RETAILER PROMOTION PASS-THROUGH:
A MEASURE, ITS MAGNITUDE, AND ITS DETERMINANTS

by

Kusum L. Ailawadi
Charles Jordan 1911 TU'12 Professor of Marketing
Tuck School of Business
Dartmouth College
100 Tuck Hall
Hanover, NH 03755
Tel: (603) 646-2845
Fax: (603) 646-1308
e-mail: kusum.ailawadi@dartmouth.edu

and

Bari A. Harlam
Visiting Scholar
Kellogg School of Management
Northwestern University
e-mail: bari-harlam@kellogg.northwestern.edu

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Abstract

We use data on all manufacturer funding and all promotion activity by a major US retailer during a two-year period to compute promotion pass-through and assess its magnitude. Then we estimate a two-tiered probit and lognormal regression model to study drivers of the large variation we observe in pass-through rates.

Although our analysis is based on data from a single retailer, it provides a much more complete picture of the magnitude and variability of pass-through than has been available to date. Some key insights from our work are as follows. First, the retailer passes through more than 100% of the total manufacturer funding it receives in aggregate but the median pass-through rate for individual manufacturers is much lower than 100%. Second, some manufacturers are promoted even without funding. This is more likely for private label and high share manufacturers in high lift and high margin categories. Third, a small number of manufacturer and category characteristics explain a significant amount of the variation in pass-through. In particular, pass-through is higher for private label. It increases with the share of the manufacturer in the focal category but also with the sales of that manufacturer in other categories. And categories with high sales, high promotion lift, low concentration, and low margin get more pass-through.

We are able to corroborate some recent conclusions in the literature, e.g., that some pass-through rates are much higher than 100% and high share manufacturers get more pass-through. We add several new insights, e.g., on the magnitude of aggregate pass-through, cross pass-through across and within categories, pass-through for private label, and the category drivers of pass-through.

One line abstract: We account for all trade promotion funds received and all price promotion spending incurred by a retailer to show the magnitude of pass-through and how it varies across categories and manufacturers.

Keywords: Trade promotion, Promotion pass-through, Promotion response, Retail Promotions, Private label promotions, Cross pass-through.

RETAILER PROMOTION PASS-THROUGH:
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As trade promotion spending in the consumer packaged goods (CPG) industry has steadily increased, manufacturers are rightly concerned about the proportion of this spending that is passed through to consumers by retailers. Research on promotion pass-through has been active since the seventies, but most of it is analytical with only a few empirical analyses that employ data that are 15-30 years old. Amongst the latter, the older studies (Armstrong 1991; Chevalier and Curhan 1976; Curhan and Kopp 1987; Walters 1989) examine a small number of specific trade deals offered to a retailer during a short period while the two recent ones (Besanko, Dubé, and Gupta 2005, hereafter denoted BDG; Pauwels 2007) do not have data on trade promotions – they estimate pass-through from changes in weekly wholesale and retail prices.

In this paper, we compute pass-through using actual data on manufacturer trade promotion funding and retailer promotional spending. The data are extracted directly from the financial and sales database of a major U.S. retail chain and contain all trade promotion funds provided by each manufacturer in each category sold by the retailer as well as all price promotion spending by the retailer for those manufacturers' products. This allows us to compute the retailer's aggregate pass-through, i.e., the percentage of total trade promotion funds that it spends on price promotions to consumers, as well as pass-through for each manufacturer in each category. We first describe the magnitude and variation of pass-through and then estimate a model to explain this variation across categories and manufacturers.

A MEASURE OF PASS-THROUGH

Promotion pass-through is defined as the percentage of trade promotion dollars that the retailer spends on retail promotions to consumers (Farris et al. 2006; Neslin 2002).

Operationally, researchers have either measured pass-through as the ratio of the retailer's discount to the manufacturer's discount for a specific trade deal (e.g., Armstrong 1991; Chevalier and Curhan 1976), or they have estimated it as the change in retail price due to a change in manufacturer price using time series price data for a given product (BDG; Pauwels 2007). These approaches worked in the past when trade promotions were in the form of off-invoice or bill-back discounts for specific items sold in specific weeks. However, they have some important limitations given the current institutional reality of CPG trade promotions.

Off-invoice discounts have diminished as manufacturers have recognized that they encourage gray markets and forward buying. Cannondale Associates (1996, 2000) report that off-invoice deals decreased from 47% of the trade promotion budget in 1995 to 32% in 2000. Gomez, Rao, and McLaughlin (2007) found in their 2002 survey that, on average, only 25% of trade promotions were off-invoice. Our experience with the retailer in this study also confirms that a large portion of manufacturer funding is now in the form of lump-sum payments, market development funds, advertising allowances etc. Some sort of allocation or accounting rule is needed to link these amounts to specific items and time periods. Similarly, if retailers forward buy promoted products, some inventory management and allocation rule is needed to determine their cost in periods when part or all of the quantity sold was bought on past trade deals (e.g., the average acquisition cost computation in the Dominicks data). In the current context, therefore, it is difficult for manufacturer price or retailer acquisition cost of a specific product at a specific time to factually reflect trade promotion monies.

