Within-the-Line Cannibalisation Arising from Price Promotions: An Examination Using Australian Beer Brands

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Abstract

Manufacturers of alcoholic beverages that are sold through retail channels face constant pressure from retailers to engage in price promotions. The rationale is that price promotions assist the retailer by portraying a 'low price' image, and boost their total sales. For the manufacturer, the intention is to gain sales by stealing them from competitor brands. Indeed, prior research shows that promotions primarily work by brand substitution (with purchase acceleration being a more minor and temporary effect), not category expansion. However, most manufacturers in the alcoholic beverage market have multiple brands. Furthermore, these brands often comprise multiple line items or sub-brands. For example, a parent brand such as the Australian beer 'West End' has line items such as [West End] Draught, Light, and so on. Promoting one such line item may steal sales from one's other line items – particularly as they share a common brand name – as well as taking sales from competitor products (and one's own other brands in a multi-brand portfolio). To what extent does this own-brand cannibalisation occur ? This paper examines the extent to which price promotions for the line items contained under a 'parent' brand do result in increased sales or market share for the parent brand. It studies sales data for three major beer brands, each comprising four line items, over two retailers. Of the twelve line items, only two result in larger share overall when they are promoted. Cannibalisation "within-the-line" appears to be a major problem for beer manufacturers. As wine brands appear to share many similarities to beer brands in terms of the structure of sub-brands, promotional efforts and distribution channels, this suggests that cannibalisation should be a priority research agenda for wine marketers.

Introduction and Background

Price promotions are endemic in consumer markets. In the US, estimates of the proportion of consumer goods sold "on deal" are very high – for example, 90% in some cases (Abraham and Lodish, 1987).

Such promotions are also well entrenched in beverage markets such as beer (Teinowitz, 1993). A stroll through a liquor store will quickly reveal the extent to which the wine market is also reliant on price promotions.

There are a number of reasons for the popularity of price related promotions. Among these are:

A clear sales gain is the usual result – one can usually see the spike in sales at the time of the promotion. However, while price promotions work in terms of volume gain, their contribution to profitability (for both the manufacturer and retailer) is an open question. This is because a given price reduction of say, X%, has a much larger than X% effect on contribution margin. Therefore it is possible to sell more volume with a price deal, but make less profit.

Inducing non-users to trial and hopefully repeat-buy. Many marketers believe that price promotions are a way of inducing trial by non-users. But research shows most people who buy consumer goods 'on deal' have used the brand in the past 12 or 18 months (Ehrenberg et al., 1994).

To 'buy time' for a brand or save it from being delisted. If a brand is losing sales or market share, the brand manager may believe that price promotions could prop up its volume, bring back users, stop or delay the retailer delisting it, or just buy time until something else can be done to the brand, such as a new formulation. Peckham (1981) found that price promotions for declining brands could somewhat cushion the decline – but that such brands would still continue to decline.

Competitive retaliation. If competitors is promoting and stealing share, there is a natural desire to react in an effort to avoid further loss or to 'signal' to the competition that such activity will not be ignored. Unfortunately, such reactions can result in escalation of promotional activity, or an entrenchment of it, with the end result being that average price levels for the category are driven down. Indeed managers apparent are more likely to overreact than underreact to competitor actions (Leeflang and Wittink, 1996).

Maintain Relationships with Retailers. Some marketers see price promotions as a necessary cost of doing business, and are wary of offending the trade. However, if this is the rationale for undertaking price promotions, it suggests a change in emphasis from 'how low should we go to get a volume uplift' to 'what is the minimum we can do and still preserve good relations with the trade'.

Build a 'low price' image for the Retailer. The prevalence of price-related retail advertising in all media reflects the desire by many retailers to be seen as 'good value' or 'low price'.

Discussion

Plainly there are a number of motivations for running price promotions. A key issue in terms of understanding the effects of price promotions is 'cannibalisation'. Price promotions have been found to sometimes result in temporary category expansion through purchase acceleration (e.g. Bell et al., 1999, Gupta, 1988). Interestingly, Bell et al (1999) found that in some categories, purchase acceleration could induce more consumption. This was one the basis that in certain grocery categories, a rise in average purchase quantity from a promotion did not necessarily co-incide with a longer interpurchase interval afterwards. In other words, some buyers 'bought up' in a promotion but returned to the category in around the same time as normal, suggesting some

degree of extra consumption. But in many other cases, this did not occur. In most cases, price promotions work mainly by brand substitution.

