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MAGAZINE SALES PROMOTION: A DYNAMIC RESPONSE ANALYSIS *

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Abstract

This paper studies the impact and effectiveness of a type of non-price promotion often used in the European periodical magazines industry to stimulate sales, in which a value pack is sold containing the magazine issue plus another product. Magazines are sold simultaneously with and without promotion at different prices, and promotions are serialized by fractioning the additional product across different issues of the magazine. We find that promoted magazines contemporarily cannibalize non-promoted sales; but this loss is compensated by a medium term increase of non-promoted sales. These results show that this sales promotion strategy is an effective way to diminish the decline rate of periodical sales.

Keywords: Sales Promotions, Magazines.

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INTRODUCTION

There is a growing audience of demanding readers for magazines in the USA and Europe (The Magazine Publisher of America 2006). This upward trend is most pronounced in the Asia-Pacific region (The International Federation of Periodical Press). Magazines trend up in readership is particularly high in the categories of "general interest" and "business". The Magazine Publishing Industry is a very dynamic industry, especially when we consider the variety of new magazines titles launched each year. For example, in 2005, 350 new magazines were introduced in the USA (The Magazine Publisher of America 2006). This strategy responds to the increasingly short-life cycles of magazines. When a new magazine is released, its sales usually reach its potential in a short period of time followed by a slow but steady decay. The traditional strategy to deal with this market response is to decide when a magazine should no longer be published and when a new magazine should be added to the publisher's portfolio. This strategy is increasingly combined with non-price promotional policies to slow down the long term decrease of sales.

Both practitioners and researchers remain very interested in the impact of sales promotion strategies. The literature on price sales promotions is extensive. Most authors have found that price promotions have no long-term effects on sales (Pauwels et al. 2004) or that they have a negative contribution to brand differentiation (Mela et al. 1998). But price reductions in the publishing industry are restricted to the subscription process (Lewis 2005). Research on the effects of non-price promotions is very scarce. Some results suggest that the long-term impact of non-price promotions on sales is significant and positive. For example, Mela et al. (1998) found positive long-term effects on sales although no strong relationships, and Bawa and Shoemaker (2004) found that, in the case of free samples, promotions might be very effective in increasing sales over 22 weeks or longer periods.

The objective of this paper is to analyze the effect on magazine sales of an innovative type of sales promotion which seems to be effective in diminishing the decline rate of periodical sales in some European countries. The central idea in these promotions is to assemble a value pack containing the magazine plus another product to sell at a price above the price of the magazine but below the sum of the expected prices of the two products: a dictionary fractionated in a collection of CDs, for example. This promotion

is serialized by fractioning the additional product in the value pack across different issues of the magazine, and the promotions take place each one immediately after another (chained promotions). The magazine is sold simultaneously with and without promotional value pack, at different prices. The basic objective of these promotions is twofold: the acquisition of new customers (which might switch from other magazines – secondary demand-, or enter the market -primary demand-) and to increase the purchase loyalty of actual customers (by introducing incentives to decrease purchase skipping), in an attempt to diminish the decline rate of periodical sales. In this paper we analyze if this type of promotion is effective to slow down the long term decrease of sales. Our results indicate that promoted magazines contemporarily cannibalize non-promoted sales; but this loss is compensated by a medium term increase of non-promoted sales.

In Section 2 we present a general econometric specification and estimation method to describe the dynamic sales response of magazines and the dynamic impact of non-price promotions on sales. We then describe the data and present the specific econometric specification for each magazine. The results section presents the main findings. Finally, we provide concluding remarks of this research, identify areas for future research and summarize our main findings

A MODEL TO STUDY PROMOTION EFFECTIVENESS

Marketing literature has widely used time series models for studying the dynamic effects of sales response and promotional policies. Time-series methods provides valuable tools to answer important research questions such as marketing effectiveness and promotion evaluation (for a review see, e.g., Hanssens et al. 1990).

Our analysis focuses on the effects of selling magazines with a promotional value pack on sales of non-promoted magazines. In the short term, promoted magazines may cannibalize sales from the non-promoted one. However, if a relevant percentage of the buyers of the promoted issues who read the magazine for the first time have a positive experience with the magazine and become customers, this positive effect compensates the cannibalization loss by a future sales enhancement. Therefore, our objective is to analyze if the promotion is cannibalizing the non-promoted sales, or if the commercialization of promoted magazines has a positive impact on the global sales.

As we show in this paper, the net effect of these promotions generates a positive impact on sales of the non-promoted magazine.

