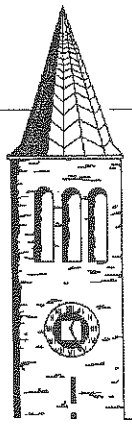

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Public Policy Implications of the Role of Channel Intermediaries in New Product Acceptance

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PUBLIC POLICY IMPLICATIONS OF THE ROLE OF CHANNEL INTERMEDIARIES IN NEW PRODUCT ACCEPTANCE

ABSTRACT

The acceleration of new grocery product offerings to channel intermediaries imposes substantial direct and indirect costs to all channel members including consumers. In order to improve the total system's efficiency of new product introductions, an understanding of the selection process of the intermediary is critical. Using data collected on new products presented to a major channel intermediary, logistic regression models are estimated to describe the intermediary's accept/reject decisions and how different variables influence these decisions. Public policy implications of these results are developed for producers, consumers, and for improving the efficiency of the overall marketing system.

THE PROBLEM

Each year the U.S. grocery distribution system is buffeted by an outpouring of new products. Due to different definitions employed, estimates of the number of new products--either fundamentally new products (e.g., derived from new technology) or line extensions (e.g., new flavors or package sizes)--introduced into grocery distribution channels in 1986 vary from 2,560 (A.C. Nielsen 1987) to 7,489 (DFS-Dorland 1986). Moreover, the number of introductions in 1986 had more than doubled since its 1970-81 annual average (DFS-Dorland 1987) and during the first eleven months of 1987, the number of new products

increased twenty-six percent over the same period a year earlier. The relatively constant shelf space allocated to dry groceries despite continuing increases in overall store sizes (Progressive Grocer 1987) creates the dilemma for buyers of having to decide which of these new products to accept.

The resources required to support this yearly influx of new products are enormous for the entire marketing system. Although aggregate data on costs of new product introductions are not available, occasional references on individual product introductions suggest that industry-wide totals are staggering. Fortune (August 1986), for example, reports a total development expenditure of $1.5 billion by the Proctor and Gamble Company to introduce a single product, its Ultra-Pamper diaper, to U.S. supermarkets.

At the very heart of manufacturer new product introductions to channel intermediary firms is a set of serious public policy questions. To what extent are manufacturers from increasingly oligopolistic industries, as a function of their channel domination, at a competitive advantage vis-a-vis their fringe selling counterparts? As manufacturers continue to develop new products at a more rapid rate than intermediaries can accommodate them, do distributors, as the new arbitors of consumer choice, dismantle neoclassical notions of consumer sovereignty. Do channel intermediaries make new product selection decisions in such a way as to enhance or inhibit overall marketing system efficiency and performance? Despite the critical importance of these questions very little empirical research has examined the public policy dimensions of new product selection decisions by channel intermediaries.

MANUFACTURER STRATEGIES AFFECT OTHER CHANNEL MEMBERS

National brand manufacturers cite a number of reasons for the proliferation of new products including: to maintain interest of channel intermediaries and consumers, to extend an item to an adjacent product-space in an effort to attract incremental business, to take advantage of new technologies, to counter competitive thrusts, to transform a commodity product to a higher margin value-added item, and to partially ensure against high new product failure rates.

Despite the key role played by new products in manufacturer marketing strategies, their proliferation imposes considerable costs on other channel members (e.g., wholesalers and retailers) and consumers. Retail organizations, for example, although often attracted to new products by the lure of additional profit opportunities, must also face substantial costs associated with new products such as personnel costs in evaluating new products (Hamm 1983), costs of entry and maintenance of new data, assigning of Universal Product Codes (UPCs), and other costs associated with inventory control and handling, separate warehouse slots and codes, specialized retail shelf space requirements, and production of shelf signs and price tags. Finally, new products impose substantial direct and indirect costs on consumers as well. These costs come in the form of higher information processing costs, often self-cancelling effects of competitive brand advertising, higher search costs, potential confusion regarding new products' characteristics and availability, and higher prices. Thus, the resultant costs and benefits associated with new products are of vital concern to both managers and public policy makers alike.

