar categories. In this research, we posit that consumer purchases in the similar categories may very well be characterized by differential responses to marketing mix across different store formats. The proposed model accounts for the influences that these diverse response parameters and preferences have on one another as well as consumer heterogeneity. Our results show that sensitivities to marketing mix as well as correlations in preferences do indeed vary across formats for consumer purchases in similar categories.

1. Introduction

Emergence of new retail formats provides opportunities and challenges to both traditional and new retailers. Five distinct store formats have been identified on the basis of their marketing instruments (M+M planetretail, 2004) namely, warehouse club, convenience store, discount store, hypermarket, and supermarket. On the one hand experimentation with new retail formats is an on-going process in American and European markets (Dawson, 2000), on the other hand markets in developing countries are struggling with re-structuring their retailing environment. For example, the Wall Street Journal (2011) reports, "The principal fear in India regarding the potential entry of Wal-Mart is that it will wipe out the "kirana" stores, the Indian equivalent of "mom-and-pop" stores in the U.S." However, such conclusions are confounded and not true (Chari and Raghavan, 2011). Furthermore, the large retail formats, such as Wal-Mart, when expand into developing economics often fail to understand the small retail formats that are so pre-dominant in these economies (Lenartowicz and Balasubramanian, 2009).

The emergence and operation of various retail formats can be attributed to three factors, competitive advantages sought by retailers, consumer trends and their purchasing behavior, and changing role of manufacturing industry (Ahlert et al., 2006). For example, with respect to competitive advantages, retailers have been quick to realize the potential of the store format in providing a tool that will serve not only to differentiate but also to target specific consumer segments. Thus, Office Depot in 2003 started offering its products via a new format they call *M2* (or *Millenium2*) for the more price sensitive consumer. This newer format, the outcome of an extensive analysis of the retail environment, provides consumers with greater convenience, better service, knowledgeable staff support and product trial options, in addition to lowering operating costs and increasing operational efficiency (DSN Retailing Today, 2004; Retail Merchandiser, 2003). Costco Wholesale, on the other hand, in serving a consumer with changing lifestyles, tested a new store format, *Costco Fresh* which would primarily focus on fresh grocery products (Drug Store News, 2007). Home Depot, meanwhile, offered a new urban format in traditional suburban locations to attract local consumers, a deviation from its strategy of opening stores mainly in city centers (Home Textile Today, 2004).

In this research we identify one important consumer trend and their purchasing behavior that may explain the co-existence of large store format such as supermarket and small store format such as specialty store simultaneously in the market. Consumers tend to shop across various store formats even for the products in similar categories (Bell and Lattin, 1998; Bell et al., 1998;

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Chib et al., 2002; Soriano, 2003; Fox et al., 2004; Hansen and Singh, 2009; Reutterer and Teller, 2009). Not only do the various formats offer distinct flavors in terms of customer service, product assortment, convenience, etc., but they also vary their marketing activities such as price and promotion (e.g., Gauri et al., 2008). Thus, convenience stores tend to offer smaller product assortments, but flexible operating hours and convenient locations, making them an attractive shopping option for consumers with time constraints and limited product category needs, while supermarkets with their larger assortments and price competitiveness provide a one stop shopping option for consumers. In contrast, specialty stores, with their narrow but deep category offerings of specialized products, serve the consumer looking for specialized and often more exclusive items not always available at most grocery stores. Thus, researchers have studied the importance of store and consumer characteristics as determinants of store format choice as far back as the 1990s (Bell and Lattin, 1998; Bell et al., 1998 to name a few). A majority of the study has assumed that consumer responses and preferences remain constant across formats. In reality, however, given the distinct store characteristics across formats as well as the heterogeneous nature of consumer shopping behavior, the same set of consumers shopping across different store formats may very well show differential response behavior in terms of their preferences and sensitivities to marketing mix variables.

Given the increasing competition in the retail industry and an ever increasing overlap in the kinds of products that can be obtained at each, it becomes critical for retailers to understand such variations in consumer shopping behavior, should they exist, across different store formats. We thus pose the following research questions: How do responses vary across different store formats? That is, do consumers show more/less responsiveness to marketing mix, product attribute and store characteristic variables across different store formats for similar product categories? Moreover, how do preferences for a category in one store format affect the preference for a similar category in another store format? How much is the variation in their differential response behavior across store formats? And finally, what are the strategic implications for the retailer in a given format?

In order to address these issues, we propose here a heterogeneous model of consumer purchase behavior that studies differential response across different store formats. We account for prices and promotions, store characteristics such as distance and assortment, and external factors such as seasonal effects, while controlling for individual differences or heterogeneity by incorporating random effects. The model is estimated using a panel of households that shops across two different formats for similar sets of categories. Furthermore, we also conduct simulations to study price and promotion elasticities and estimate their impact on market share and profits.

We show that consumer responses do indeed vary significantly over the different store formats even when purchasing in the same categories. Results show that marketing variables such as prices and promotions do indeed impact household purchasing behavior as a function of format. As a result, retailers must carefully tune their pricing and promotional strategies to their specific format in order to compete effectively. More specifically, we show that using such tailored strategies can in fact help specialty stores compete effectively with supermarkets. Finally, the simulation studies show how the impact of a retail strategy on response and therefore profits can vary significantly as a function of format.

