MAGAZINE SALES PROMOTION

A Dynamic Response Analysis

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ABSTRACT: This paper studies the effectiveness of a type of nonprice promotion often used in the European magazines industry to diminish the decline rate of periodical 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. Although promoting magazines contemporarily may cannibalize nonpromoted sales, this loss is compensated by a long-term increase in nonpromoted sales caused by product awareness and loyalty improvements. This strategy is increasingly used as an innovative form of product advertising.

There is a growing audience of demanding readers for magazines in the United States and Europe (*Magazine Publishers of America* 2006). This upward trend is most pronounced in the Asia-Pacific region (International Federation of the Periodical Press 2004). The upward trend in magazine 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 magazine titles launched each year. For example, according to *Magazine Publishers of America* (2006), in 2005, 350 new magazines were introduced in the United States. Nevertheless, 2005 saw a sharp increase in the number of withdrawn magazines in terms of number of titles (see Table 1). This strategy responds to the increasingly short life cycles of magazines. When a new magazine is released, its sales usually reach their 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 develop advertising campaigns to reinforce loyalty and increase product awareness. Classical advertising has a limited impact, however, and often the editors must decide when a magazine should no longer be published and when a new magazine should be added to the publisher's portfolio. To slow down the long-term decrease of sales, this strategy is increasingly combined with nonprice promotional policies (e.g., advertising and subscription campaigns, promotions at outdoor

events and trade shows, and circulation promotions such as big prize offers). Yet there is no clear evidence indicating the cost-effectiveness of these policies in general. Sales promotions are usually oriented toward the short term, while the aim of an editor is to maintain long-term sales benchmarks.

The objective of this paper is to analyze the effect on magazine sales of an innovative type of sales promotion that seems to be effective in diminishing the declining 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). Each issue of the magazine is sold simultaneously with and without the promotional value pack, at different prices (promoted magazines are sold at a higher price to roughly cover the cost of the promotion). The basic objective of these promotions is twofold: the acquisition of new customers (some who might switch from other magazines [secondary demand], or some who 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 sales. The promotional magazine pack is sold with in-store advertising displays to enhance the visibility of the promotion at the point-of-sale. In this paper, we analyze whether this type of promotion is effective in slowing down

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TABLE I
Number of New and Withdrawn Magazines Between 2003 and 2005 in the United States

	Number of magazines	Number of new magazines	Number of withdrawn magazines	Net increase rate
2003	6,234	440	454	.14
2004	7,188	480	474	.13
2005	6,325	350	−1,213	−.13

Source: National Directory of Magazines, Oxbridge Communications, Inc. (2006).

the long-term decrease of sales. In particular, we consider two magazines edited by the Spanish subsidiary of a multinational company, which is one of the largest magazine publishers in the world with a worldwide portfolio of magazines. Furthermore, one of the magazines considered in this paper is also published in France and Portugal in the three different languages under the same brand. Our results indicate that magazines promoted contemporarily can cannibalize sales of nonpromoted magazines, but this loss is compensated by a medium-term increase in nonpromoted sales.

There is a natural similarity between advertising in general and the type of sales promotion considered in this paper. Sales promotion and advertising are often considered as related, probably because they often occur simultaneously, but they are quite different in their purpose. Broadly speaking, sales promotions are mainly intended to encourage the purchase of a product/service in the short term, whereas advertising means inducements to long-term buying behavior. A sales promotions caveat is that they often make consumers focus more on the promotion than the product. Even though sales can be boosted in the short term, the long-term value of many sales promotions is uncertain. The type of promotion presented here is a gimmick whose purpose is to encourage the long-term purchase of a magazine, increasing product awareness and loyalty; it therefore falls closer to an advertising strategy than to standard short-term operations.

Both practitioners and researchers are highly 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, Gupta, and Jedidi 1998). However, price reductions in the publishing industry are restricted to the subscription process (Lewis 2005). Research on the effects of nonprice promotions is very scarce. Some results suggest that the long-term impact of nonprice promotions on sales is significant and positive. For example, Mela, Gupta, and Jedidi (1998) found positive long-term effects on sales, but 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 periods of 22 weeks or longer.