Given these issues, we measure pass-through by adding up all the promotion funding, in all its forms, that the retailer receives from a manufacturer in a year and comparing it to the retailer's total spending on price promotions for the manufacturer's products. Table 1 provides

complete definitions and sources of data for these and all the other variables used in our empirical work. This measure accords with the basic definition of pass-through, is much less dependent on allocation rules, and accounts for not just promotional discounts but also the amount sold on promotion, both of which determine promotion spending and should figure in the measurement of pass-through (van Heerde and Neslin 2008).

< Insert Table 1 About Here >

If funding is purely in the form of a fixed discount per promotional unit sold by the retailer, our measure coincides with the ratio of retail to manufacturer discount because both promotion spending and funding go up proportionally with the number of promotional units sold. However, when funding is not just per promotional unit sold, e.g., when part of it is in lump sum or other forms or even when there is forward buying, our measure diverges from previous ones and is more appropriate, as noted above. Other advantages of our measure are as follows. It is computed from actual funding and spending data and does not rely on model-based estimation. It focuses on promotions and separates them from regular prices, a distinction that is important in measuring pass-through (Dubé and Gupta 2008; McAlister 2007). It covers potential retailer forward buying.[1] It clearly identifies cases where the retailer promotes even without manufacturer funding and cases where the retailer does not promote despite receiving funding.

The limitations of the measure should also be noted at the outset. It precludes us from studying promotion frequency versus depth decisions (Agrawal 1996; Kumar, Rajiv, and Jeuland 2001), pass-through timing (Meza and Sudhir 2006), or promotion timing within and across brands (Lal 1990; Tellis and Zufryden 1995). We also cannot examine temporally coordinated cross brand pass-through (e.g., BDG; McAlister 2007; Dubé and Gupta 2008). However, at an aggregate level we can study whether pass-through for one manufacturer is influenced by

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[1] Of course, there is the possibility of some forward buying at the end of the year which would not be covered.

funding received from other manufacturers.   Finally, annual data aggregate across funding

changes that manufacturers may make in response to retailer spending during the year.

However, our measure is not affected by this potential endogeneity because it is computed not

estimated. Further, our discussions with the retailer and two CPG manufacturers support annual

analysis. According to them, the negotiation of trade promotion funding occurs largely at the

beginning of the year and mid-year changes are impractical and infrequent.

In sum, therefore, our measure is right for its central purpose – assessing the magnitude

and key determinants of pass-through. In the remainder of this paper, we (a) describe our data;

(b) report the magnitude of pass-through; (c) examine the extent to which cross-sectional

variation in pass-through is explained by key category and manufacturer characteristics; and (d)

conclude with a summary of our findings and their implications.

THE MAGNITUDE OF PASS-THROUGH

We use actual sales and financial data from a major U.S. packaged goods retail chain. It

sells over 200 categories of edible grocery, health, beauty, and general household products and is

a High-Low retailer, i.e., it offers price promotions on several products in each of its stores each

week. Our data cover all manufacturer funding and all price promotions by the retailer during

the years 2003 and 2004. To our knowledge, this is the first paper to measure pass-through using

complete information on a retailer's price promotion spending and funding. Therefore, it is

useful to first provide a detailed description of the magnitude of pass-through in the data. We

include in this analysis all manufacturers with annual sales greater than $10000 across all the

retailer's stores. Together, these manufacturers account for 99% of the retailer's total sales.

We begin with the ratio of total price promotion spending by the retailer during the year

to total funding received from manufacturers that year. Table 2 provides this aggregate pass-

through for the retailer as a whole as well as for each of its four major product departments. To preserve confidentiality of the retailer's data, the departments are not identified by name and only ratios and not dollar amounts are listed in the table.

< Insert Table 2 About Here >

Table 2 highlights some important facts. First, aggregate pass-through is over 100% in both years. In other words, the retailer actually spends a little more on price promotions across all products than the total funding it receives from all manufacturers. Aggregate pass-through is higher in 2004 than in 2003, reflecting the retailer's increased promotion spending in the face of growing competition, particularly from mass retailers like Wal-Mart. Second, there is significant variation in this aggregate pass-through across the four major departments, with values ranging from 65% to 200%. Thus, although promotion spending is greater than funding in aggregate, manufacturers in some categories and departments get much lower pass-through than others. These large differences also suggest some cross-subsidization across categories and departments.

< Insert Table 3 About Here >

Table 3 provides additional insights into the nature of pass-through. The first column lists the number of observations for which pass-through is defined, i.e., where manufacturer funding is greater than zero. The drop in number of observations from Table 2 to Table 3 underscores the importance of not only studying pass-through rates but also examining the retailer's promotion spending for the 27% of manufacturers who provide no funding.

The second column of Table 3 reports median pass-through across all manufacturers who provide funding. The overall median pass-through rate is 20% though it varies considerably across departments. This magnitude seems counter-intuitive at first given that aggregate pass-

through is more than 100%. However, note that some manufacturers provide no funding and some receive no spending. As can be seen below, the two groups are not the same.