The rest of the paper is organized as follows: First, we do a background study with a brief review of the relevant literature and propose our research questions. Second, we develop our model and follow with a brief outline of the data we use for estimation. We then present our results followed by a discussion section summarizing the key findings. Finally, we conclude by discussing the managerial implications and providing some directions for future research.

2. Background

Disentangling the store format choice decision from the pricing strategy choice decision has been a complex one not only because of the practical reason that both decisions are made simultaneously, but also because the literature has not always drawn a clear distinction between the nature of these two aspects of store choice. The early literature in marketing has focused on store choice decisions dealing exclusively with issues such as store competition (Bucklin and Lattin, 1992; Chan et al., 2006), store preference (Bell and Lattin, 1998), and shopping cost (Bell et al., 1998). Much of this literature has in fact used store format and pricing strategy interchangeably, inherently assuming that the format is tied in to a specific price strategy, and has furthermore assumed homogenous consumer response across formats.

Retailers often use different elements of store characteristics, market characteristics and competitive characteristics to differentiate themselves and to cater to the needs of diversified consumers (Gauri et al., 2008). Thus, store characteristics such as assortment (Briesch et al., 2009; Hansen and Solgaard, 2004) or convenience (Pan and Zinkhan, 2005; Seiders and Tigert, 2000; Ellickson and Misra, 2008) are useful tools for differentiation, while market characteristics such as geo-demographics also influence consumer shopping behavior across different formats (Fox et al., 2004). Competitive characteristics such as price (Bell and Lattin, 1998; Heerde et al., 2008), advertisements (Bodapati and Srinivasan, 2006) and promotions (Chen and Zhang, 2006; Walters, 1991) are also common tools used to attract different segments of consumers.

In response to these different retail strategies, consumers not only often shop across different store formats but also exhibit differential response behavior. For example, Hansen and Singh (2009) show that consumer preference for similar brands varies significantly across different retail formats. Unfortunately, there is little research that studies differential consumer response behavior with respect to marketing mix variables across different retail formats (see Chu et al., 2008, for an exception that studies differential consumer response to price across online and offline channels).

Consumers shop across multiple store formats for various reasons such as to explore new categories (Cummins et al., 2008), to balance the store visit cost (Bell et al., 1998; Gijsbrechts et al., 2008), to acquire store-specific knowledge (Rhee and Bell, 2002) and to satisfy occasion specific needs (Cort and Dominguez, 1977). Literature confirms the impact of sociodemographic variables (Leszczyc and Timmerman, 1997; González-Benito and Muñoz-Gallego, 2007), advances in technology (Messinger and Narasimhan, 1997), consumer risk factors (Mitchell and Harris, 2005) and category characteristics (Bhatnagar and Ratchford, 2004) on consumer store choice behavior. Given the rapidly changing socio-demographic environment where consumers patronize multiple stores for various needs, it would be natural to assume not only changes in preference for similar product items across store formats, but changes in responses as well.

3. Model development

3.1. Conceptual framework

We posit that in a market place with different store formats, heterogeneous consumers tend to shop across different formats, often for products in similar categories. Furthermore, these consumers might visit these multiple formats in the same shopping

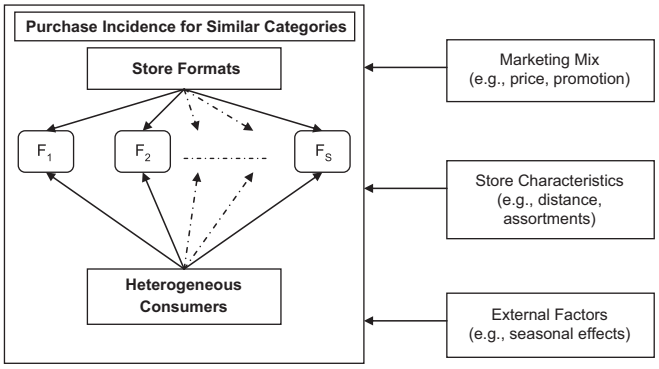

Fig. 1. Conceptual framework.

trip. Given they are shopping for similar product categories, possibly they might perceive these categories differently across different formats.

In a global retailing environment marketing mix, price and promotion, are predominant factors influencing consumer shopping behavior. Furthermore, store characteristics and seasonal variations are common factors across globe influencing consumer decision to shop across different store formats. Therefore, as suggested by the literature above and consistent with factors influencing global retailing environment, this cross format shopping behavior could be affected by factors such as format specific marketing mix, format characteristics, and seasonal variations. The conceptual framework of our model is presented in Fig. 1.

Specifically, and consistent with prior literature (e.g., Chu et al., 2008) we propose a multivariate model of consumer shopping behavior across different store formats for purchases in similar product categories.

3.2. Modeling framework

We consider H households ($h=1,\ldots,H$) visiting S store formats ($s=1,\ldots,S$) for purchases in C categories ($c=1,\ldots,C$) over a time horizon of T shopping trips[4] ($t=1,\ldots,T$). If a shopping trip is made at t then household h must decide which store format s to visit and which category c to purchase. We allow consumer shopping behavior for similar product categories across distinct store formats to be influenced by store characteristics, marketing mix, product attributes, external factors and demographics/consumer characteristics. Since for each shopping trip t we allow consumer h to visit multiple store formats for purchases in multiple categories, we use a multivariate probit model that allows us to capture the correlation in unobserved preferences as well as the correlation in responses (e.g., Manchanda et al., 1999).