As we aim to model the crossed-effects of selling promoted magazines and non-promoted ones, our wok considers sales data of promoted and non-promoted magazines over a long time span at aggregated level. This enabled us to build a dynamic model as a linear regression of current sales of the non-promoted magazines against one or more prior values of the sales of the promoted and non-promoted magazines. Then, we specify the dynamic sales response model for each magazine as a linear dynamic model:

$$Sales_t = v_0\,PSales_t + v_1\,PSales_{t-1} + \ldots + v_k\,PSales_{t-k} + \phi_1\,Sales_{t-1} + .. + \phi_r\,Sales_{t-r} + \varepsilon_t \quad (1)$$

where

$PSales_t$ = the sales of the value-pack promoted magazines in time t,

$Sales_t$ = the sales of the non-promoted issues in time t,

$\{\phi_j\}_{j=0}^{r}$ = the direct effect of the value-pack promoted magazines in time t-j, on sales of non-promoted issues in time t,

$\{v_j\}_{j=0}^{k}$ = the direct effect of the sales of the non-promoted issues in time t-j, on sales of non-promoted issues in time t,

ε_t = a (white noise) random disturbance in time t.

Notice that the coefficients of model (1) can be estimated by OLS. To determine the number of lagged variables (i.e., the values of r and k) , we consider the autocorrelation of sales of non-promoted magazines and the cross-correlation between the sales of non-promoted magazines and the sales of promoted magazines (for a methodological review see Box and Jenkins 1997). Then, if the correlations of non-promoted sales are not significant at lag $r+1$ and greater, model (1) has $\{Sales_{t-j}\}_{j=0}^{r}$ as regressors.

Analogously, if the cross-correlation of promoted and non-promoted sales are not significant at lag $k+1$ and greater, model (1) has $\{PSales_{t-j}\}_{j=0}^{k}$.

The model (1) can be expressed as:

$$\left(1 - \phi_1 L - \dots - \phi_r L^r\right) Sales_t = \left(v_0 + v_1 L + \dots + v_k L^k\right) PSales_t + \varepsilon_t \quad (2)$$

where L is the lag operator (such that $L^j Sales_t = Sales_{t-j}$ for all integer j). The expression (2) can be written equivalently as:

$$Sales_t = \beta(L) PSales_t + \gamma(L)\varepsilon_t \quad (3)$$

where

$$\beta(L) = \frac{\left(v_0 + v_1 L + \dots + v_k L^k\right)}{\left(1 - \phi_1 L - \dots - \phi_r L^r\right)} \text{ and } \gamma(L) = \left(1 - \phi_1 L - \dots - \phi_r L^r\right)^{-1},$$

are infinite polynomials. In particular, the polynomial $\beta(L) = \sum_{l=0}^{\infty} b_l L^l$ is known as transfer function, the first coefficient is $b_0 = v_0$ and the remaining coefficients can be computed from the estimations of model (1); see, e.g., Box and Jenkins (1976). The coefficient b_l provides the net effect of a sold unit of promoted magazine on the sales of non-promoted magazines l periods later. In other words, positive b_l means that any sale of the promoted magazine has a positive impact on the sales of the non-promoted magazine l periods later, whilst a negative value $b_{l'}$ means a cannibalization effect l' periods later. The total net effect (or gain) of the promotion is given by

$g = \sum_{l=0}^{\infty} b_l = \beta(1)$. The gain can be estimated by the estimated $\beta(L)$ evaluated at $L=1$, i.e.

$$\hat{g} = \hat{\beta}(1) = \frac{\left(\hat{v}_0 + \hat{v}_1 + \dots + \hat{v}_k\right)}{\left(1 - \hat{\phi}_1 - \dots - \hat{\phi}_r\right)}. \quad (4)$$

The promotion is effective if $\hat{g} > 0$, i.e. the summa of positive effects ($b_l > 0$) is larger than the summa of cannibalization effects ($b_{l'} < 0$).