To maximize both distributive efficiency and the probability of new product acceptance in this increasingly cost competitive environment

manufacturers require an intimate knowledge of buyers' behavior, not just at consumer levels but at the pivotal channel intermediary levels as well. Economic theory suggests that manufacturers should allocate their new product budgets to various components of the new products' marketing plan in order to equalize marginal returns. To exercise this optimality criterion, manufacturers need better information regarding the product (and service) dimensions most important to buyers and the set of decision rules used in their accept/reject decisions. However, relatively little is known specifically about how the key accept/reject decisions are made by channel intermediaries.

This paper develops logistic regression models to formalize the channel intermediary's decision process regarding new product introductions by manufacturers. The effects of various components of manufacturers' marketing strategies on new product selection decisions are estimated and their policy implications are discussed.

LITERATURE REVIEW

Past efforts to investigate the economic relationships of the new product introduction process can be classified into those with either a private firm, strategic orientation of a public policy perspective. Some key references from the former, managerial perspective are Grashof (1970), Heeler et al. (1973) and Montgomery (1975). See Rao and McLaughlin (1988) for a discussion of this literature.

This paper takes the latter orientation where the most common conceptual theme has been the structure-conduct-performance paradigm of industrial organization economics. Adams and Yellen (1976) developed a formal model incorporating the concept of commodity bundling where

comparable products are available in slightly differing forms. They demonstrated that pricing strategies can be followed that extract consumer surplus much in the same way as price discrimination but perhaps more profitably. They conclude that commodity bundling produces nonoptimal product output and causes significant redistribution of income.

Schmalensee (1978) identified product proliferation as an explicit manufacturer strategy to raise entry barriers. These may be due to the substantial marketing costs associated with new product development, large sales forces, and the substantial advertising and promotional expenditures accompanying new products. He showed that in an industry characterized by brand proliferation, an equilibrium is possible in which established brands earn excess profits but no potential entrant can possibly enter. In general, entry barriers have been shown in these structural studies to be higher in product categories with a high level of product proliferation (Conner et al. 1986).

In a detailed analysis of the breakfast cereal industry, Scherer (1979) attempted to estimate the welfare effects of new product proliferation. Like other theoretical treatments of the welfare effects of expanded product variety (see, for example, Lancaster 1975; Dixit and Stiglitz 197 ; Stern 1972; and Spence 1976) Scherer's results were somewhat inconclusive. He speculates, however, that "it appears probable that product proliferation has, at least at the margin, cost more than it was worth."

Finally, Connor (1981) constructed a simple regression model to examine the relationship between market structure and the number of new products introduced. In general, he found that imperfect market

structures resulted in greater levels of product proliferation. Curiously, however, very high levels of concentration (e.g., CR4 above 65 percent) were positively correlated with fewer new products, suggesting that caution should be exercised in generalizing these results.

Thus, the few past efforts attempting to evaluate the policy dimensions of new product introductions have relied either on secondary data involving limited numbers of categories or strictly theoretical approaches. Moreover, the most recent empirical studies (Scherer and Connor) were both conducted on data collected from the 1970s. Given the surge of new products over the past decade and their increasing economic importance, research on this important problem is required.

THE CHANNEL INTERMEDIARY'S ACCEPTANCE MODEL

The conceptual model guiding our analysis of the policy dimensions of the decision to accept or reject a new product by a channel intermediary is presented in Figure 1.

Insert Figure 1 Here

This approach expands the conventional structure-conduct-performance paradigm by elaborating the conduct dimension. Conduct has not recieved the research attention enjoyed by the other two elements primarily due to the dificulty of quantification and the lack of access to the requisite data. This study attempts to remedy both of these traditional constraints.

While the conduct model implies that a new prduct's acceptance is a function both of manufacturer strategies and of channel intermediary

structural characteristics, this latter set of variables is held constant in our model. Effectively, the buyer evaluates the new product's likely demand and profit potential based on the information (marketing strategy variables) presented by the manufacturer and subsequently makes an accept/reject decision.

In Table 1, we have grouped these variables into four categories: financial, competition, marketing strategy and other. Further, we have hypothesized the direction of influence of each variable on the intermediary's decision to accept a new product; elaboration of the reasons for these hypothesized directions may be found in Rao and McLaughlin (1988).

Insert Table 1 About Here

Under certain assumptions, the acceptance probability for a new product modeled by the familiar logistic function:

$$P_j = P[y_j = 1] = \frac{1}{1 + \exp(-\alpha - \underset{\sim}{\beta}' \underset{\sim}{x}_j)} \qquad (1)$$

where:

P_j = probability of acceptance of the j-th item by the channel intermediary;

y_j = channel intermediary's decision on j-th item (= 0 for reject; = 1 for accept);

$\underset{\sim}{x}_j$ = (px1) vector of descriptors measured for the j-th item;

$\underset{\sim}{\beta}$ = (px1) vector of parameters; and

α = an intercept term.