There is some agreement that sales promotions generate substantial short-term sales increases, but the key question to be addressed in each market is the same one: whether sales promotions are truly profitable. The literature has focused on the decomposition of promotional sales increase in different sources, such as stockpiling, store switching, and brand switching (some recent examples include Mace and Neslin [2004]; Van Heerde, Gupta, and Wittink [2003]; and Van Heerde, Leeflang, and Wittink [2004]). In the magazine market, sales are accounted for on a monthly basis, and each month corresponds to a different issue. Thus, stockpiling is impossible for this market. There is no individual purchase increase (since typically each customer buys a single issue). Even if we obtain some purchase acceleration within the monthly sales, this effect has little relevance (other than the logistics of magazine distribution to cover the temporal demand within the month). For analogous reasons, there are no anticipatory responses to expected future promotions (since they will refer to different issues and different fractioned promotional products). Besides, the promotion is applied to all sales points, so no store switching is generated. In summary, promotional sales decomposition has less importance than in other types of markets covered by the marketing literature. Therefore, magazine sales responses can be mainly explained by the sales dynamics and the cannibalization between promoted and nonpromoted magazines. In this paper, we focus on this key problem by using time series analysis.

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 provide valuable tools to answer important research questions such as marketing effectiveness and promotion evaluation (for a review, see, e.g., Hanssens, Parsons, and Schultz 2001).

Our analysis focuses on the effects of selling magazines with a promotional value pack on sales of nonpromoted magazines. In the short term, promoted magazines may cannibalize sales from the nonpromoted ones. 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 for the cannibalization loss through a future sales enhancement. Therefore, our objective is to analyze whether the promotion is cannibalizing the nonpromoted sales or whether 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 nonpromoted magazine.

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

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

where

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

$Sales_t$ = the sales of the nonpromoted issues in time t,

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

$\{\phi_j\}_{j=0}^r$ = the direct effect of the sales of the nonpromoted issues in time $t-j$ on sales of nonpromoted issues in time t,

ε_t = a random disturbance in time t. Although serial autocorrelation is possible, we do not find evidence in favor of it in our data set.

Notice that the coefficients of model (1) can be estimated by OLS (ordinary least squares). Under the standard assumptions, the conditional Gaussian maximum likelihood estimates are the OLS estimates (notice that normality is not required for either consistency or asymptotic normality of these estimates). To determine the number of lagged variables (i.e., the values of r and k), we use the Box-Jenkins (1976) methodology. In particular, we considered the autocorrelation and partial autocorrelation functions and the cross-correlation of the sales of nonpromoted and promoted magazines, and the cross-correlogram of the prewhitened series. To detect potential misspecification problems, we also carried out a diagnosis analysis studying the dynamic structure of the models' residuals.

Model (1) can be expressed as:

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

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

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

where

$$\beta(L) = \frac{\left(v_0 + v_1 L + ... + v_k L^k\right)}{\left(1 - \phi_1 L - ... - \phi_r L^r\right)}$$

and

$$\gamma(L) = \left(1 - \phi_1 L - ... - \phi_r L^r\right)^{-1}$$

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

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

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

THE DATA

We consider two specialized magazines, Magazine A and Magazine B, which are published monthly by a multinational publishing company. Each issue of the magazine is sold simultaneously with and without a promotional value pack, at different fixed resale prices. There is no other promotional activity taking place simultaneously. 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

FIGURE 1
Monthly Scaled Sales for Magazine A and B
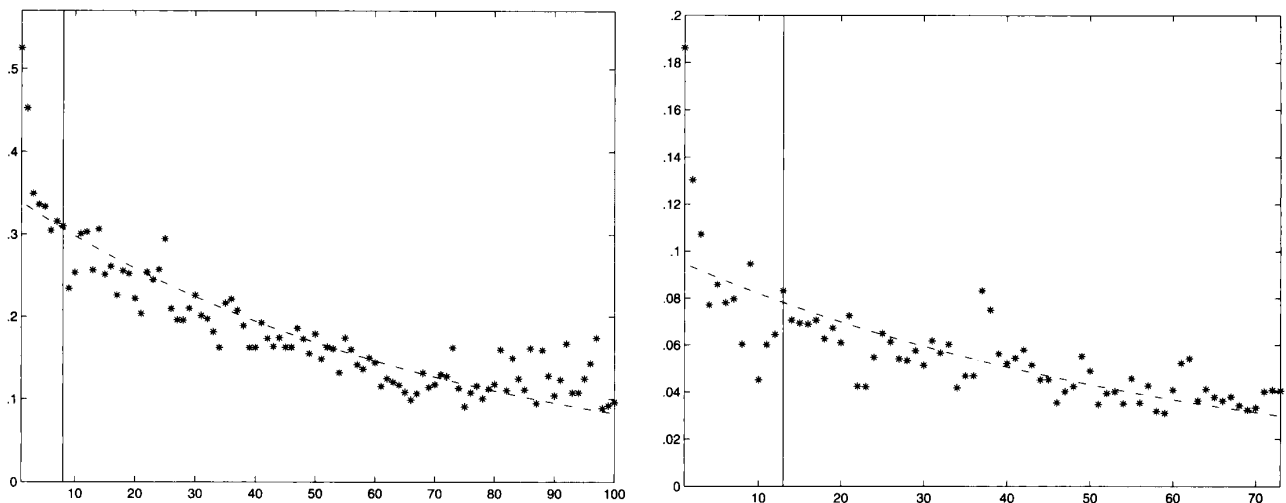
market share in the *Business* category, data begins in October 1997 and ends in October 2003. In particular, we are using their sales data as a measure of consumer responses to promotion in each magazine.