Let $y_{hcst}=y_{hc_1s_1t},\ldots,y_{hc_Cs_1t},\ldots,y_{hc_1s_St},\ldots,y_{hc_Cs_St}$ be the binary dependent variables representing purchase incidence decision. Then using a random utility formulation, the latent utility for household h making a purchase in category c in store s at time t is given by

$$\boldsymbol{U}_{hcst}=\boldsymbol{\alpha}_{hcs}+\boldsymbol{X}_{hcst}\boldsymbol{\beta}_{hcs}+\boldsymbol{Z}_{hst}\boldsymbol{\gamma}_{hs}+\boldsymbol{S}_t\boldsymbol{\delta}_{hcs}+\epsilon_{hcst} \quad (1)$$

The intercept terms $\boldsymbol{\alpha}_{hcs}$ capture format specific household level category preferences. Marketing mix variables in the model are represented by vector $\boldsymbol{X}_{hcst}$ and their corresponding responses are captured through vector $\boldsymbol{\beta}_{hcs}$. The store specific characteristics that influence households' store selection are contained in vector $\boldsymbol{Z}_{hst}$ and their corresponding responses are captured by vector $\boldsymbol{\gamma}_{hs}$. The influences of external factors are represented in vector $\boldsymbol{S}_t$ and their corresponding responses are captured by vector $\boldsymbol{\delta}_{hcs}$. The external factors in our model constitute seasonal dummies such as major holidays. Unobservable influences affecting consumer shopping behavior across store formats are represented by vector ϵ_{hcst}. Since these unobservable factors could be common across store formats as well as categories, we assume

$$\epsilon_{hcst}\sim MVN(0,\Sigma_u) \quad (2)$$

For identification purpose Σ_u is restricted to be a correlation matrix. The correlated structure of the utilities captures the preference correlation caused by unobservable factors such as co-incidence. The underlying correlation structure will characterize the effect of unobservable factors on joint purchase decisions across store formats as well as across categories.

Households differ not only in their intrinsic utilities but also in their responses to various factors such as marketing mix and store characteristics. The existing literature models the household level differential responses that may be related across categories (Manchanda et al., 1999). We further capture household level differential responses and preferences across categories and store formats. Let $\boldsymbol{\Gamma}=\{\boldsymbol{\alpha}_{hcs},\boldsymbol{\beta}_{hcs},\boldsymbol{\gamma}_{hs},\boldsymbol{\delta}_{hcs}\}$, then household level heterogeneity is captured by assuming:

$$\boldsymbol{\Gamma}\sim\boldsymbol{N}(\boldsymbol{\mu}_{\boldsymbol{\Gamma}},\Sigma_{\boldsymbol{\Gamma}}) \quad (3)$$

The matrix $\Sigma_{\boldsymbol{\Gamma}}$ captures the correlation in consumer sensitivity towards the covariates (e.g., marketing mix variables). Therefore, various elements of this matrix will capture how response parameters are correlated not only across categories but also across store formats. We estimate correlation matrix for $\Sigma_{\boldsymbol{\Gamma}}$ due to identification restrictions[5].

The link between latent utility and observed behavior of purchase is given by

$$y_{hcst}=\begin{cases}1 & \text{if } u_{hcst}>0\\ 0 & \text{otherwise}\end{cases} \quad (4)$$

The above formulation leads to a multivariate probit model (Green, 2008). This is the full hierarchical model accounting for household heterogeneity and specifying the full variance covariance structure on unobserved preference correlations. We estimate our model using a hierarchical Bayesian approach. MCMC methods are used to simulate the draws. Gibbs sampler is used to simulate parameter draws from the posteriors. We used a total of 50,000 iterations for the Markov Chains with a "burn-in" of 40,000. The last 10,000 iterations are used to calculate the posterior means and the standard deviations of the model parameters after ensuring that convergence criteria were met.

In addition to the full model we also estimate two benchmark models. The first one, the base model, is a non-hierarchical multivariate probit model with a partial variance covariance matrix. The model accounts for within-format cross category correlation but ignores across format cross category correlation. Thus, we assume that utilities for categories are independent across store formats, though correlated across categories within a store format. Cross-category correlations within store are important for retailers to jointly coordinate marketing activities across product categories (Chib et al., 2002), however the cross-category correlations across store formats are important to understand the nature of market competition and market structure across retail formats (Hansen and Singh, 2009). The second benchmark model,

[4] Shopping trip T is operationalized in weeks.

[5] To capture the observed portion of heterogeneity across households we model response parameters as $\boldsymbol{\Gamma}\sim\boldsymbol{N}(\boldsymbol{D}_h\boldsymbol{\mu}_{\boldsymbol{\Gamma}},\Sigma_{\boldsymbol{\Gamma}})$, where $\boldsymbol{D}_h$ is a matrix containing the household demographics. We estimate this model using household level demographics collected at Census Block Group (CBG) level and were found to be insignificant.

Table 1
Model specification.