THE DATA

We consider two specialized magazines, Magazine A and Magazine B, which are published by a multinational publishing company and distributed monthly at different prices, with and without a promotional value pack. For Magazine A, which is the leader in the category of *Science and Nature* magazines, we consider a data sequence that begins October, 1995 and ends January, 2004. For Magazine B, which has

the second highest market share in the *Business* category, data begins in October, 1997 and ends in October, 2003. In particular, we are using their sales data as a measure of consumer responses to promotion in each magazine. Due to the confidentiality policies of the publishing company, Figure 1 shows the scaled values of monthly sales for Magazines A and B, respectively. Fitting an exponential trend reveals that there is a steady decay of sales in both cases, slowed down by the effect of promotions (denoting the start of promotion activities with a vertical line). In this industry, publishers argue that the sales decay is typically strongest before implementing promotional strategies, whilst their implementation slows down this decay and sales may even become steady. This is a core issue to hold market leadership in the medium and long term.
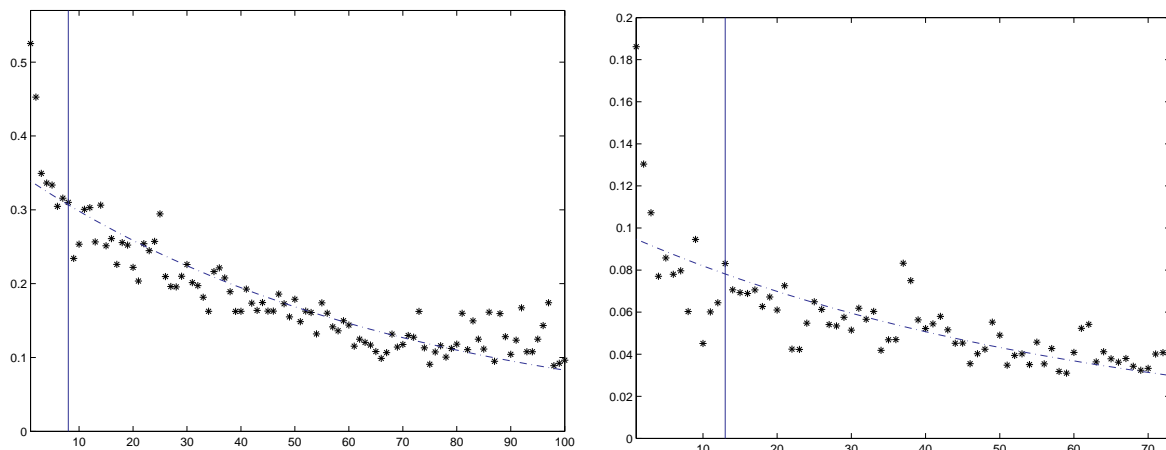
Figure 1: Monthly scaled sales for Magazine A and B.

Figure 2 shows the values of sold units provided as a percentage of the market potential for Magazines A and B, when promoted and non-promoted magazines are simultaneously sold. The sample period begins November, 1999 and ends September, 2003 for Magazine A, and begins April, 2001 and end September, 2003 for Magazine B. The exponential decay of their effect is clearly observed in all of them.
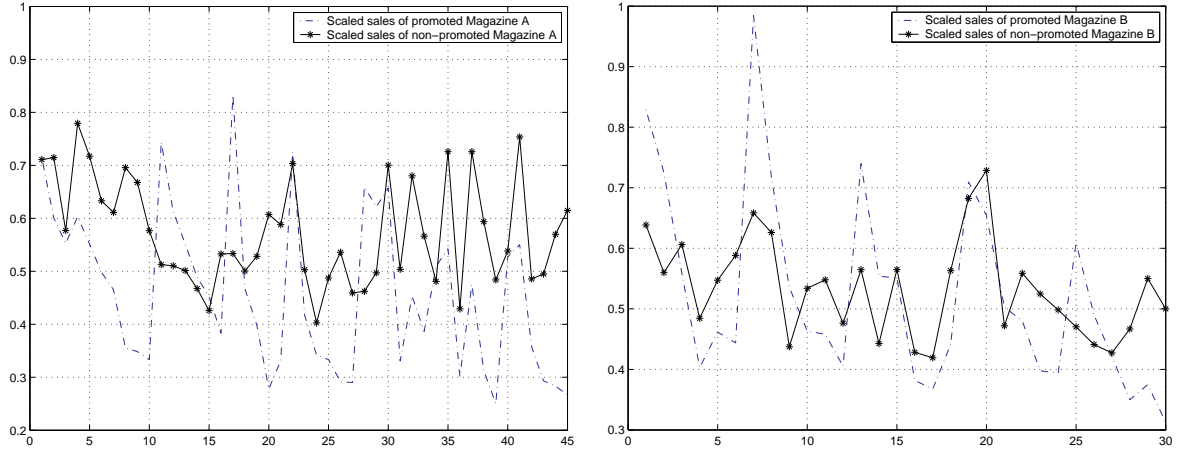
Figure 2: Monthly sold units provided as a percentage of the market potential for the promoted and non-promoted Magazine A and B.