Figure 1 shows the values of sales for Magazines A and B, respectively, rescaled due to the confidentiality policies of the publishing company. The graphs reveal that there is a fast initial decay of sales in both cases, followed by gradual stabilization by the effect of promotions (denoting the start of promotion activities with a vertical line). A plateau is reached a few periods of time after the promotions were introduced. In this industry, publishers argue that the sales decay is typically strongest before implementing promotional strategies, while their implementation slows down this decay and sales become steady. This is a core issue to hold market leadership in the medium and long term.

Figure 2 shows the values of sold units provided as a percentage of the market potential for Magazines A and B when promoted and nonpromoted magazines are simultaneously sold. The market potential of both magazines was provided by the publisher, and it is considered constant. The sample period begins November 1999 and ends September 2003 for Magazine A, and begins April 2001 and ends September 2003 for Magazine B.

It seems that the sales data become stationary after the promotion activity starts. This can be formally tested. We perform the augmented Dickey-Fuller (ADF) test of unit roots to study whether the sales data considered here are stationary. The ADF test considers a regression of the differenced variable on its lag and the user-specified number of lagged differences of the variable. The ADF statistic, used in the test, is a negative

number. The more negative it is, the stronger the evidence for rejecting the null hypothesis that there is a unit root. Tables 2 and 3 report the ADF statistics for data of sales with and without promotion of Magazines A and B, considering these series after the initial period where promotions started. Therefore, we reject the hypothesis of unit roots in all cases.

If, in addition we omit the first 10–12 data just after the introduction of the promoted magazines, the evidence against unit roots is even stronger, suggesting that a stationary pattern is quickly achieved after the promotion begins. In addition, the autocovariance functions are quite stable and show a quick decreasing pattern, which is often considered as a heuristic sign of stationary time series.

ECONOMETRIC ANALYSIS AND RESULTS

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

Magazine A

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

FIGURE 2
Monthly Sold Units Provided as a Percentage of the Market Potential for the Promoted and Nonpromoted Magazine A and B
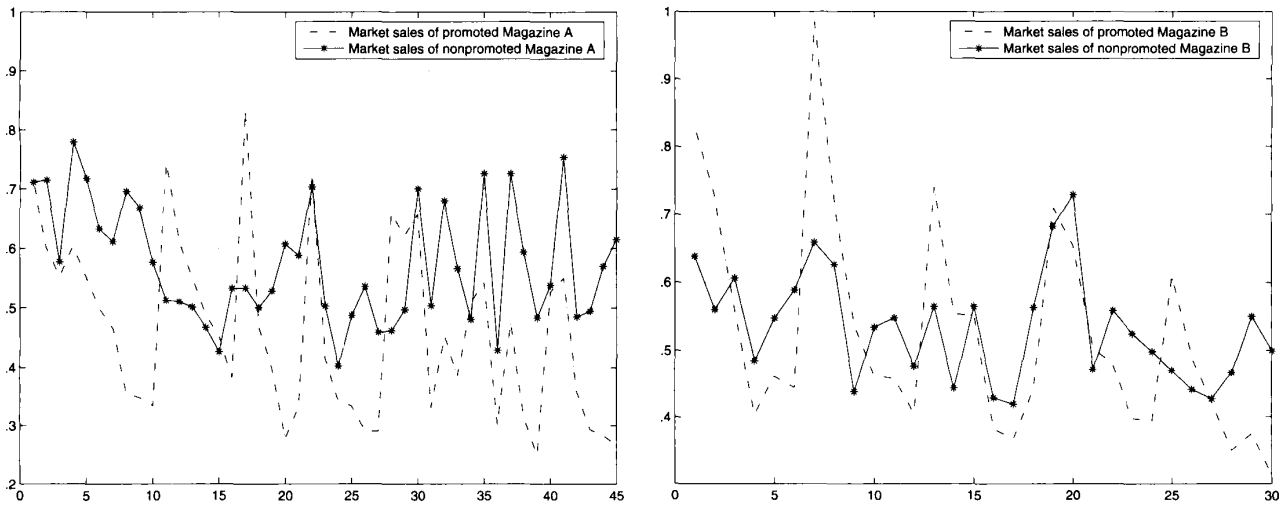