	Percentage of Observations with	
	Zero Promotion Spending	Non-zero Promotion Spending
Zero Promotion Funding	12% in 2003 13% in 2004	15% in 2003 14% in 2004
Non-zero Promotion Funding	25% in 2003 17% in 2004	48% in 2003 56% in 2004

The median pass-through rate of 20% is across manufacturers who provide some funding to the retailer. But, 14-15% of manufacturers receive some promotion spending even though they provide no funding. All spending by the retailer on these zero-funding manufacturers is left out of this distribution though it does contribute to aggregate pass-through. On the other hand, 17-25% of the manufacturers receive no promotion spending although they provide some funding. They are included in the distribution and contribute to the low median pass-through.

If we only consider manufacturers who provide at least some (>$100) funding and who also receive at least some spending (> $100) from the retailer, the median pass-through increases to 75% as shown in the last column of Table 3.[2] This is broadly consistent with previous studies of major manufacturers in a few categories (83% in BDG and 65% in Pauwels 2007) and with the average of 63% reported in Cannondale Associates (2003) survey of retailers. Since the samples in these studies are likely to cover manufacturers who provide funds and receive spending, there is convergent validity in the numbers despite different measurement approaches.

< Insert Figure 1 About Here >

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[2] Aggregate pass-through, on the other hand, changes very little.

However, even in this group, the median is substantially lower than the retailer's aggregate pass-through. This is because low pass-through rates for several manufacturers are more than offset by very high pass-through for a few others, as can be seen from the complete distribution of pass-through rates in Figure 1. For instance, in 2004, almost 28% of pass-through rates are greater than 100%; the 90th percentile is 400%; and the top 10% of pass-through rates account for only 2.7% of funding but 21% of retailer spending. It is important to note that median pass-through rates also vary widely across the retailer's four main departments, ranging from 58% to 159% in 2004. Clearly, manufacturers care about the pass-through that they get for their own trade funds, not the retailer's aggregate pass-through so we now turn our attention to the manufacturer and category characteristics that might explain this variation.

DETERMINANTS OF PASS-THROUGH

Model Specification

We compile data on several manufacturer and category characteristics that may drive a retailer's pass-through decision:

$$
\begin{aligned}
\text{Passthru}_{mc} = {} & \beta_o + \beta_1 \text{Man.Share}_{mc} + \beta_2 \text{Ret.Rel.Price}_{mc} + \beta_3 \text{Ret.Rel.Margin}_{mc} + \\
& \beta_4 \text{Othr.Cat.Sales}_{mc} + \beta_5 \text{Othr.Cat.Funds}_{mc} + \beta_6 \text{Othr.Man.Funds}_{mc} + \\
& \beta_7 \text{PLDum}_{mc} + \beta_8 \text{Ret.Cat.Sales}_c + \beta_9 \text{Ret.Cat.Margin}_c + \beta_{10} \text{Ret.Cat.Lift}_c + \\
& \beta_{11} \text{Cat.Conc}_c + \beta_{12} \text{Cat.Ret.Shr}_c + \beta_{13} \text{Cat.Dist}_c + \beta_{14} \text{DDum1}_c + \beta_{15} \text{DDum2}_c + \\
& \beta_{16} \text{DDum3}_c + \varepsilon_{mc}
\end{aligned} \tag{1}
$$

The subscripts in equation (1) refer to manufacturer *m* in category *c*, and complete definitions of all variables are provided in Table 1. Previous researchers have only examined a small subset of these characteristics across a small number of categories and, as noted earlier, they use different pass-through measures. Therefore, our analysis is exploratory rather than a test of *a priori* hypotheses based on past work.

We first highlight the relevance of characteristics that have not been studied before. Othr.Cat.Funds and Othr.Cat.Sales allow us to examine whether a manufacturer gets higher pass-through in one category because it provides more funds or has higher sales in other categories. Othr.Man.Funds lets us assess whether funding from other manufacturers within the category has any association with the pass-through that a given manufacturer gets. Ret.Cat.Lift allows us to test whether the retailer provides higher pass-through for categories that are more responsive to promotions. Ret.Cat.Margin and Ret.Rel.Margin let us determine whether pass-through is affected by the retailer's regular margin from a category or a particular manufacturer. Cat.Ret.Shr and Cat.Dist allow us to examine how the competitive intensity faced by the retailer in the category affects pass-through. Finally, dummy variables Ddum1 – Ddum3 control for any department-specific effects not reflected by the other variables in our model.

We use a two-tiered model to account for the fact that our dependent variable is censored at zero (Wooldridge 2002; Greene 2003). Like tobit, it corrects for censoring, but it is more flexible than tobit because it removes the constraint of having a single mechanism for the choice between zero and non-zero pass-through and the amount of non-zero pass-through.[3] A probit determines whether pass-through is zero or non-zero while a lognormal regression determines the magnitude of pass-through given that it is non-zero.[4] To control for potential endogeneity of characteristics like manufacturer share and margin, category sales and margin, etc., we use their values in 2003 to explain variations in 2004 pass-through rates. There are 2207 observations in

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[3] Type 2 Tobit also allows for different estimates for the two decisions, but it is intended for sample selection problems (Wooldridge 2002). Further, the two-tiered model has been shown to be superior to Tobit 2 (Manning, Duan, and Rogers 1987) particularly in the presence of collinearity (Leung and Yu 1996), which is likely between the inverse Mills ratio and the independent variables when the same independent variables appear in both stages.