ECONOMETRIC ANALYSIS AND RESULTS

Next we study the specification that best fits the sales behaviour of Magazines A and B. We also present the estimation results and discuss the net impact of promotions on the non-promoted magazines using actual sales data. In all the cases, there is evidence of positive impact on the sales of non-promoted magazines, even though some contemporary cannibalization can be observed.

Magazine A

After studying the autocorrelation of sales of the non-promoted magazine A and the cross-correlation between the sales of the non-promoted Magazine A and the sales of the promoted Magazine A, we consider the following model for modelling sales of Magazine A:

$$Sales_t = v_0\, PSales_t + v_1\, PSales_{t-1} + \ldots + v_3\, PSales_{t-3} + \phi_1\, Sales_{t-1} + \phi_2\, Sales_{t-2} + \varepsilon_t \quad (5)$$

where *k=3* and *r=2*. Table 1 reports the parameter estimates, their standard deviation, their t-ratio, their p-value and their confidence intervals at 95% of equation (5). As we can observe in Table 1, the promotion effect is significant after 3 months (i.e., v_3 is the only significant coefficient as its p-value is less than 0.05). Although the other promotion impact coefficients are non-significant (i.e., v_0, v_1, v_2), they reveal some interesting insights into the net impact on the sales of non-promoted magazines. First,

we observe a contemporary cannibalization of $\hat{v}_0 = -.2028376$ units, and a positive direct impact during the following months given by .3858014 in the first month, .1570358 in the second and .7516317 in the third one. We can use expression (4) to compute the gain or global effect. If we consider direct and indirect effects, with negative and positive sign, the gain or net effect of an extra unit of $PSales_t$ on $Sales_t$ is given by $\hat{g} = 19.086$ which is positive. Nonetheless, since some coefficients are non-significant we can obtain a more accurate estimation reformulating the model.

TABLE 1. The estimated parameters of model (5) for Magazine A

Parameter	Estimates	Std. Err.	t	P>|t|	95 % Conf Int.	
v_0	-.2028376	.240515	-0.84	0.401	-.6806627	.2749876
v_1	.3858014	.2616771	1.47	0.144	.9056687	.1340659
v_2	.1570358	.2599933	0.60	0.547	.3594864	.6735579
v_3	.7516317	.2369205	3.17	0.002	.2809478	1.222316
ϕ_1	.6043867	.0910768	6.64	0.000	.4234467	.7853266
ϕ_2	.3384183	.0871701	3.88	0.000	.1652397	.5115969

Sample size = 96, $R^2 = 0.9809$, Adj $R^2 = 0.9796$

Root MSE = 24872, F(6, 90) = 769.72,

Next we refine the modelling omitting the non-significant terms of equation (5). Then, the model that was finally adopted for modelling sales of Magazine A is given by:

$$Sales_t = v_3 PSales_{t-3} + \phi_1 Sales_{t-1} + \phi_2 Sales_{t-2} + \varepsilon_t \quad (6)$$

Parameter estimates of equation (6) are reported in Table 2. The results still suggest a significant lagged impact of promotions given by $\hat{v}_3 = .6195721$. Therefore, we conclude that the promotion of magazine A has a lag of 3 months before it has a positive impact. Using these estimations, we compute a more accurate estimation of the gain $\hat{g} = 7.8705$.

TABLE 2. The estimated parameters of model (6) for Magazine A

Parameter	Estimates	Std. Err.	t	P>|t|	95 % Conf Int.	
v_3	.6195721	.1898817	3.26	0.002	.2425046	.9966396
ϕ_1	.6070237	.0913037	6.65	0.000	.4257125	.7883348
ϕ_2	.314255	.0864969	3.63	0.000	.1424894	.4860206

Sample size = 96, $R^2 = 0.9799$, $\text{Adj } R^2 = 0.9792$

Root MSE = 25116, F(3, 93) = 1508.06

Magazine B

Analogously to Magazine A, we first study the autocorrelation of sales of the non-promoted Magazine B and the cross-correlation between the sales of the non-promoted Magazine B and the sales of the promoted Magazine B. Then we model the sales of Magazine B as follows:

$$Sales_t = v_0 \, PSales_t + v_1 \, PSales_{t-1} + v_2 \, PSales_{t-2} + \phi_1 \, Sales_{t-1} + \phi_2 \, Sales_{t-2} + \varepsilon_t \quad (7)$$

where $k=2$ and $r=2$. Parameter estimates of equation (7) are reported in Table 3. As we can observe in Table 3, for Magazine B the promotion effects are significant for all the variables in the model except for v_1 . A first analysis suggests a simultaneous cannibalization of -.4365949 sold units, and a positive impact during the following months given by .3314508 in the first month, .3713876 in the second one. If we consider direct and indirect effects, with negative and positive sign, the gain or net effect of an extra unit of $PSales_t$ on $Sales_t$ is given by $\hat{g} = 1.8705$ which is positive. Nonetheless, since some coefficients are non-significant we can obtain a more accurate estimation reformulating the model.