If the manufacturer has multiple brands in the category, the brand substitution effect is likely to mean some of the extra sales from promoting one of its brands will come from another of its brands. Also, many brands comprise multiple line items. In mainstream grocery markets, these line items or variants are often promoted together. For example, a margarine brand may have three variants – normal, reduced salt, and milk free. Generally these are always priced the same, whether on deal or off deal. The situation is somewhat different in markets such as wine or beer where a particular line item or variant is promoted while the others are at normal price. For example, the Australian beer line item Toohey's New (*Toohey's* is the brand name, *New* is the line item) might be promoted while the other Toohey's variants are not. The pressing question for the brand manager is, if one of these line items is promoted, does the market share for the *group* of line items actually increase ? Or does the promoted line item simply steal most or all its sales from the unpromoted items ? Prior knowledge suggests that cannibalisation will be a major problem in this situation. Many research studies point to the fact that in repeat-purchase markets, consumers buy from repertoires of brands over time (e.g. Ehrenberg, 2000). This repertoire buying means that a particular line item of a parent brand that is on deal will be recognised by buyers of other line items within that brand as "a brand I buy". Therefore the promotion for that line item will be particularly acceptable to users of the other line items that comprise the parent brand. If this "within-line" cannibalisation is severe, then price promotions are even less useful than what has been suggested. This is because not only do they have no longer term benefit, and drive average prices down, but do so without any appreciable volume gain for the parent brand !

Understanding the extent of what can be called "within-line" cannibalisation (as opposed to across-brand cannibalisation which is obviously also important, but is not studied here) is therefore extremely important to brand managers. It may be particularly salient to managers of brands in the alcoholic beverages market for the reason that brands comprise multiple line items, and those line items are often promoted at different times. Therefore the potential for "within-line" cannibalisation is high. With that in mind, this study is a test-case for determining the extent of cannibalisation within an alcoholic beverages category. It examines three major brands of Australian beer, both of which include multiple line items carrying the same parent brand name.

Data

Data were obtained from a commercial provider of information to the retailing industry. The data was for sales of 375 ml bottled beer, for two liquor retailers in a mainland Australian state. In total 91 weeks of data were provided. The data comprised weekly level price and volume levels for all brands in the market. Three major beer brands are analysed, but for confidentiality reasons they cannot be identified. They are referred to as Brand A, Brand B and Brand C.

Analysis method

The research question is the extent to which price promotions for individual line items add to the total level of sales for the parent brand. The concept under study is therefore cannibalisation. One approach to study cannibalisation effects is to examine cross elasticities. Cross elasticities tell us the extent to which a percent price change by one brand or line item impacts on the volume

of another brand or line item (e.g. Cooper, 1988, Kamakura and Russell, 1989) examine competitive structure using cross elasticities. Cross elasticities are a valuable diagnostic, but do not directly tell us the extent to which total sales or market share are affected by price changes for specific line items. We used absolute cross price effects (e.g. Sethuraman et al., 1999). The specific analysis method was to determine the magnitude of sales or share increase for each individual line item when it is promoted – and then determine the magnitude of sales or share increase for the parent brand *overall*, when these respective line items are promoted. For example, suppose that the hypothetical parent brand Z has four line items Z1, Z2, Z3, and Z4. The analysis first determines the volume gain for Z1 for a given price change in Z1, then repeats this for Z2, Z3, and Z4. Note the prices for Z1, Z2, Z3, and Z4 are all included as independent variables, but it is the parameter for the association between the price of Z1 and the quantity of Z1 that is of initial interest. The volume gain for parent brand Z *overall* from the price changes for Z1, Z2, Z3, and Z4 is then estimated, again using prices for all four line items in a multiple model. As far as interpreting the results, suppose that when Z1 is promoted, for every dollar its price is reduced, its sales increase by 100 units. However, when Z1 is promoted, for every dollar its price is reduced the *total* sales of Z (the parent brand overall) increase by only 50 units. This indicates half of the volume gain by Z1 is cannibalisation of the *other* Z line items.