[4] The second tier of the model can be a truncated (Cragg 1971) or lognormal (Wooldridge 2002) regression. We use the latter because the assumption that logarithms of non-zero pass-through rates are normally distributed fits our data well. Also, the truncated regression for non-zero pass-through rates exhibits convergence problems with standard optimization algorithms and its estimates are sensitive to scaling of model variables.

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the retailer's four major departments with data in both 2003 and 2004. Of these, 1709 have non-missing data on our model variables. Since pass-through is only defined when funding is greater than zero, observations with zero funding automatically drop out of the analysis below. We separately analyze these cases of zero funding later in this section. The remaining 1507 observations are included.

Model Estimates

Probit Estimates for Zero Non-Zero Pass-Through: The first column of Table 4 summarizes overall fit for the probit model. The likelihood ratio is highly statistically significant, rejecting the null hypothesis that all model coefficients except the constant term are zero. Measures of explanatory power, analogous to R^2, are around 0.16. The first column of Table 5 provides estimated coefficients. It shows that the probability of non-zero pass-through increases with the share of the manufacturer in the focal category but also with the manufacturer's sales in other categories. Private label is more likely to get non-zero pass-through than manufacturer brands. The probability of non-zero pass-through is also higher in large and promotion sensitive categories. In contrast, it is lower in categories that are more concentrated and where the retailer has greater market share.

<center>*< Insert Tables 4 and 5 About Here >*</center>

To provide a sense for the magnitude of these effects, Table 5 also shows elasticities for each variable and their standard errors. [5] The elasticities are computed off the "baseline" probability that the dependent variable equals one at mean values for continuous variables and 0 values for dummy variables in the model. The elasticity for a continuous variable is the

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[5] Standard errors of the elasticities are obtained by simulation using the parametric bootstrap method (Efron and Tibshirani 1986). For each of 500 draws from the asymptotic multivariate normal distribution of the estimated parameter vector, we compute the elasticity of each variable and then obtain its standard error as the standard deviation across the 500 draws.

percentage change in baseline promotion probability when that variable is increased by 10% from its mean, and the elasticity for a dummy variable is the percentage change when that dummy variable changes from 0 to 1. The baseline, i.e., the predicted probability that, conditional on providing funding, the average brand manufacturer in department 4 will be promoted, is 80%. This increases by 11.5% for private label. The elasticities of other significant variables are small, partly because the baseline probability is so high.

Lognormal Regression Model for Pass-Through: Of the 1507 observations in the analysis, 1170 have non-zero pass-through. The variables in our model explain 20.1% of the variation in (the logarithm of) non-zero pass-through rates. The third column of Table 5 provides coefficient estimates, most of which are significant. The standardized coefficients in the last column of Table 5 show their relative importance.

Among manufacturer characteristics, we find that pass-through increases with market share, relative price, and sales in other categories. The former is consistent with BDG (2005) and Pauwels (2007). But, contrary to BDG, pass-through is significantly higher for private label than for manufacturer brands. Retailers may push private label with the expectation that it engenders store loyalty (Steenkamp and Dekimpe 1997; Corstjens and Lal 2000). Further, retail margins on private labels are often substantially higher, so it is profitable for the retailer to switch consumers from the lower margin manufacturer brands (Ailawadi et al. 2006). Finally, pass-through is not strongly associated with funding from other manufacturers in the category, i.e., our data do not suggest the existence of cross pass-through within a category.

Among category characteristics, categories with high sales and high promotion lift get higher pass-through. Large categories are more likely to build store traffic so it makes sense for them to get higher pass-through (Chevalier and Curhan 1976; Pauwels 2007; Walters 1989), and

it is intuitively appealing that a retailer would pass-through more in categories where the return from promotions is higher. The opposite is true of categories where the retailer's market share position is strong -- the retailer faces less competition, and therefore less pressure to pass-through promotion funds in such categories (Bucklin 1987). Finally, pass-through is lower in categories whose regular margins are high and that are more concentrated.

Probit Model of Promotion Decision Without Funding: As noted earlier, observations with zero funding are left out of the pass-through model. However, the retailer does promote products of some of these manufacturers, so it is important to understand the determinants of the retailer's promotion decision in the absence of funding. We therefore estimate a probit model of the retailer's binary decision of whether or not to promote for this subset of the data. The explanatory variables in the model are the same as in equation (1). The last column of Table 4 summarizes fit for this model and shows that our manufacturer and category characteristics do a reasonable job of explaining the retailer's decision to promote in the absence of funding, with measures of explanatory power around 0.20.

< Insert Table 6 About Here >

Table 6 provides coefficient estimates and corresponding elasticities. It shows that four variables significantly affect the retailer's promotion decision for these manufacturers. High share manufacturers and private label have a significantly higher probability of being promoted in the absence of funding, as do categories with high regular margins and high promotion lift. The baseline predicted probability of promotion without funding for brand manufacturers is 58%. It increases by 10.3%, 4.5%, and 2.7% with a 10% increase in the retailer's regular category margin, category promotion lift, and manufacturer share respectively. And, it goes up by 33.6% for private labels.

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Cross-validation of model estimates: The purpose of our models is to describe how promotion pass-through varies with key category and manufacturer characteristics, not to make predictions. However, we conducted a cross-validation to assess the stability of our results by estimating each model on a calibration sample and using the calibration estimates to compute fit in a hold-out sample. Following Steckel and Vanhonacker (1993), we used 80% of the observations for calibration and 20% for hold-out. The table below shows hit rates for the probit models and R^2 for the lognormal model in the calibration and hold-out samples.