	Unobserved preference correlation		Accounting for random taste variation (heterogeneity)
	Full	Partial	
Base model	×	✓	×
Homogenous model	✓	×	×
Full model	✓	×	✓

homogeneous model, is a non-hierarchical multivariate probit model with a full variance covariance matrix. The model does not account for heterogeneity but it does capture the unobserved utility correlations across categories and across formats. The sensitivity of the estimated cross-category correlations are subjected to the panel structure of the data (Chib et al., 2002). Therefore, the full model that accounts for the effects of unobserved heterogeneity takes into consideration whether cross-category correlation are proxy for the effects of unobserved heterogeneity. The differences in three distinct model specifications are given in Table 1.

4. Data

Our data comes from a panel of 225 households shopping across two distinct store formats, a supermarket and a specialty store,[6] for the candy category in the northeast US region for a period of 2 years from January 2003 to December 2004. This panel dataset is unique in the sense that we have basket level information for each purchase history of every household across these two formats for the given duration.

The specialty store in our dataset offers superior quality confectionary products such as chocolate and candy. Apart from its main line of regular chocolate–candy category it also sells occasion specific candy products during Valentine's Day, Easter, and Christmas. The supermarket in our dataset is selling mainly consumer packaged grocery products such as diary, meat, bakery, beverages etc. They also have a dedicated confectionary aisle selling both regular as well as superior varieties of chocolate and candy for all occasions.

Category selection within the confectionary products plays an important role in our model. Consumers may not respond differentially for all categories across different formats. We posit that categories with occasion specific needs as well as with some social implications such as a 'prestige' tag associated with it may very well show a differential response from consumers purchasing from different formats. We divide the confectionary class of products (candy category) into three categories—boxed chocolates, non-boxed chocolates and other candy. Boxed chocolates consist of premium chocolates that usually come with better packaging, may be priced higher and are often used as gifts for social occasions. The non-boxed chocolate category consists of bulk or wrapped chocolates (such as bars and nuggets), and are usually priced lower than boxed chocolates. All other candies (non-chocolate) which are sold in bulk fall under the 'other' candy category.

[6] The supermarket is a chain of 75 stores whereas specialty store is a chain of 7 stores. The selected households in our sample visit both formats at least once. As such, the final dataset included all 7 of the specialty stores and 12 of the supermarket stores.

Table 2
Pairwise purchase incidence in the sample.

		Supermarket			Specialty store		
		Boxed	Non-boxed	Other candy	Boxed	Non-boxed	Other candy
Supermarket	Boxed	364	36	70	28	23	17
	Non-boxed	…	1407	137	48	39	33
	Other candy	…	…	1127	61	42	28
Specialty Store	Boxed	…	…	…	791	421	245
	Non-boxed	…	…	…	…	606	199
	Other candy	…	…	…	…	…	432

4.1. Data descriptive

Our dataset of 225 households purchasing in these three categories across the two formats for a 2-year period gives us a total of 3597 purchase occasions. The joint purchase incidences of these categories within as well as across store formats are given in Table 2. Note that the cross format joint incidences are low and purchases of boxed chocolates (the premium category) are high in the specialty store. Also the joint purchase incidences across categories within the specialty store format are higher than that in the supermarket format. The holiday (occasion specific) purchases for these categories are also higher in the specialty store and moreover, this percentage is significantly higher for the boxed chocolate category.

Table 3 displays category and format specific purchases in percentages. It is evident that consumers are more likely to visit the specialty store for purchases in the boxed chocolate category, and are willing to pay a higher price. Moreover, this effect is more pronounced when purchasing for special occasions/prominent holidays such as Valentine's Day, Christmas, New Year etc.

4.2. Variable operationalization

The category price ($/oz.) is operationalized by using a household specific weighted average regular price of brands within the category (Manchanda et al., 1999). Similarly, the promotion is monetary value of discount or promotion depth ($/oz.) operationalized by household specific weighted average discounts of brands within the category. Finally, consistent with the laws of retail gravitation, the non-linear effect of distance on consumer store choice is captured by including square of distance in the model. Note that our model allows households to visit multiple store formats for a given trip, unfortunately, we do not have a means to determine whether such instances of multiple format shopping on a given trip were completed in two separate trips or in one circuitous route. For such cases then (please note that these represent only 1.47% of total trips), we operationalize the distance variable as the mean of three distances: household to supermarket, household to specialty store, and supermarket to specialty store.

One of the critical issues in comparing across formats is the difference in the breadth of the assortment available. In order to account for this disproportionately high number of categories carried by the supermarket, we use an assortment index, defined as the ratio of number of purchases in other (than candy) categories to the number of purchases in total categories. This value lies between 0 and 1, with a higher value indicating more purchases from other categories. Our dataset thus consists of 6 categories in the confectionary class of products and 35 categories in the supermarket,

Table 3
Percentage decomposition of purchases.

Total household Purchases		3597	
		Percentage of all purchases	Percentage of occasion specific purchases
Supermarket	Boxed chocolate	7.7004	9.2573
	Non-boxed chocolate	29.7652	19.0527
	Other candy	23.8418	17.7610
Specialty store	Boxed chocolate	16.7337	23.9505
	Non-boxed chocolate	12.8200	18.4069
	Other candy	9.1390	11.5716

including the categories under consideration. Finally, we incorporate the impact of holiday consumption by using occasion specific dummies for Valentine's Day, Mother's Day, Halloween, Christmas, and New Year's Day. Summary statistics for the covariates in our model are given in Table 4.