The logistic regression model in equation (1) can be estimated by maximum likelihood methods. The LOGIST procedure developed by Walker and Duncan (1967) and implemented in the SAS package (Harrell, 1984) is suitable for this purpose and utilized here.

Empirical Study

Data were collected from a large supermarket chain whose headquarters and majority of stores are located in the Northeastern U.S. The chain is publicly held, covers a large trading area with approximately 100 stores and its 1986 sales approached $1 billion. The chain's headquarters region is one frequently employed by manufacturers for test marketing due to the representativeness of the consumer profiles and trading area. Hence, although the model developed here only applies to one company, the representativeness of the firm and its environment may permit a cautious generalization of the results to other market conditions.

Two types of primary data were collected from the chain: (a) vendor supplied materials including product physical characteristics, financial information, and promotional support, and (b) a one-page questionnaire completed by each buyer assessing qualitative attributes for every new item. These data were collected for over 2,000 products on a weekly basis from June, 1986 to February, 1987.

Intermediary's Acceptance Rates: The overall acceptance rate of new products by this chain was 31.9 percent. However, significant variation exists in the rates of acceptance by product category (from 21 percent for canned foods to 44 percent for snack items) and by suggested retail

price of the item (29 percent for items priced less than $1.00 to 39 percent for items over $2.00).

The marketing support variable is likely to be highly correlated with the size of the firm offering the product to the channel. Our attempt to collect additional data on manufacturer size using total sales as a measure was not completely successful, due in major part to the large number of privately held firms for which data were not available. However, for the available data, the acceptance rate was 41.3% for firms with annual sales over $700 million, 28.6% for firms with sales between $2 and 700 million and 29.2% for firms with sales under $2 million.

Analysis Method: The data were divided randomly into two subsamples for analysis and validation; the validation data constituted about 1/3 of the total sample. The major analysis consisted of building logistic regression models for all categories of items, for subgroups of items with several levels of marketing support and for groups of items of different price ranges. Analyses for subgroups of items were conducted to account for the inherent heterogeneity among the various categories of products. In all of these models, the product category variations are accounted for by using a set of dummy variables.

RESULTS

Structure and Fit of the Overall Model: The logistic regression model fits the data extremely well. The predictive accuracy exceeds 78 percent (see Rao and McLaughlin (1988)). The estimated coefficients for the variables for the logistic model for the total sample of items are shown in Table 2. The model chi-square is highly significant. Further,

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Insert Table 2 Here
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the coefficients of the majority of the variables are in the predicted direction. The variables of product uniqueness, expected category growth, and number of competing firms show positive and significant effects. The variable bill-back terms of trade shows negative and significant effect. These results are according to our hypotheses. The only variable with negative and significant effect is gross margin for which we have hypothesized a weak positive relationship. This finding is consistent with similar results of Montgomery (1975), however, who found that the relationship between new product acceptance and gross margin to be negative but not significant. The only other variables that appear with a contradictory sign were the remaining terms of trade factors, but their coefficients are not statistically significant.

Model Structure for Subgroups: The logistic model was also estimated for subgroups of items--by marketing support and by price. As could be expected, the classification accuracy (not shown here) improved for the various subgroups of items (due to greater homogeneity within a subgroup). The direction and significance of the variables of these models are presented in Table 3.

Insert Table 3 Here

The subgroup models revealed a number of differences from the overall model. First, for low priced items, as the intensity of vendor effort and profit per shelf volume increase, the probability of acceptance increases. Second, for medium and high price items, gross

margin, vendor effort, and profit per volume cease to have significant influences on the accept/reject decision, however, both the quality and expected category growth show positive significant influences. In addition, the synergy dummy has a negative significant effect for high priced items. Third, quality measure is the only significant variable common to both highly supported and unsupported items. For highly supported items, opportunity costs (negative), expected category growth (positive), and both price dummies (negative) are significant, while gross margin (negative), number of competing firms (positive), and vendor effort (positive) are significant indicators. Note that for all these subgroups, most of the signs on the terms of trade dummy variables are negative and none of the few positive signs is significant.