Statistic and Model	Value in	
	Calibration Sample	Hold-out Sample
Probit model for zero-non-zero pass-through: Hit rate	80.3%	76.0%
Log-normal model for non-zero pass-through: R^2	0.217	0.174
Probit model for promotion spending with zero funding: Hit rate	66.9%	64.4%

As is to be expected, fit is lower in the hold-out sample because it is computed using estimates from the calibration sample. However, the degradation in fit is small for all three models, showing that the estimates are stable and can be used for description and inference.

DISCUSSION

To the best of our knowledge, this paper is the first to empirically examine all of the promotion pass-through by a retailer across all the funding received from manufacturers. It is also the first to examine the association of a variety of manufacturer and category characteristics with pass-through. Our measurement and analysis of pass-through using actual funding and spending data reveals some important insights. We summarize them below as stylized facts.

Aggregate pass-through is higher than individual pass-through for the average manufacturer: The retailer's total promotion spending divided by total manufacturer funding is

more than 100%. Some manufacturers get several times more spending than the funding they provide, and others are promoted even without providing funding. However, most manufacturers get much less than 100% pass-through (Blattberg, Breisch, and Fox 1995).

The retailer promotes private label, promotion sensitive, and profitable categories even without funding: Contrary to conventional wisdom, the retailer does not only promote manufacturers who provide trade promotion funds. Our findings suggest that the decision to promote unfunded products is influenced by affordability and incremental sales considerations. Private labels, which generally provide higher retail margins, and high margin categories may allow the retailer to offer self-funded promotions while still maintaining reasonable margins, and self-funded promotions make more economic sense when returns on the promotions are higher.

Large manufacturers get greater pass-through: Large share manufacturers are more likely to be promoted even without funding and they get higher pass-through of the funding they provide. We need a better understanding of why since there are arguments on both sides. On one hand, high share products have higher baseline sales, which can make promotions less profitable for retailers (McAlister 1986; Tellis and Zufryden 1995; van Heerde and Neslin 2008). On the other hand, retailers may feel greater competitive pressure to promote these highly visible and high lift products (Ailawadi et al. 2007; Kim and Staelin 1999). We also need to understand whether the positive association with our pass-through measure is because retailers promote high share manufacturers more deeply and/or frequently than low share brands or simply because the lift from the same promotion depth and frequency is bigger for high share brands.

Private label gets greater pass-through: Analytical models have tended to conclude that private label should not be promoted (Sethuraman 2006) but retailers do promote private label. BDG report that private label receives lower pass-through than manufacturer brands in the

Dominicks chain. In contrast, we find that private label is more likely to be promoted with as well as without funding, and it gets higher pass-through. Since the difference between private label and manufacturer brand retail margins varies significantly across retailers (Ailawadi and Harlam 2004), so might the profitability of private label promotions and therefore the retailer's pass-through. Also, pass-through for private label is only relevant when the retailer out-sources it and receives some funding from the suppliers, not when it produces its own private label. Clearly, therefore, the issue of private label pass-through needs more research.

Cross pass-through may occur at an aggregate level: The fact that aggregate pass-through is more than 100% even though most individual pass-through rates are much lower suggests some cross-subsidization. Our analysis in Table 2 suggests that this may occur across different categories and departments. The fact that private label is more likely to be promoted without funding than manufacturer brands suggests that brand manufacturer funding subsidizes private label promotions. However, pass-through for one manufacturer is not associated with funding from other manufacturers in the category. Thus, the evidence is consistent with cross subsidies across departments and categories, and from manufacturer brands to private label, but less so with cross pass-through within a category.

As we noted earlier, we cannot test for temporally coordinated weekly cross pass-through within a category (BDG; Moorthy 2005). However, our discussions with the retailer support the argument of McAlister (2007) that such complex promotion optimization is not practical, nor would it be well-received by manufacturers. According to the retailer, trade promotion funds are viewed to some extent as a "pool of money". It uses some of the funding received in categories where it has more leverage to promote private label and to promote categories where it has less

leverage but where competition is strong and/or promotions drive incremental sales. This is consistent with the patterns we observe in the data.

Conclusion: Although our results are based on analysis of a single retailer, we believe they are likely to apply to other High-Low retailers. One reason is that our median pass-through rate for manufacturers who provide some funding and receive some promotion spending is close to the magnitude reported elsewhere. Another is that studies of other retailers have also found that a significant proportion of manufacturers gets pass-through rates much higher than 100% (Armstrong 1991; BDG; Walters 1989), suggesting that their aggregate pass-through may also be higher than the median rate for individual manufacturers. Still, we hope that other researchers will test the generalizeability of our results.

Ours is the first study of pass-through to span a wide range of product categories. We find large cross-category differences whereas much of the focus in prior work has been on manufacturer characteristics. But some of our findings require further study. First, categories with high regular margins are more likely to be promoted without funding, but when funding is provided, they get lower pass-through. Second, pass-through is lower for concentrated categories. Third, category distribution is not strongly related to pass-through, which is surprising since it measures the competitive intensity faced by the retailer. We did not have data on manufacturer distribution, which varies more than category distribution and may be a stronger driver of pass-through (Farris 2004). Future research should study its effect.