5. Results and discussions

Estimates from the proposed model (full model) as well as the two benchmark models (base model and homogeneous model), are presented in Tables 5 and 6.[7] Interestingly, and lending credence to the model, we note that the signs of all the 90 parameter estimates tell a consistent story across all the models for each of the formats. Thus, the price parameter is expectedly negative (and the promotion parameter expectedly positive) across all models, product categories and formats. Also, while the holiday dummy is positive for the boxed chocolate category for all models and formats (indicating a positive impact on purchasing in this category for holidays), it is negative for non-boxed chocolates in the supermarket format for all models. Based on the log marginal density[8] we find that the full model provides the best fit which captures full cross-correlation across formats. We now discuss our proposed model results in further details below.

5.1. Category preference

As can be seen from Table 5, inherent category preferences vary across store formats. Specifically we find that for the premium category (boxed chocolates) household preferences are higher in the specialty store format compared to that in the supermarket. The non-premium category (other candy) on the other hand, is less preferred in the specialty format.[9] This result is consistent with the nature of a specialty format which would specialize in premium confectionary products. Moreover, consumers clearly appear to have a greater preference for the specialty format when it comes to boxed chocolate (often bought as gifts for social occasions) supporting earlier research showing consumer preference for premium products when a 'social image' component was involved (Karni and Schmeidler, 1990). Once consumption moves away from the social context (other candy category), preference for the specialty format expectedly declines.

Table 4
Summary statistics of covariates.

Covariates	Category	Supermarket		Specialty store	
		Mean	SD	Mean	SD
Price ($/oz.)	Boxed chocolate	0.3921	0.0809	1.0756	0.0506
	Non-boxed chocolate	0.2881	0.0253	0.8669	0.0856
	Other candy	0.1662	0.0156	0.8982	0.1708
Promotion ($/oz.)	Boxed chocolate	0.0359	0.0328	0.0495	0.0275
	Non-boxed chocolate	0.0580	0.0195	0.0755	0.0457
	Other candy	0.0081	0.0014	0.0504	0.0268
Store distance (miles)		3.6968	2.3567	2.6943	3.5996
Assortment index		0.6840	0.4105	0.0342	0.1189

5.2. Marketing mix

While price parameters are expectedly negative and promotion parameters expectedly positive, they do vary significantly across the two formats and three categories. In general, across all categories, households exhibit lower price as well as promotion sensitivities in the specialty store. In fact, overall household responses to marketing variables (i.e. prices and promotions) are lower in the specialty store and their impact on household preference for category purchase incidence is insignificant.[10] In the supermarket format, however, not only is the response to marketing mix strong, it also has a significant impact on purchase incidence. In fact, the impact of promotions is more than that of prices in influencing household category purchase incidence in the supermarket format. This result is indicative of consumers' willingness to pay higher prices at specialty formats with less impact from promotional incentives. The use of promotions as a means for increasing sales would clearly be less effective in a specialty format relative to a supermarket format.

5.3. Store format characteristics and external factors

While the holiday dummy is positive for the boxed chocolate category for all formats (indicating a positive impact on purchasing in this category for holidays), the holiday impact is more prominent in the specialty store. Clearly, households seem to prefer purchasing the premium categories from the specialty store when there is a special occasion. This is certainly in line with our earlier findings given that the special occasion would particularly involve a 'social image' component.

In the case of non-boxed chocolates in the supermarket format, however, the impact is negative. Clearly, the holidays tend to decrease purchasing in the non-boxed category, perhaps due to the increased gift occasions leading to purchasing in the boxed chocolate category. Note that this decrease in purchasing for the non-boxed category is not seen in the specialty store format (as we show in the next section).

The coefficients corresponding to the variables that influence household decisions for store format selection have the expected signs. Specifically, consistent with the law of retail gravity, we

[7] Apart from these three models we also estimate following dynamic specification of model that capture the correlations across successive shopping trips: $\boldsymbol{U}_{hcst} = \boldsymbol{\alpha}_{hcs} + \boldsymbol{X}_{hcst}\boldsymbol{\beta}_{hcs} + \boldsymbol{Z}_{hst}\gamma_{hs} + \boldsymbol{S}_t\boldsymbol{\delta}_{hcs} + \boldsymbol{Y}_{hcs(t-1)}\boldsymbol{\theta}_{hcs} + \epsilon_{hcst}$.where $\boldsymbol{Y}_{hcs(t-1)}$ is 1 if the category was purchased in last time period $t-1$. However, we found parameter $\boldsymbol{\theta}_{hcs}$ to be insignificant and this model does not have better fit (LMD = −26,801.1683) than the proposed model.

[8] The log marginal density (LMD) is a Bayesian measure of model fit proposed by Newton and Raftery (1994) which gives implicit penalty for the number of parameters while calculating this statistic.

[9] Note that this results no longer stands true if we neglecting either cross-correlation or heterogeneity.

[10] Note that this cannot be generalized for non-boxed chocolate category. The absolute magnitude of the price sensitivity for non-boxed chocolate is greater in supermarket compared to that in specialty store. However, the parameter is insignificant.

Table 5
Model estimations.