TABLE 2
Augmented Dickey-Fuller (ADF) Statistics for Sales Without and With Promotion of Magazine A

			Interpolated Dickey-Fuller		
	ADF statistics	p value	1% critical value	5% critical value	10% critical value
Sales without promotion (with 10 lags)	−4.898	0	−3.511	−2.891	−2.580
Sales with promotion (with 10 lags)	−6.107	0	−3.511	−2.891	−2.580

TABLE 3
Augmented Dickey-Fuller (ADF) Statistics for Sales Without and With Promotion of Magazine B

			Interpolated Dickey-Fuller		
	ADF statistics	p value	1% critical value	5% critical value	10% critical value
Sales without promotion (with 10 lags)	−6.991	0	−3.549	−2.912	−2.591
Sales with promotion (with 10 lags)	−3.999	0	−3.549	−2.912	−2.591

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

where $k = 3$ and $r = 2$. Table 4 reports the parameter estimates, their standard deviation, their t ratio, their p value, and their confidence intervals at 95% of equation (5), respectively, and also the F test value to test for the overall significance of

model (5). As we can observe in Table 4, the promotion effect is significant after three months (i.e., v_3 is the only significant coefficient, as its p value is less than .05). Although the other promotion impact coefficients are nonsignificant (i.e., v_0, v_1, v_2), they reveal some interesting insights into the net impact on the sales of nonpromoted magazines. First, we observe a contemporary (but nonsignificant) cannibalization of $\hat{v}_0 = -.20$

TABLE 4
Estimated Parameters of Model (5) for Magazine A

Parameter	Estimates	SE	t	p > |t|	95% CI	
v_0	−.205663	.2393318	−.86	.392	−.6810661	.2697401
v_1	−.3867956	.2604807	−1.48	.141	−.9042084	.1306172
v_2	.1563864	.2588105	.60	.547	−.3577089	.6704817
v_3	.749429	.2357893	3.18	.002	.2810626	1.217795
ϕ_1	.6057521	.0906065	6.69	0	.4257734	.7857307
ϕ_2	.3378463	.0867645	3.18	0	.1654993	.5101932

Notes: SE = standard error; *CI* = confidence interval.

Sample size = 96; R^2 = .9809; AdjR^2 = .9796; Root MSE (mean square error) = 24,759, $F(6, 91)$ = 779.23.

TABLE 5
Estimated Parameters of Model (6) for Magazine A

Parameter	Estimates	SE	t	p > |t|	95% CI	
v_3	.6150437	.1888937	3.26	.002	.2399909	.9900966
ϕ_1	.6086366	.0908768	6.70	0	.4281987	.789074
ϕ_2	.3133399	.0861279	3.64	0	.142331	.484348

Notes: SE = standard error; *CI* = confidence interval.

Sample size = 96; R^2 = .9799; AdjR^2 = .9792; Root MSE (mean square error) = 2,5116, $F(3, 93)$ = 1,508.06.

units, and a positive direct impact during the following months given by −.38 in the first month, .15 in the second, and .749 in the third. 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 $\hat{g}$ = 5.5558, which is positive. Nonetheless, since some coefficients are nonsignificant, we can obtain a more accurate estimation reformulating the model.