PUBLIC POLICY IMPLICATIONS

This paper reported on the modeling of the accept/reject decisions by one channel intermediary for new items. Generally, the statistical results are significant and the explanatory variables behaved as predicted. Such results, especially when refined and validated with subsequent analyses--now in progress--should prove useful to both firm managers (see Rao and McLaughlin) and public policy makers.

To the extent that this model is successful in predicting the acceptance probability by channel intermediaries, it can reduce new product introduction costs and (eventually) may help reduce new product failure rates. The lack of significant effects of certain terms of trade (e.g., slotting allowance and free cases) suggests that manufacturers should redirect some of these funds into activities more likely to positively influence buyers, such as improvement of product

quality. Such a redirection is particularly important in light of the increasingly large expenditures on non-price trade allowances to gain entry into supermarket shelves (see, for example, Supermarket News, 1984 and New York Times, 1988).

This model estimated the importance of the various components of a manufacturer's new product strategy in determining the acceptance of the new product by an individual channel intermediary. Once this research is extended to additional intermediaries, aggregate importance weights of these factors can be determined. Thus, calculation of marginal returns associated with manufacturer investments into various marketing mix factors becomes straightforward and optimum levels of manufacturer expenditures can be determined. Consequently, channel efficiency increases: profits are likely to be higher for channel members and at the same time prices may be lower for consumers.

In general, the higher acceptance rate for new products introduced by the large manufacturers (due to their greater resources in R&D, advertising and promotion, larger "families of products," etc.) may suggest still greater barriers to entry for smaller, regional suppliers. One long run consequence may be a continued grocery industry dominance by larger manufacturers (increased concentration). However, non-price terms of trade are generally not found to be statistically significant, and when they are they have tended to negatively influence acceptance. Although this result appears contrary to certain of our prior expectations, a possible explanation is that the presence of certain nonprice incentives like slotting allowances may be correlated with inferior products. Conversely, buyers may indeed recognize and accept truly superior products on their own merits. Thus this implies that

much of the large and currently expanding manufacturer promotional allowances directed to the retail trade may be redundant. Indeed, this study indicates that small manufacturers may be better off by concentrating on product quality, uniqueness and competitive prices.

Data collection efforts in this research were somewhat disappointing since various pieces of information were missing (e.g., number of coupons, dollar amounts of advertising, etc.) for a large number of items. This is also a problem for channel intermediaries. We believe that information from vendors could be much improved by including, perhaps even standardizing, advertising and promotional materials, discounting schedules, etc., in new product packets. Although some vendors may not embrace such a proposal due to feared loss of competitive advantage, overall results would undoubtedly eliminate duplication and waste while increasing the efficiency of the entire system.

Our analysis clearly points out that different categories of products are evaluated by buyers differently. A snack or cracker is twice as likely to be accepted as a canned food. Given intermediary space constraints, categories with greater numbers of new product introductions are increasingly likely to "crowd out" products from adjacent categories. Moreover, entry barriers tend to be higher in categories with greater levels of product proliferation (Conner 1986). This has implications not only for smaller suppliers who have traditionally been less aggressive than their larger competitors in new product development, but also for consumer choice which becomes shaped by the greater numbers of entries in certain product categories, and, the evidence here suggests, by larger suppliers who have a greater

number of their new products accepted. Further, in the case of food products, consumer healthand nutrition may be affected.

While we have focussed our efforts on existing channel intermediaries, the gradual emergence of new distribution channels for grocery items will be significant for marketers. These new channels could include co-op buying, mail order, and certain combinations of technologically dependent systems (such as order by phone, delivery to central locations and pick-up by customers). While dramatic innovation of channels for grocery items is not likely in the immediate future, their growth will undoubtedly diminish the power of existing channel intermediaries.

Finally, certain intermediary organizations which evaluate new products exist in other channels (e.g., book stores and movie theaters) where many of the problems of new product selection decisions are parallel to the grocery channel. The existing firms in the grocery product system which track new product introductions (e.g., Marketing Intelligence Service, Ltd., and DFS-Dorland) do not provide adequate information idiosyncratic to each buyer's decision. Thus, opportunities appear to exist for the services of information intermediaries for the grocery product channel. Likely consequences of such institutions would be improvements in channel-wide marketing efficiency.