		Base model		Homogeneous model		Full model	
		Supermarket	Specialty store	Supermarket	Specialty store	Supermarket	Specialty store
Intercept	Boxed chocolate	**−3.0360**	**−1.4411**	**−3.0601**	**−1.5195**	**−3.3650**	**−2.0818**
	Non-boxed chocolate	**−2.0317**	**−0.8023**	**−2.0499**	**−0.7984**	**−1.9969**	**−1.2929**
	Other candy	**−2.4278**	**−1.8332**	**−2.3955**	**−1.8315**	**−2.0808**	**−2.2120**
Price	Boxed chocolate	**−4.5064**	−0.2836	**−4.4613**	−0.2073	**−3.7858**	−0.2497
	Non-boxed chocolate	−2.0250	**−1.4064**	−1.8625	**−1.4080**	−1.9030	**−1.5265**
	Other candy	−2.8074	−0.1228	−2.8394	−0.1325	**−4.0534**	−0.1131
Promotion	Boxed chocolate	**5.9744**	0.4522	**5.9326**	0.3797	**5.8278**	0.6378
	Non-boxed chocolate	**4.9283**	**0.8504**	**4.7407**	**0.8509**	**4.8764**	**0.9359**
	Other candy	**5.2832**	0.2306	**5.2465**	0.2460	**6.8048**	0.2320
Holiday	Boxed chocolate	**0.3587**	**0.5549**	**0.3597**	**0.5560**	**0.3296**	**0.5092**
	Non-boxed chocolate	**−0.1825**	**0.4493**	−0.1865	**0.4488**	**−0.1875**	**0.3477**
	Other candy	0.0297	**0.2022**	0.0259	**0.1960**	0.0236	0.1033
Distance		0.1773	**2.0225**	0.1854	**1.9774**	0.8386	**22.4061**
Distance square		−0.0552	**−0.7031**	−0.0625	**−0.7155**	−0.0745	**−1.9064**
Assortment index		**2.8117**	**1.8000**	**2.7815**	**1.7868**	**2.5091**	**1.4289**
Log marginal density		−55,346.4219		−55,294.3750		−26,764.0977	

Note: Parameters in bold indicate significance at 95% level.

find distance to the store has non-linear effects and consumers are willing to travel in order to purchase from the specialty format.[11] The effect of assortments has a greater impact when purchasing from the supermarket format, consistent with the fact that supermarkets will have a larger assortment, and households may derive a significant portion of utility from purchasing in other categories. In contrast, households may have to make a special trip for a single category when purchasing from a specialty store. However, this may not be the case if both stores from supermarket and specialty store are located in the same mall. In the context of current study none of the store from supermarket and specialty store is located in the same mall.

5.4. Cross-category correlation

We also investigate the cross category correlation in utilities (the $\boldsymbol{\Sigma}_u$ matrix) between and within formats (see Table 6). Interestingly, we find that within the supermarket format these cross category correlations are negative while within the specialty store format they are positive. This indicates that while these products are purchased together in the specialty format, this is not the case in the supermarket format where consumers tend to buy one or the other category. This is a significant result and one that is supported by our other results. Thus, the negative coefficient for the holiday dummy in the non-boxed chocolate category in the supermarket format (see Table 5) for all models indicates that during this time period, purchasing in that category is actually negatively impacted. Furthermore, as noted earlier, this depression for the non-boxed category is not seen in the specialty format. Clearly, holidays positively impact purchasing in all categories in the specialty format. From the consumers' point of view, this is certainly logical—a supermarket is visited with far greater frequency since it provides other staples as well. While given the infrequency with which specialty formats would be visited, the motivation could well be to buy the additional category while there, since a future visit was likely to be relatively distant. This is in fact also supported by the assortment parameters in Table 5 which show a greater impact on purchasing in the supermarket format indicative of the fact that the wider assortment does in fact provide an additional draw for consumers. Note that a similar investigation of response parameters across the formats indicate insignificant correlations implying that for the categories under consideration, responses between categories and formats are insignificantly correlated.

Furthermore, we find that neglecting unobserved heterogeneity understates significant within cross-category correlations in supermarket store and overstates in specialty store. In specialty store some of the significant cross-category correlations are attributed to absence of unobserved heterogeneity. Even though cross-format cross-correlations are insignificant we find neglecting unobserved heterogeneity overstates their values.

6. Simulation study

Since a multivariate probit model does not allow for an analytical calculation of elasticity we conduct a simulation experiment to study market response to specific changes in a given variable. This allows us to compare the magnitude of responses across formats and categories. Using the methodology proposed by Allenby and Lenk (1994), we use estimated utilities to calculate base incidence probabilities. A 10% bump in a specific independent variable then allows the determination of a change in incidence probabilities, thereby allowing the calculation of a traditional elasticity formulation. Table 7 offers price elasticities calculated in this manner. Given our earlier discussion on boxed chocolates as a possible gift item, we would expect price elasticities to be significantly lower for that category in the specialty store relative to the supermarket format. Our results bear this out. Clearly, for this particular category consumers are willing to pay a higher price for the specialty format product.

This sensitivity in response to the boxed chocolate category makes the latter a promising target for eliciting strong consumer responses to promotional strategies. This would then be a powerful tool in the hands of either retailer. In order to study such retail

[11] Using simulation method we find the elasticity of distance on purchase incidence probability is −0.8465 for supermarket whereas for specialty store it is −0.4328. This contrast, indicating the greater willingness to travel to the specialty store relative to the supermarket, is far more reasonable than the direct parameter comparison, and certainly more consistent with the literature (Briesch et al., 2009; Solgaard and Hansen, 2003).