Time-series analysis was used. This technique is similar to ordinary regression but caters to the fact that the price and volume data runs over a time period. Preliminary analysis showed that data had autoregressive properties (correlated residuals). Furthermore, the residuals that are closer to each other are more highly correlated than ones further apart, in other words the residuals have a moving average pattern. Fitting a model to a series with correlated residuals can deflate the standard errors of the parameters, leading one to conclude certain explanatory variables are statistically significant when in fact they are not. Based on initial examination of the data, an ARIMA (1, 1, 1) model was used (see, for example, Makridakis et al., 1983) with price as an independent variable. This catered to the data characteristics of correlated residuals, non-stationarity, and the moving average pattern in the residuals. The data exhibited seasonality, as well as some predictable volume spikes corresponding with time periods such as Christmas and Easter. For this reason, market share was used instead of volume, which helped to nullify the 'noise' in the data due to seasonal effects. Dummy variables for each season and holiday periods were also included to minimise any confounding effects from these occurrences on market share.

Note that this analysis uses absolute changes in market share coinciding with absolute changes in price. One could alternatively use percentage changes in price. This would make no appreciable difference to the results and is less straightforward to interpret.

Rather than set a strict cut off point for the level of statistical significance to determine if a model parameter was deemed statistically significant or not, a level of 10% 'with some latitude' was chosen. This allowed one result (at $p = .13$) to be included. Others, which resulted in p values of 0.20 and higher were not deemed to be statistically significant.

The results from the analysis are shown in Table 1. Details of the model fit are not shown but are available from the author on request. All models exhibited excellent levels of statistical fit.

Table 1 Results by Retailer

Retailer 1 (L)

Brand A	Price level (normal price	Deal price	Average market share (%)	A $1 change in price is associated with a change in market share for this line item of …	A $1 change in price associated with a change in market share of for the parent brand of ….
Line item A1	$31 to $33	$27 to 29	3	.5 points	.5 points
Line item A2	$34 to $37	$31 to 32	1	.02 points	*ns*
Line item A3	$31 to $33	$26 to 28	1	.01 points	*ns*
Line item A4	$27 to $29	$24 to 26	1	.1 points	.09 points
Brand B			Average market share (%)	A $1 change in price is associated with a change in market share for this line item of …	A $1 change in price associated with a change in market share of for the parent brand of ….
Line item 1	$31 to $32	26 to 28	34	1.5 points	.8 points
Line item 2	$30 to $34	24 to 28	4	.8 points	*ns*
Line item 3	$27 to $29	22 to 24	4	.2 points	.8 points
Line item 4	$22 to $26	18 to 20	3	.4 points	*ns*
Brand C			Average market share (%)	A $1 change in price is associated with a change in market share for this line item of …	A $1 change in price associated with a change in market share of for the parent brand of ….
Line item 1	$30 to $32	22 to 28	3	.7 points	.7 points
Line item 2	$30 to $40	25 to 29	.6	.1 points	.1 points
Line item 3	$49 to $55	44 to 46	.3	.03 points	*ns*
Line item 4	$50+	$46+	.1	.01 points	*ns*

Retailer 2

Brand A	Price level (normal price	Deal price	Average market share (%)	A $1 change in price is associated with a change in market share for this line item of …	A $1 change in price associated with a change in market share of for the parent brand of ….
Line item 1	$31 to $34	$28 to $30	3	.2 points	ns
Line item 2	$34 to $38	$32 to $34	1	.1 points	.1 points
Line item 3	$30 to $35	$22 to $30	1	*ns*	*ns*
Line item 4	$29 to $32	$25 to $29	1	.06 points	*ns*

Brand B			Average market share (%)	A $1 change in price is associated with a change in market share for this line item of …	A $1 change in price associated with a change in market share of for the parent brand of ….
Line item 1	$29 to $32	$28 to $29	14	.4	.3 points
Line item 2	$34 to $38	$29 to $30	1	.1	.1 points
Line item 3	$32 to $35	$22 to $23	.5	ns	*ns*
Line item 4	$26 to $32	$18 to $24	.5	.06	*ns*