Figure 1

CONCEPTUAL APPROACH

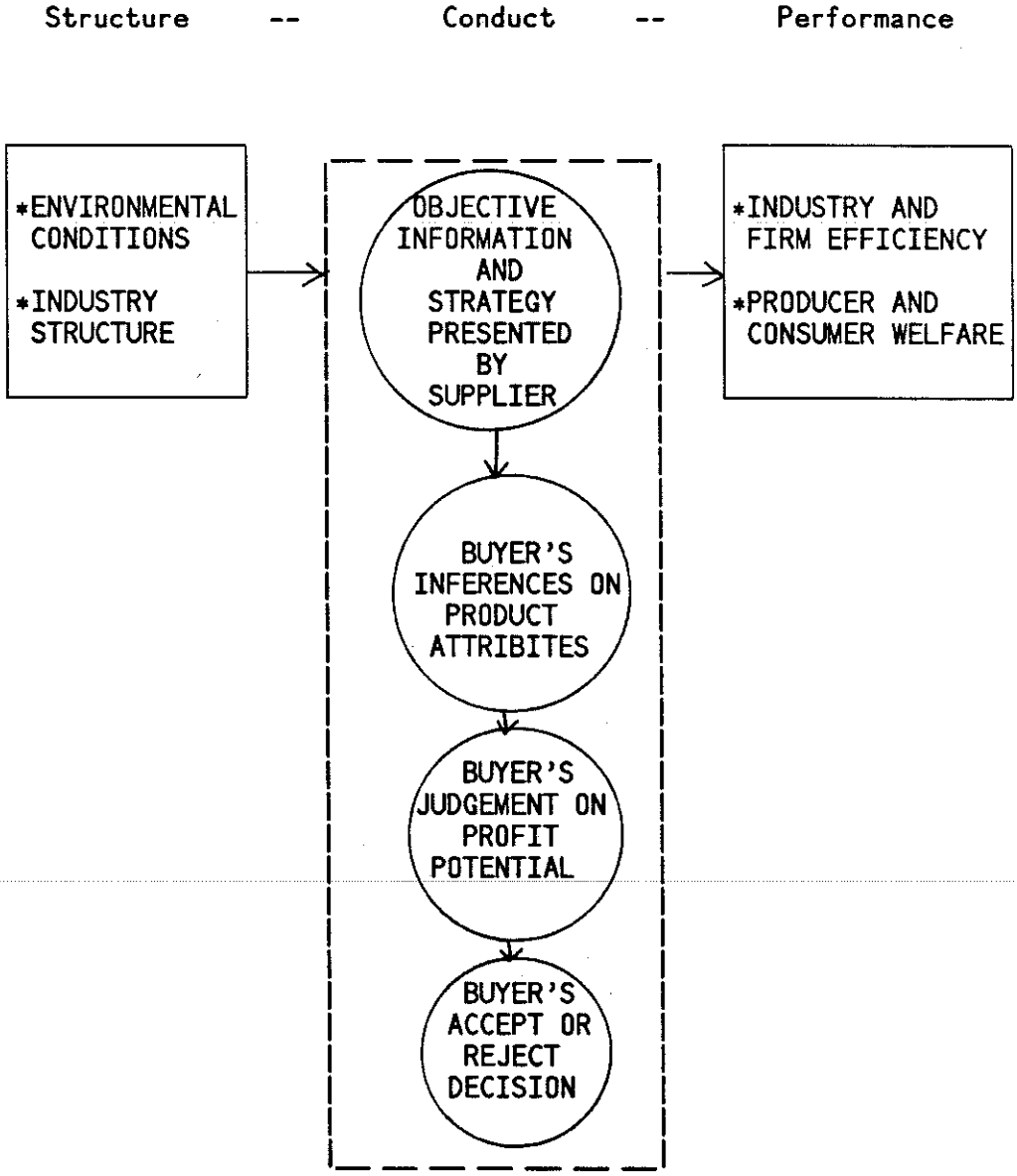

Table 1

VARIABLES, OPERATIONALIZATION, SPECIFIC MEASURES AND HYPOTHESES

Category	Variable	Operationalization	Measure(s)	Hypothesized Direction of Influence
FINANCIAL	GROSS MARGIN	Gross Margin $\left(\frac{\text{Retail Price}-\text{Cost}}{\text{Retail Price}}\right)$	Percentage gross margin	Positive (?)
	PROFIT	Profit per shelf volume	$ profit per cu. ft. of shelf volume	Positive (?)
	OPPORTUNITY COST	Opportunity cost of capital	Dollars needed to meet min. order quantity	Negative
COMPETITION	FIRM	Firm - number of competing items	Actual buyer determination	Positive (?)
	BRAND	Brand - number of competing brands		Negative
MARKETING STRATEGY	PRODUCT UNIQUENESS	Product performance, quality and package design ratings	Buyer judgments on 0-10 scales (sum)	Positive
	VENDOR EFFORT	Vendor advertising and promotion effort promised and vendor reputation ratings	Buyer judgments on 0-10 scales (sum)	Positive
	MARKETING SUPPORT	Vendor's plans for TV advertising and coupons	Three categories --no, partial and high support	Positive
	TERM OF TRADE	Presence or absence of four types of non-price marketing incentives	Dummy variables	Positive or Negative
	PRICE	Manuf. suggested retail price/unit	Two dummy variables for low and medium prices	Positive (?)
OTHER	CATEGORY GROWTH	Expected growth of product category	Index of buyer judgments on 0-10 scales	Positive
	SYNERGY	Association with family of existing products	Whether item is a member of a family (0,1)	Negative (?)

Table 2

RESULTS OF LOGISTIC REGRESSION FOR TOTAL SAMPLE
(ACCEPT/REJECT DECISIONS)

GROUP OF ITEMS	
VARIABLE	ALL ITEMS
INTERCEPT	-5.47(41.92)*
GROSS MARGIN	-0.06(10.30)*
PROFIT PER SHELF VOLUME	0.004(3.24)