Table 6
Correlation matrix (Σ_u).

		Supermarket			Specialty store		
		Boxed chocolate	Non-boxed chocolate	Other candy	Boxed chocolate	Non-boxed chocolate	Other candy
Base model							
Supermarket	Boxed chocolate	1.0000	**−0.2501**	−0.0197	0.0000	0.0000	0.0000
	Non-boxed chocolate	…	1.0000	**−0.6612**	0.0000	0.0000	0.0000
	Other candy	…	…	1.0000	0.0000	0.0000	0.0000
Specialty Store	Boxed chocolate	…	…	…	1.0000	0.3046	**0.0924**
	Non-boxed chocolate	…	…	…	…	1.0000	**0.0834**
	Other candy	…	…	…	…	…	1.0000
Homogeneous model							
Supermarket	Boxed chocolate	1.0000	**−0.2592**	−0.0211	0.0120	0.0070	0.0082
	Non-boxed chocolate	…	1.0000	**−0.6714**	−0.0513	−0.0361	−0.0088
	Other candy	…	…	1.0000	0.0295	0.0109	0.0051
Specialty store	Boxed chocolate	…	…	…	1.0000	0.3141	**0.0957**
	Non-boxed chocolate	…	…	…	…	1.0000	**0.0864**
	Other candy	…	…	…	…	…	1.0000
Full model							
Supermarket	Boxed chocolate	1.0000	**−0.2955**	−0.0234	0.0048	0.0028	0.0009
	Non-boxed chocolate	…	1.0000	**−0.7071**	−0.0104	−0.0065	0.0011
	Other candy	…	…	1.0000	0.0036	0.0011	0.0015
Specialty store	Boxed chocolate	…	…	…	1.0000	**0.0811**	0.0400
	Non-boxed chocolate	…	…	…	…	1.0000	0.0382
	Other candy	…	…	…	…	…	1.0000

Note: Correlations in bold indicate significance at 95% level.

Table 7
Price elasticities.

	Supermarket	Specialty Store
Boxed chocolate	−2.17	−0.11
Non-boxed chocolate	−0.16	−0.17
Other candy	−0.12	−0.16

strategies further, we conduct the following two simulation studies. First, we study the impact of a 10% price cut in the boxed chocolate category (by either or both retail formats) on the market share of the remaining categories and formats. Second, for each case, we study the impact on individual category profits across the two store formats. For this purpose, we first compute the unit margin by utilizing both the retail and the wholesale price provided by the retailer. We then multiply this with the total quantity for our data analysis period, which is obtained from the market share calculations based on the first stage of the simulation study. The results of these two studies are given in Tables 8 and 9 respectively.

As can be seen the numbers and signs are consistent across both tables. We find that a 10% price cut in the boxed chocolate category in supermarkets increases its' own market share by 28.80%, and profits by 15.59%. By comparison, the drop in market share and profits of the same category in the specialty store is only 0.55% and 0.56% respectively. This interesting asymmetry in results is seen again when the price cut is offered by the specialty store. The gains in market share and profits are minimal for the same store format (0.57% and 0.46%, respectively) and more importantly, the supermarket does not lose significantly (0.42% and 0.45% loss in market share and profits, respectively). Given the (relatively) inelastic nature of demand in the specialty store, this is certainly logical—the specialty store will be less 'helped' as well as less 'hurt' when faced with price fluctuations. Clearly, a one sided price war would not reward the specialty store significantly, but if initiated by the supermarket, would certainly reward the latter.

In order to explore this further, we also study a third scenario where the specialty store immediately retaliates with a matching price cut. We find that the supermarket will still have appreciable gains in market share and profits across categories, and though the specialty store appears to lose market share and profits, this loss is relatively lower compared to the earlier scenario when it did not retaliate.

It is also interesting to note that a positive impact in the supermarket format is not seen consistently across its categories. Thus, supporting our earlier observation that consumers seem to buy one or the other category but not jointly in the supermarket format is borne out by the results in Table 7. In all scenarios, a gain in market share or profits for this format in the boxed chocolate category is met with a drop for the non-boxed chocolate category. The positive impact on boxed chocolates observed in scenario 2 for the specialty format, however, is also seen in the non-boxed chocolates, also supporting our earlier contention that consumers seem to buy the categories jointly when purchasing from the specialty format store.

7. Managerial implications and conclusion

Any given store format provides consumers not only with purchasing opportunities, but also with a shopping environment and context that consumers will experience apart from the specific category needs. A format thus offers a means of defining a positioning strategy for a diverse market characterized by heterogeneous consumer needs and intense competition. The format selection by retailers becomes even more critical given that the same set of consumers now tend to shop across different formats not only for products in different categories but sometimes in the same categories. Understanding consumer shopping behavior across different store formats therefore becomes critical for retailers in establishing an effective positioning strategy tailored to consumers and their purchasing needs.

Our research uses a conceptual framework of heterogeneous consumer shopping behavior across different store formats for similar product categories, to offer a model which includes factors such as store characteristics, marketing variables, category characteristics and external factors (e.g. seasonal effects). The model

Table 8
Effects of promotion depth on market shares (MS).