We have identified several correlates of pass-through and cross-validation shows that the estimated effects are stable, but a substantial amount of variation remains unexplained. Future research should consider how other category characteristics, and other factors controllable by manufacturers such as different types of trade promotion or different performance clauses, affect

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pass-through. Also, we have studied the retailer's pass-through in the form of price promotions. But, non-price support like displays, shelf talkers, extra shelf space, etc., is also very important to manufacturers. Future research should study the impact of manufacturer funding on non-price support. As an aside, we note that aggregate pass-through is greater than 100% even without accounting for the retailer's spending on non-price support. Including such expenditure would make this number higher.

We have computed pass-through and examined its cross-sectional variation. However, we have not addressed the question of how pass-through for a given manufacturer in a given category would change with changes in funding from that manufacturer or from other manufacturers in that category and other categories. At least for products that the retailer promotes without funding and those whose pass-through rates are extremely high, promotion spending may not change drastically even if funding changed. Conducting such analyses requires multiple years of data but is a fruitful direction for research.

Finally, we hope that researchers will incorporate the institutional details and insights from this work in their analytical and structural models of promotion spending and pass-through. This should help bridge the gap between theoretical development and empirical analysis that has developed due to the paucity of good data.

TABLE 1
DEFINITIONS OF VARIABLES

Abbreviation	Name	Definition[*]
Spending	Promotion spending	Retailer's total spending in $ mill, across all stores, on price promotions for products of a given manufacturer in a given category = [Unit volume sold on promotion x Regular retail price per unit] – [Dollar volume sold on promotion].
Funding	Manufacturer funding	Total trade promotion funding in $ mill provided to the retailer by a manufacturer for all products of the manufacturer in a given category. Includes all forms of funding, e.g., off-invoice and bill-back discounts, lump sum and development funds, etc.
Passthru	Pass-through	Promotion spending for a given manufacturer in a given category divided by Manufacturer funding by the manufacturer in that category.
Characteristics of Manufacturer Within a Category:		
Man.Share	Manufacturer market share	Unit sales of the manufacturer as a proportion of total category unit sales at the retailer.
Ret.Rel.Price	Regular retail price relative to category	Regular retail price per unit of the manufacturer's products divided by category average regular retail price per unit.
Ret.Rel.Margin	Regular retail margin relative to category	Regular retail % margin on the manufacturer's products divided by category average regular retail % margin.
Othr.Cat.Sales	Manufacturer sales in other categories	Sales of the manufacturer in other product categories ($ tens of mill).
Othr.Cat.Funds	Manufacturer funding in other categories	Average promotion funding per category provided by the manufacturer in other categories ($ mill).
Othr.Man.Funds	Average funding by other manufacturers in category	Average promotion funding per manufacturer provided by other manufacturers in the category ($ mill).
PLDum	Private label dummy	A dummy variable =1 if it is a private label vendor, 0 otherwise.
Characteristics of Category:		
Ret.Cat.Sales	Retailer category sales	Dollar sales of the category at the retailer ($ tens of mill).
Ret.Cat.Margin	Regular retail margin of category	Regular dollar sales of the category minus regular cost of those sales to the retailer divided by regular dollar sales.
Ret.Cat.Lift	Retail category promotion	Net unit lift of each promoted item in the category (computed following Ailawadi et al.

	lift	2006) as a proportion of baseline unit sales, averaged across all promoted items in the category using item baseline unit sales as weights (*Source*: Retailer records).
Cat.Conc.	Category concentration	Sum of squared market shares of all manufacturers in the category.
Cat.Ret.Shr	Retailer's share of category	Retailer's dollar sales of the category as a % of total U.S. sales of the category (*Source*: IRI).
Cat.Dist	Category distribution	Proportion of All Commodity Volume (ACV) in the U.S. accounted for by retail stores that carry the category (*Source*: IRI).
DDum1	Department 1 dummy	Dummy variable =1 if the category is in Department 1.
DDum2	Department 2 dummy	Dummy variable =1 if the category is in Department 2.
DDum3	Department 3 dummy	Dummy variable =1 if the category is in Department 3.
[*] The retailer's scanner data from all stores and/or its financial database are the source of data except where an alternative source is listed and the unit of measurement is annual.		

TABLE 2
AGGREGATE PASS-THROUGH OF TOTAL PROMOTION FUNDING

Group	Number of Observations	% of Total Sales	% of Total Funding	% of Total Spending	Aggregate Pass-through (%)*
2003:					
Total	3027	100%	100%	100%	105.9%
Department 1	958	33.5%	24.8%	18.1%	77.4%
Department 2	619	18.9%	26.4%	16.1%	64.7%
Department 3	811	20.5%	23.7%	31.1%	139.2%
Department 4	603	15.5%	14.4%	26.9%	197.1%
Miscellaneous Products[#]	50	11.6%	10.8%	7.8%	76.9%
2004:					
Total	2868	100%	100%	100%	119.9%
Department 1	1036	35.6%	27.1%	21.2%	93.8%
Department 2	623	19.3%	26.1%	18.3%	84.0%
Department 3	654	20.7%	24.0%	34.7%	173.2%
Department 4	507	12.2%	10.9%	18.3%	201.5%
Miscellaneous Products[#]	48	12.2%	11.9%	7.5%	76.4%

[#] Includes products that don't belong in four main departments
*Aggregate pass-through is total promotion spending by retailer as a percentage of total promotion funding by manufacturers.