Brand C			Average market share (%)	A $1 change in price is associated with a change in market share for this line item of …	A $1 change in price associated with a change in market share of for the parent brand of ….
Line item 1	$32 to $34	$28 to $30	2	.1 points	*ns*
Line item 2	$39 to $44	$35 to $29	1	.05 points	.1 points
Line item 3	$50 to $55	$42 to $45	1	.06 points	*ns*
Line item 4	$50 to $54	$46 to $50	.3	.04 points	*ns*

Summary of results:

Instances of:	
Cannibalisation, ranging from apparent to severe	15 instances
Cannibalisation, but only mild	1 instance
No cannibalisation	5 instances
No identifiable relation between the price of the line item and share of line item or parent brand as a whole	2 instances
Share gain by parent brand more than that for promoted line item	2 instances

Discussion

Out of the 24 components of the analysis (3 brands x 4 line items each x 2 retailers), there were 14 cases where the data is consistent with the notion of apparent to severe cannibalisation. The results of the analysis are discussed in more detail for retailer 1 first, then retailer 2.

In Retailer 1, we see apparently different cannibalisation effects for different product line variants. Brand A's largest variant, A1 gains volume that does not appear to be at the expense of the other line items A2, A3 and A4. But price promotions for A2 and A3 do *not* co-incide with volume gains for brand A as a whole. For brand B, its largest variant B1 gains market share but only about half of this gain translates to market share gain for B overall. B2 and B4 also seem to cannibalise the rest of the range when put on deal. B2 is unusual in that volume gains for B overall are larger than what they are for B2 itself (.2 share points for B2 compared to .8 share points for B overall). This points to some interactive effect with the other line items. Brand C also appears to suffer no cannibalisation from its larger variants C1 and C2, but share gains by C3 and C4 do appear to cannibalise the brand overall.

In Retailer 2, all three brands suffer about as much from within-line cannibalisation. Brand A does not enjoy market share gains when A1 or A4 are promoted even though those individual line items raise their own share. Brand A does enjoy share uplifts when A2's price changes. A3 does not exhibit a significant relationship between price and market share. Brand B benefits when B1 and B2 are promoted, but not B3 and B4. Brand C benefits when line item C2 is promoted but not C1, C3 or C4.

The general pattern is that market share gains for the parent brand overall are harder to achieve by promoting the less popular (ie smaller volume) line items. When smaller share line items are promoted, there is generally no discernible impact on the overall volume for the parent brand overall (in other words the product line overall). There are two possible explanations:

(1) The smaller share line items are simply so small (compared to the larger line items in the range) that it is not possible to see their impact on the volume levels for the product range overall. Take the example of Brand B in Retailer 2. Its smallest line item, B4, has an average market share of .5 points compared to B1 which has 14 points. A $1 price reduction for B4 results in a .06 share point increase for B4 and that line item is often discounted from its normal price level of between $26 to $32 to between $18 and $24. Therefore the volume gain for B4 is often .06 share points multiplied by (say) approximately a $6 price reduction which equals around .4 share points. This is not a large increase to detect, but the analysis *can* detect the impact of B2 on B's overall share of .1 share point per dollar. So this is suggestive that the lack of detection of overall share gains is plausibly due to cannibalisation. That said, a further check was undertaken to determine if these results (lack of overall share gain) were attributable to simply having one line item per brand that has much higher volume levels than the others. To do this a subset of brand A was created, using only A2, A3 and A4 – the smaller line items. The analysis then determined if price changes by any of those line items resulted in lower share gains for the subset overall (volume of A2+A3+A4) compared to the uplift for the individual line items when put on deal. This analysis again suggested that volume uplifts for any particular line item were larger than what they were for the three-item subset.

As a further check, the market share for C2,C3 and C4 in retailer 1 were aggregated, and the market share weighted price for these items was calculated. The association between the average price for C2, C3 and C4 (combined) on the combined share of C2, C3 and C4 was -0.1. That is, a $1 change in the average price of C2, C3 and C4 combined was associated with a 0.1 point share change. Whereas for brand C as a *whole* (including C1) this figure was only 0.07. Again this suggests a fairly marked amount of cannibalisation (around 30% of the share uplift for C2, C3 and C4 (combined) is cannibalising the larger line item C1).