	% change in MS of boxed chocolate	% change in MS of non-boxed chocolate
Scenario 1: Supermarket gives 10% promotion depth in Boxed Chocolate category		
Supermarket	+28.8045	−0.2365
Specialty store	−0.5534	−0.5209
Scenario 2: Specialty Store gives 10% promotion depth in Boxed Chocolate category		
Supermarket	−0.4235	−0.2281
Specialty store	+0.5658	+0.4220
Scenario 3: Supermarket and Specialty Store give 10% promotion depth in Boxed Chocolate category		
Supermarket	27.0572	−0.2495
Specialty store	−0.2956	−0.7256

Table 9
Effects of promotion depth on profits (π).

	% change in π of boxed chocolate	% change in π of non-boxed chocolate
Scenario 1: Supermarket gives 10% promotion depth in boxed chocolate category		
Supermarket	+15.5869	−0.2635
Specialty Store	−0.5630	−0.5218
Scenario 2: Specialty store gives 10% promotion depth in boxed chocolate category		
Supermarket	−0.4495	−0.2640
Specialty store	+0.4603	+0.4101
Scenario 3: Supermarket and specialty store give 10% promotion depth in boxed chocolate category		
Supermarket	+14.0189	−0.2853
Specialty store	−0.4001	−0.7373

also allows us to capture the correlations in utilities which help explain joint purchasing behavior and consumer preferences for categories within as well as across store formats. We find, as posited earlier in our framework, that consumers do indeed have a higher preference for categories in the specialty format compared to supermarket format, and that the relative impact of marketing variables (price and promotion) vary across categories and formats. Furthermore, the holidays, the assortment available as well as distance all play a role in purchase probabilities.

These results speak to significant managerial strategy implications. For example, the low sensitivity to price makes the specialty format – relative to the supermarket format – particularly resistant to sales promotions. This is confirmed with our later simulation exercise demonstrating that a price cut neither helps nor particularly damages market share or profits for a specialty store relative to the supermarket format. On the other hand, the supermarket format is tremendously responsive to sales promotions. The specialty store format must therefore find another tool to compete with. Fortunately, our analysis reveals several countermeasures available to this formatting structure as well.

For example, as is revealed by the utility correlation matrix, cross category joint purchasing behavior is far more prevalent in the specialty format relative to the supermarket format. This is an intuitively pleasing result given that for the specialty format where consumers make a deliberate and planned trip for confectionary goods, they will tend to purchase across the categories—whether anticipating future needs or avoiding a second trip. This inclination to 'maximize' the utility from a particular trip will not occur in the supermarket format given that this is a more frequently visited format with utility coming from several other categories as well. This clearly speaks to the retailer in terms of strategy—the customers of a specialty format, relative to the supermarket format, will clearly be more amenable to purchases beyond their immediate needs. Efforts on the part of the retailer to promote purchasing across categories within the broad banner of confectionary goods are more likely to be rewarded in a specialty format relative to a supermarket format.

We also find that the specialty format is particularly responsive to seasonal or holiday dummies. Thus, a measure, albeit a non-price measure, to attract consumers to the store during holidays may prove relatively more effective for specialty formats relative to supermarket formats. Retail managers of specialty stores can thus take advantage of special occasions (including such holidays which results show above, significantly and positively influence consumer purchases). Since in this format the different categories are purchased together, a strategy that draws on several results could be to offer cross category purchasing incentives for the usual line of product categories, along with some newly introduced lines particularly for holidays.

In summary, we find evidence of differential consumer response behavior for similar categories across different store formats. Our model can help retail managers explore factors that are responsible for this differential response behavior and ultimately, use them to exact a strong response from consumers and to differentiate themselves from other retail formats. Interestingly we find consumer perceptions for similar categories across different store formats do indeed vary. Therefore, the correlation matrix could be utilized by the retail managers in order to take marketing mix decisions effectively. External factors such as holidays have a differential impact across the different store formats. Retail managers could use these factors to increase their profitability and compete more effectively in a market place characterized by intense competition from different store formats.

Furthermore, our study sheds lights on some of the concerns raised with regard to expansion of large retail formats not only in developed countries but also in developing countries that could very well raise the question of very survival of small retail formats. Even for shopping in the same category consumer needs could vary depending on the shopping context. Therefore, small retail formats could still manage their traditional marketing tools, price and promotions, efficiently to compete with these large formats as consumer responses to prices and promotions significantly vary across formats. Moreover, in some categories there could very well be no competitions at all across formats or the

nature of competition could favor small formats (e.g., same categories are seen as complements in specialty store whereas they are substitutes in supermarket). Therefore, small formats selling those categories could very well survive harmoniously with large formats.

There are some caveats to our analysis which we leave for future research to address. For example, while we do capture unobserved heterogeneity in our model it may be interesting to study the effects of psychographic variables.[12] It may then be possible to form consumer segments that can be identified as patrons of specific formats. A second interesting avenue of future research is to study the decomposition of this differential response behavior into category specific and store format specific components. Clearly, the consideration of format – though relatively under used – is not only a rich and interesting tool in the development of retail strategy, but a critical one as well.

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[12] It should be noted that we did incorporate household demographics (using Census Block Group (CBG), level data), by implementing multivariate probit model in Hierarchical Bayes framework, but found the effects to be insignificant.