TABLE 3
OVERVIEW OF PASS-THROUGH RATES

Group	Median Pass-through Conditional on Positive Funding		Median Pass-through Conditional on Significant Funding and Spending	
	N1[*]	Value	N2[**]	Value
2003:				
Total	2217	20.3%	1374	75.4%
Department 1	895	2.6%	458	51.0%
Department 2	503	15.5%	317	48.0%
Department 3	489	57.9%	329	110.4%
Department 4	301	133.3%	247	182.3%
Miscellaneous Products[#]	29	18.8%	23	56.2%
2004:				
Total	2103	20.0%	1311	76.4%
Department 1	944	1.5%	467	58.7%
Department 2	481	30.3%	343	57.6%
Department 3	411	66.1%	295	120.3%
Department 4	237	114.8%	182	159.1%
Miscellaneous Products[#]	30	11.6%	24	15.0%

[*]N1: Number of observations for which manufacturer funding is greater than 0
[**]N2: Number of observations for which manufacturer funding is greater than $100 and retailer spending is greater than $100.

TABLE 4
GOODNESS-OF-FIT MEASURES

Measure	Probit Model for	
	Zero or Non-zero Pass-Through	Promotion Without Funding
N (no. of observations)	1507	202
K (no. of independent variables)	16	16
Log likelihood: Full model (LL)	-668.74	-113.99
Log likelihood: Base model with constant (LL_0)	-800.90	-139.66
Likelihood ratio: LR1 = -2*(LL- LL_0)	264.34***	51.33***
$\rho^2 = 1 - \dfrac{LL}{LL_0}$	0.165	0.183
Aldrich-Nelson Pseudo $R^2 = \dfrac{LR1}{LR1 + N}$	0.149	0.203
***p<0.01		

TABLE 5
DETERMINANTS OF PASS-THROUGH

Variable	Probit Model for Zero/Non-zero Pass-through		Lognormal Model for Non-zero Pass-through	
	Coefficient	Elasticity (%)[a]	Unstandardized Coefficient	Standardized Coefficient
Manufacturer market share	6.05***	1.82	3.75***	0.196
	(0.68)	(0.37)	(0.68)	
Manufacturer sales in other categories	0.14*	0.26	0.29***	0.128
	(0.07)	(0.14)	(0.09)	
Regular retail price relative to category	0.06	0.26	0.14*	0.049
	(0.04)	(0.16)	(0.08)	
Regular retail margin relative to category	0.03	0.09	-0.23	-0.032
	(0.10)	(0.40)	(0.23)	
Manufacturer funding in other categories	0.27	0.15	-0.13	-0.021
	(0.22)	(0.13)	(0.26)	
Avg. funding by other manufacturers in category	0.31	0.14	0.87	0.051
	(0.36)	(0.17)	(0.55)	
Private label manufacturer dummy	0.40***	11.46	1.85***	0.256
	(0.11)	(3.82)	(0.23)	
Retailer category sales	0.04***	0.84	0.06***	0.121
	(0.01)	(0.32)	(0.02)	
Regular retail margin of category	0.25	0.37	-2.43**	-0.080
	(0.55)	(0.78)	(1.11)	
Retail promotion lift of category	0.10**	0.53	0.16**	0.073
	(0.04)	(0.26)	(0.07)	
Category concentration	-0.84**	-0.63	-1.56*	-0.064
	(0.42)	(0.33)	(0.94)	
Retailer share of category	-0.02*	-0.73	-0.10***	-0.187
	(0.01)	(0.49)	(0.02)	
Category distribution	0.69	2.20	0.44	0.012
	(0.57)	(1.83)	(1.15)	
Department 1 dummy	0.03	1.03	-0.68*	-0.112
	(0.20)	(6.49)	(0.39)	
Department 2 dummy	0.39**	11.15	-0.19	-0.028
	(0.20)	(6.68)	(0.38)	
Department 3 dummy	-0.09	-3.34	-0.06	-0.008
	(0.19)	(6.52)	(0.35)	

Note: Standard errors are in parentheses.
*** $p<0.01$; ** $p<0.05$; * $p<0.10$.
[a] Percentage change in probability of non-zero pass-through from "baseline" when a continuous variable increases by 10% from its mean or a dummy variable changes from 0 to 1. "Baseline" probability is 80.3%.