Next, we refine the modelling, omitting the nonsignificant terms of equation (5). The model that was finally adopted for modelling sales of Magazine A is then given by:

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

Parameter estimates of equation (6) are reported in Table 5. The results still suggest a significant lagged impact of promotions given by $\hat{v}_3$ = .615. The R^2 of the proposed model is .97, and the F test value is 1508.06. Therefore, we conclude that the promotion of Magazine A has a lag of three months before it has a positive impact. Using these estimations, we compute a more accurate estimation of the gain: $\hat{g}$ = 7.8828.

Figure 3 shows the Impulse Response Function (IRF) for model (6), that is, the dynamic response to a pulsed input. The IRF is given by the coefficients of the linear transfer filter: $\beta(L) = \sum_{l=0}^{\infty} b_l L^l$. The summation of the coefficients in the IRF equals to the gain. We have computed the IRF based on the transfer function estimates, which is a consistent estimation

under the exogeneity assumption of promoted sales (which can be checked through Granger causality tests, as we discuss at the end of this section). Note, however, that in products for which this assumption is not satisfied, marketers should estimate a VARMA (vector autoregressive moving average) specification for promoted and nonpromoted products, and then compute the IRF based on the Choleski decomposition for the bivariate linear filter. As we can observe, all impulse responses are positive and its temporal pattern shows a steady decay to zero.

Magazine B

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

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

where k = 2 and r = 2. Parameter estimates of equation (7) are reported in Table 6. As we can observe in Table 6, 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 −.43 sold units, and a positive impact during the following months given by .33 in the

FIGURE 3
The Impulse Response Function for Model (6)
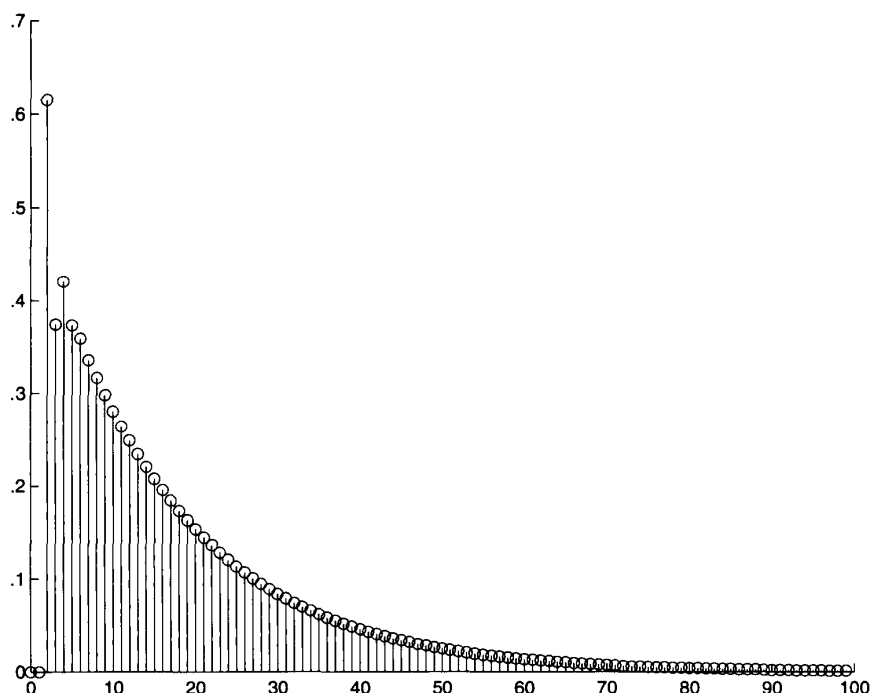
first month and .37 in the second one. If we consider direct and indirect effects, with negative and positive sign, the gain or net effect of an extra unit of $PSales_t$ on $Sales_t$ is given by $\hat{g}$ = 1.8112, which is positive. Nonetheless, since some coefficients are nonsignificant, we can obtain a more accurate estimation reformulating the model.

The model can be adjusted by dropping the nonsignificant term v_2. We then consider:

$$Sales_t = v_0 PSales_t + v_1 PSales_{t-1} + \phi_1 Sales_{t-1} + \phi_2 Sales_{t-2} + \varepsilon_t. \tag{8}$$

Parameter estimates of model (8) are reported in Table 7. The R^2 of the proposed model is .93, and the F test value of 240.39 shows the overall significance of model (8). The results still suggest a contemporary cannibalization of −.45 units, compensated by a positive impact of .63 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 6, and we accept that 1.4483 is a more efficient estimation of the global effect.