TABLE 3. The estimated parameters of model (7) for Magazine B

Parameter	Estimates	Std. Err.	t	P>|t|	95 % Conf Int.	
ν_0	-.4365949	.2103286	-2.08	0.042	-.8566502	-.0165396
ν_1	.3314508	.2621793	1.26	0.211	-.1921573	.855059
ν_2	.3713876	.2093212	1.77	0.081	-.0466558	.7894309
ϕ_1	.5451433	.1201937	4.54	0.000	.3050999	.7851867
ϕ_2	.307856	.103383	2.98	0.004	.1013858	.5143261

Sample size $= 70$, $R^2 = 0.9387$, Adj $R^2 = 0.9340$

Root MSE $= 11826$, $F(5, 65) = 199.20$

The model can be adjusted by dropping the non-significant term ν_2. Then we consider:

$$Sales_t = \nu_0\, PSales_t + \nu_1\, PSales_{t-1} + \phi_1\, Sales_{t-1} + \phi_2\, Sales_{t-2} + \varepsilon_t \quad (8).$$

Parameter estimates of model (8) are reported in Table 2. The results still suggest a contemporary cannibalization of -.4507993 units, compensated by a positive impact of .6363678 units the next month. The gain or net effect of an extra unit of $PSales_t$ on $Sales_t$ is given by $\hat{g} = 1.4483$ which is positive. This model is globally more significant than the one considered in Table 3, and we accept that 1.4483 is a more efficient estimation of the global effect.

TABLE 4. The estimated parameters of model (8) for Magazine B

Parameter	Estimates	Std. Err.	t	P>|t|	95 % Conf Int.	
ν_0	-.4507993	.2135689	-2.11	0.039	-.8772034	-.0243953
ν_1	.6363678	.2011938	3.16	0.002	.2346715	1.038064
ϕ_1	.6326151	.1113867	5.68	0.000	.4102243	.855006
ϕ_2	.2392546	.0974282	2.46	0.017	.044733	.4337762

Sample size $= 70$, $R^2 = 0.9358$, Adj $R^2 = 0.9358$

Root MSE $= 12017$, $F(4, 66) = 240.39$

DISCUSSION

The primary purpose of this study was to analyze a class of non-price promotion implemented in the *Magazines Publishing Industry* in Europe, and also to determine if the effect of implementing these promotions is favourable in the medium term. The net effect is the sum of a negative contemporary effect due to cannibalization and the positive lagged effect of sales of the promoted issues on sales of non-promoted issues in the near future.

Marketing scholars and practitioners often infer a negative market response from cannibalization between substitutive products as it is the case of our promotion: when a product is sold simultaneously with and without promotion at different prices. However, Tables 2 and 4 show that this magazine's promotion is an effective means to attract enough new customers for the regular magazine to compensate the loss of customers switching to other magazines or exiting the market. These results suggest that some buyers of the promoted issues, who read the magazine for the first time, have a positive experience with the magazine and become customers. This finding is consistent with previous research on dynamic marketing response to promotions (Rothschild and Gaidis, 1981) and to advertising stimulus (Tellis, 1988).

Limitations and future research

We have used market aggregated data, but further research in this area could determine how different segments respond to different kind of value-pack promotions, and determine how these promotions affect the actual purchase behaviour of representative consumers within each segment. For instance, it could be worthwhile to determine which products in the value-pack best motivate new entrants to the market or attract competitors' customers.

Also, it might be useful to know what specific elements of the value-pack added product appear to impact purchase behaviour the most (type and design). In addition, we did not delve into the identification of word of mouth effects and the attraction of customers generated by promotional advertising.

Summary

This paper provides empirical evidence that the simultaneous sale of promoted and non-promoted magazines generates a contemporary cannibalization, but the advertising and word of mouth effect of promotions generates a positive impact on future sales of non-promoted magazines. Also this study suggests that a relevant percentage of the buyers of the promoted issues who read the magazine for the first time have a satisfactory experience with the magazine and become customers. In addition, we believe that this sort of strategy is applicable to other types of industries in which price promotions cannot be carried out and the product is periodically sold.

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