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TABLE 6
DETERMINANTS OF PROMOTION SPENDING WITHOUT FUNDING

Variable	Probit Model for Zero/Non-zero Spending	
	Coefficient	Elasticity (%)[a]
Manufacturer market share	26.28**	2.67
	(11.74)	(1.42)
Manufacturer sales in other categories	0.16	0.09
	(0.94)	(0.55)
Regular retail price relative to category	0.10	0.95
	(0.07)	(0.74)
Regular retail margin relative to category	0.27	1.76
	(0.24)	(1.80)
Manufacturer funding in other categories	7.28	0.09
	(7.95)	(0.12)
Avg. funding by other manufacturers in category	-0.27	-0.19
	(1.68)	(1.23)
Private label manufacturer dummy	0.56*	33.63
	(0.33)	(23.94)
Retailer category sales	0.03	1.31
	(0.03)	(2.03)
Regular retail margin of category	3.55**	10.31
	(1.50)	(5.29)
Retail promotion lift of category	0.39***	4.53
	(0.12)	(2.33)
Category concentration	-0.72	-0.91
	(1.14)	(1.53)
Retailer share of category	-0.02	-1.27
	(0.03)	(2.50)
Category distribution	-1.43	-9.18
	(1.39)	(10.00)
Department 1 dummy	0.28	18.11
	(0.60)	(53.38)
Department 2 dummy	-0.39	-26.63
	(0.59)	(41.16)
Department 3 dummy	-0.28	-19.15
	(0.49)	(31.63)
Note: Standard errors are in parentheses. *** p<0.01; ** p<0.05; * p<0.10. [a] Percentage change in probability of non-zero spending from "baseline" when a continuous variable increases by 10% from its mean or a dummy variable changes from 0 to 1. "Baseline" probability is 58.2%.		

FIGURE 1
DISTRIBUTION OF INDIVIDUAL PASS-THROUGH RATES
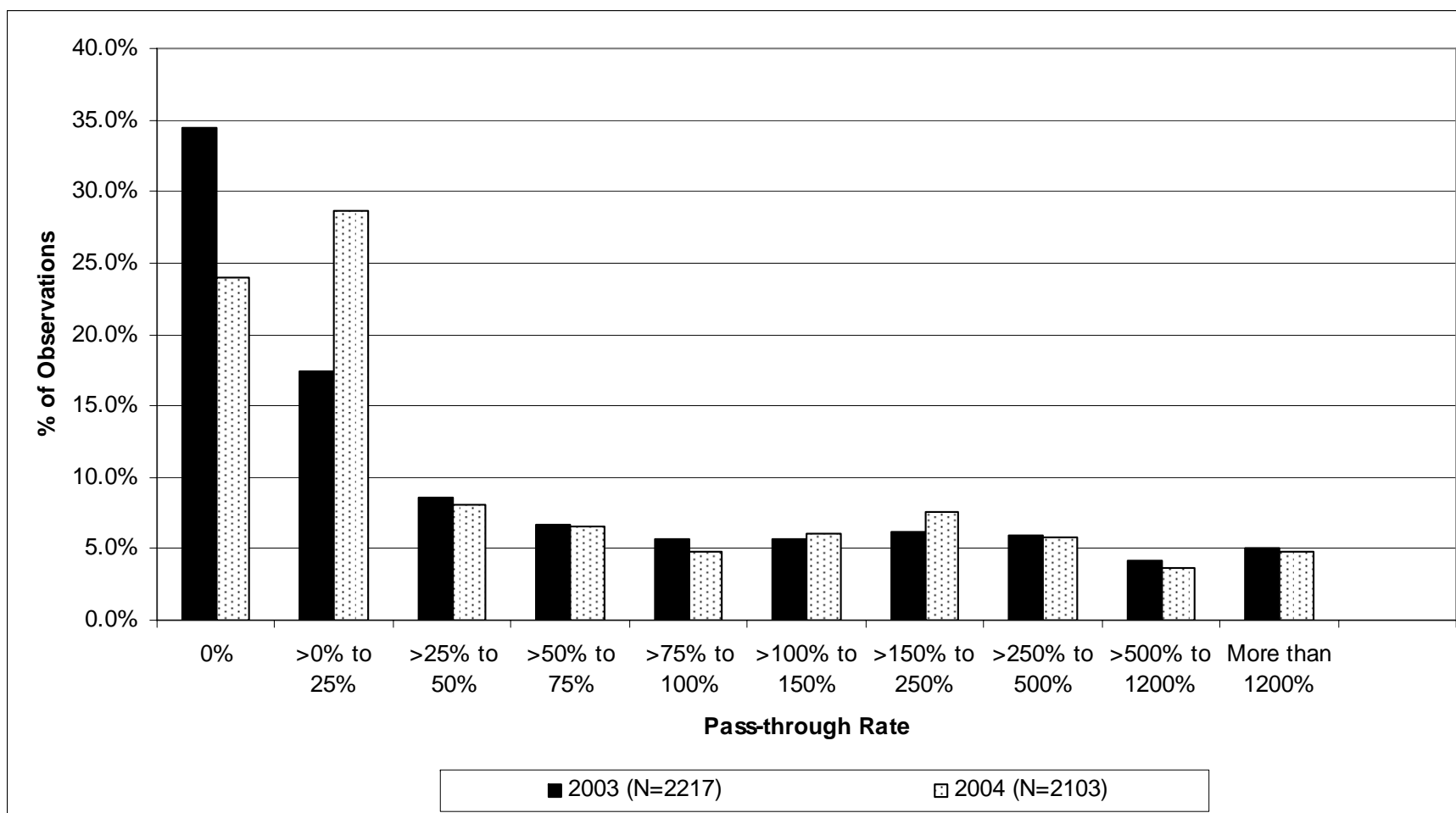
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