Figure 4 depicts the impulse response function for model (8). As we can observe, impulse responses are characterized by a significant negative impact at the first lag, followed by a positive long tail, so that the filter gain is positive.

Model Diagnosis

Finally, we have checked the validity of the estimates. First, we verify whether there is serial correlation in the error terms. The simplest method is to look at an autocorrelation plot of the residuals. As the residual Auto Correlation Function (ACF) and Partial Autocorrelation Function (PACF) for models (6) and (8) fall within the 95% confidence bands around zero (using the Bartlett confidence intervals), we concluded that nonsignificant structures can be found. We also tested the residual serial correlation with the Box-Pierce Q statistics and the Portmanteau statistics for models (6) and (8). In all cases, we found no evidence of residual autocorrelation at 95% confidence. Another of the main assumptions for the OLS regression in dynamic regression models is the homogeneity of the conditional variance of the innovations. We have also considered the ACF and PACF for the square residuals of models (6) and (8) to study the presence of conditional heteroskedasticity (e.g., an ARCH [Autoregressive Conditional Heteroskedasticity] or GARCH [Generalized Autoregressive Conditional Heteroskedasticity] structure), and we found no structure.

Usually, multicollinearity is not a big concern in linear dynamic regression models unless the considered series is essentially deterministic and shows very small fluctuations. To ensure that we do not have these problems, however, we have computed several multicollinearity diagnostic measures,

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TABLE 6
Estimated Parameters of Model (7) for Magazine B

Parameter	Estimates	SE	t	$p > \lvert t \rvert$	95% CI	
v_0	−.4365949	.2103286	−2.08	.042	−.8566502	−.0165396
v_1	.3314508	.2621793	1.26	.211	−.1921573	.855059
v_2	.3713876	.2093212	1.77	.081	−.0466558	.7894309
ϕ_1	.5451433	.1201937	4.54	0	.3050999	.7851867
ϕ_2	.307856	.103383	2.98	.004	.1013858	.5143261

Notes: SE = standard error; CI = confidence interval.

Sample size = 70; R^2 = .9387; AdjR^2 = .9340; Root MSE (mean square error) = 1,1826, $F(5, 65)$ = 199.20.

TABLE 7
Estimated Parameters of Model (8) for Magazine B

Parameter	Estimates	SE	t	$p > \lvert t \rvert$	95% CI	
v_0	−.4507993	.2135689	−2.11	.039	−.8772034	−.0243953
v_1	.6363678	.2011938	3.16	.002	.2346715	1.038064
ϕ_1	.6326151	.1113867	5.68	0	.4102243	.855006
ϕ_2	.2392546	.0974282	2.46	.017	.044733	.4337762

Notes: SE = standard error; CI = confidence interval.

Sample size = 70; R^2 = .9358; AdjR^2 = .9358; Root MSE (mean square error) = 12,017, $F(4, 66)$ = 240.39.

FIGURE 4
The Impulse Response Function for Model (8)
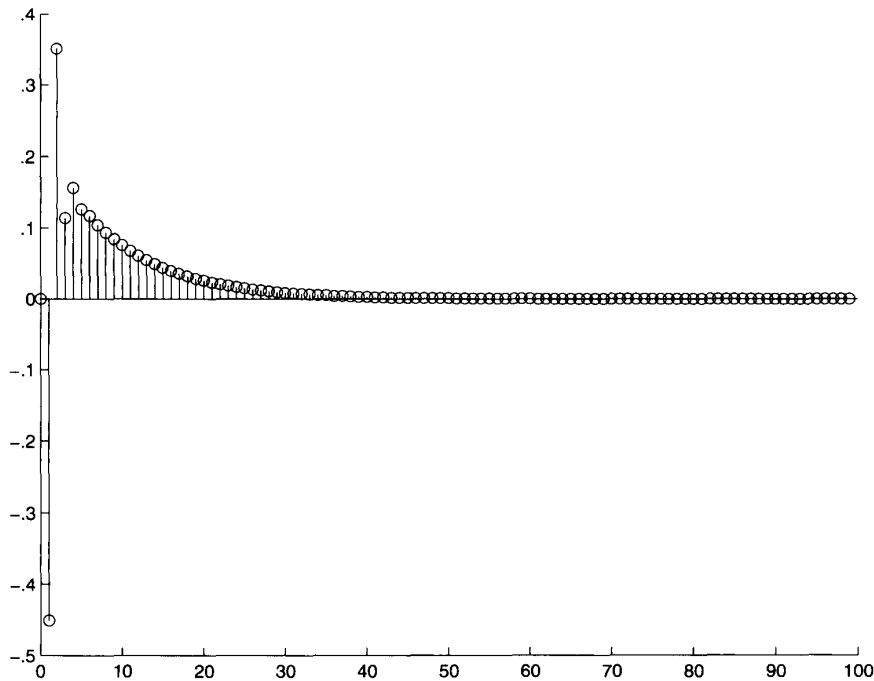
including the variance inflation factor (VIF) and tolerance defined as 1/VIF. As a rule of thumb, a variable whose VIF values are greater than 10 are possibly redundant. For both models (6) and (8), we concluded that there is no multicollinearity.