(2) Another potential explanation is that the smaller share line items are always promoted when the larger volume line items are promoted, but the larger share line items are also promoted at times when the smaller line items are not promoted. If that were the case this might make it more unlikely the smaller line items could positively impact on the volume for brand overall when the larger line items are on deal at the same time. This possibility was checked by generating scatterplots comparing the price of B1 against the price for B2 B3 or B4, for example. The co-incidence of deal vs normal pricing of the various line items did not follow any particular pattern. Therefore this explanation can be ruled out.

Summary and Conclusions

This paper outlined why cannibalisation "within-line" might be a particular problem for alcoholic beverage brands. It used data from two retail chains, on three beer brands, to analyse this issue. The analysis showed that when the price levels for particular line items within a brand are lowered, the market share uplift for the line item is usually larger than what it is for the parent brand as a whole. This indicates that promoting one line item tends to result in it stealing some, or much, of its sales from the other line items comprising the brand. This appeared to be particularly evident when the lower volume line items in the range are promoted. In a couple of cases the effect of a price change for a line item meant the uplift for the brand as a whole was greater than for the line item. This was unexpected, and may be due to some interaction effects or unmeasured co-incidental occurrences such as advertising or merchandising support. However the main story is that "within-line" cannibalisation is a real issue for beer manufacturers. It appears that price promotions for a certain line item sometimes take *all* their sales from other line items under the same brand. This may be a result of having sequences of promotions where the promoted line item is given prominence by increasing its shelf presence, and reducing the shelf presence of the unpromoted line items comprising the parent brand. This is likely to simply suppress the sales of the unpromoted line items in favour of the promoted one.

In some instances the level of cannibalisation in this study was 30 to 50%, in some other cases there was no apparent cannibalisation. It may be that retailer actions can limit the degree of cannibalisation (as well as possibly exacerbating it). For example, if a particular line item is promoted and physically placed away from the other line items comprising the parent brand, it may take sales away from the items it is placed with, rather than the other line items it shares the parent brand name with.

Price-based promotions may be even less worthwhile than has been previously thought, due to this cannibalisation problem. Evaluation of promotions needs to consider the effect on the parent brand as a whole, and not just examine the volume uplift for the promoted line item alone.

References

Abraham, M.M. and L.M. Lodish, 1987. Promoter: An Automated Promotion Evaluation System. Marketing Science 6 (No. 2, Spring), 101-123.

Bell, D.R., J. Chiang and V. Padmanabhan, 1999. The Decomposition of Promotional Response: An Empirical Generalization. Marketing Science 18 (No. 4), 504-526.

Cooper, L.G., 1988. Competitive Maps: The Structure Underlying Asymmetric Cross Elasticities. Management Science 34 (No. 6, June), 707-723.

Ehrenberg, A.S.C., 2000. Repeat Buying - Facts, Theory and Applications. Journal of Empirical Generalisations in Marketing Science 5, 392-770.

Ehrenberg, A.S.C., K. Hammond and G.J. Goodhardt, 1994. The After-Effects of Price-Related Consumer Promotions. Journal of Advertising Research 34 (July/August), 11-21.

Gupta, S., 1988. Impact of Sales Promotions on When, What and How Much to Buy. Journal of Marketing Research 25 (November), 342-355.

Kamakura, W.A. and G.J. Russell, 1989. A Probabilistic Choice Model for Market Segmentation and Elasticity Structure. Journal of Marketing Research 26 (November), 379-390.

Leeflang, P.S.H. and D.R. Wittink, 1996. Competitive Reaction Versus Consumer Response: Do Managers Overreact? International Journal of Research in Marketing 13 (No. 2, April), 103-119.

Makridakis, S., S. Wheelwright and V. McGee, 1983. Forecasting: Methods and Applications, USA: John Wiley.

Peckham, J.O., 1981. The Wheel of Marketing, New York: A.C. Nielsen.

Sethuraman, R., V. Srinivasan and D. Kim, 1999. Asymmetric and Neighborhood Cross-Price Effects: Some Empirical Generalizations. Marketing Science 18 (No. 1), 23-41.

Teinowitz, I., 1993. Price Promotions Drive Beer: But big-name brews can't hold share levels. Advertising Age 64, 12-13.