OPPORTUNITY COST	-0.001(1.14)
NUMBER OF COMPETING FIRMS	0.14(11.72)*
NUMBER OF COMPETING BRANDS	-0.03(1.89)
QUALITY MEASURE	0.25(18.03)*
VENDOR EFFORT	.03(0.46)
EXPECTED CATEGORY GROWTH	0.68(46.49)*
SYNERGY DUMMY	-0.31(2.01)
TERMS OF TRADE DUMMIES:	
OFF-INVOICE	-0.19(0.70)
SLOTTING ALLOWANCE	-0.43(2.03)
BILL BACK	-0.93(6.04)*
FREE CASES	-0.22(0.87)
LOW PRICE DUMMY	-0.17(0.30)
MEDIUM PRICE DUMMY	0.02(0.01)
PRODUCT CATEGORY DUMMIES	(NOT PRESENTED HERE)
NUMBER OF OBSERVATIONS	687
MODEL CHI-SQUARE, D.F.	249.49; 23
P-VALUE	0.0

NOTE: ENTRIES ARE COEFFICIENT AND CHI-SQUARE FOR EACH VARIABLE (with 1 d.f.)

*Significant at 0.05 level.

Table 3

RESULTS OF LOGISTIC REGRESSION FOR
SELECTED SUBGROUPS OF ITEMS
(Accepted/Reject Decisions)

Group of Items Variable	Low Priced Items	Medium Priced Items	High Priced Items	Unsupported Items	Highly Supported Items
Intercept	- *	- *	- *	- *	- *
Gross Margin	- *	-	+	- *	+
Profit per Shelf Volume	+ *	-	-	+	-
Opportunity Cost	-	-	+	+	- *
Number of Competing Firms	+	+ *	+ *	+ *	-
Number of Competing Brands	-	-	-	-	+
Quality Measure	+	+ *	+ *	+ *	+ *
Vendor Effort	+ *	+	-	+ *	+
Expected Category Growth	+	+ *	+ *	+	+ *
Synergy Dummy	+	-	- *	+	-
Terms of Trade Dummies:					
Off-Invoice	-	+	-	+	-
Slotting Allowance	-	- *	+	-	+
Bill Back	-	- *	-	-	+
Free Cases	-	+	-	-	-
Low Price Dummy				+	- *
Medium Price Dummy				+	- *
Product Category Dummies		(Not Shown Here)			
Number of Observations	237	289	161	194	155
Model Chi-Square; D.F.	90.61; 21	128.06; 21	117.75; 21	120.87; 23	95.61; 23
P-Value	0.0	0.0	0.0	0.0	0.0

Entries indicate the direction of influence ("-" for negative, "+" for positive) and statistical significant ("*" at the 0.05 level).

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