In addition, we performed Granger-causality Wald tests (1969) for each time series in the data set to study whether the explanatory variable can be explained by the lags of the dependent variable. Testing causality, in the Granger sense, involves using Wald F tests to test whether lagged information on a variable y (e.g., sales of nonpromoted magazines) provides any statistically significant information about a variable x (e.g., sales of promoted magazines) in the presence of lagged x. In a VAR (vector autoregressive) model, under the null hypothesis that y does not Granger cause variable x, all the coefficients on the lags of variable y will be zero in the equation for variable x. A high p value is evidence that the coefficients are jointly zero, rejecting the presence of Granger causality. We have conducted this test to study the exogeneity (absence of feedback) of promoted sales with respect to sales. For both cases, Magazines A and B, we have rejected the reverse causality at the .05 significance level with p values of .1849 and .3839, respectively.

To sum up, the estimation results and additional analyses suggest that the proposed models (6) and (8) are robust to model specification assumptions, and rule out reverse causality explanations.

DISCUSSION

The primary purpose of this study was to analyze a type of nonprice promotion implemented in the magazine publishing industry in Europe, and also to determine whether the effect of implementing these promotions is favorable in the long 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 nonpromoted issues in the near future. This type of promotion is used as a substitutive strategy for classical advertising, as it tends to increase magazine awareness and loyalty, and eventually reduces the trend toward declining sales.

Marketing scholars and practitioners often infer a negative market response from cannibalization between substitutive products, as is the case with our promotion (i.e., when a product is sold simultaneously with and without promotion at different prices). However, Figures 3 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).

In addition, we provide deeper insights into the long-term economic impact of the magazine promotion considered here. The impulse response function provides the dynamic effect of promotion in terms of sales units, and therefore, a manager can value the future revenues—multiplying the gain $g = \beta(1) = \Sigma_{l=0}^{\infty} b_l$ by the price P. It is usually convenient to discount the cash flow of future revenues, however. Taking an interest rate $i \in (0, 1)$ and a price inflation rate $\pi \in (0, 1)$, the discounted value of future revenues generated by a unit sale of the promoted magazine is given by

$$P \times \beta(D) = P \times \sum_{l=0}^{\infty} b_l D^l,$$

where $D = (1 + \pi)/(1 + i)$ is the discount factor. Notice that this value can be computed using

$$P \times \beta(D) = P \times \frac{\left(v_0 + v_1 D + \ldots + v_k D^k\right)}{\left(1 - \phi_1 D - \ldots - \phi_r D^r\right)},$$

whose coefficients have been consistently estimated. Furthermore, a manager can consider the discounted net value provided for a unit sale of the promoted magazine using the unit margin $(P - C)$ instead of using the price P.

Let us then assume an interest rate of 10%, an inflation rate of 4%, and consider the average prices of Magazine A and B without promotion, which are €2.50 and €2.80, respectively. For Magazine A, the discounted value of future revenues generated by a unit sale of the promoted magazine is 9.5135; for Magazine B, we obtain 2.1240. These results allow us to conclude that the promotion activity of Magazine A is more profitable than that of Magazine B.

Limitations and Future Research

We have used market-aggregated data, but further research in this area could determine how different segments respond to different kinds of value-pack promotions, as well as how these promotions affect the actual purchase behavior 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. It also might be useful to know what specific elements of the value-pack added product appear to impact purchase behavior 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 nonpromoted magazines can generate a contemporary cannibalization, but the advertising and word-of-mouth effect of promotions generates a positive impact on future sales of nonpromoted magazines. Also, this study suggests that a relevant percentage of the buyers of the promoted issues who read the magazine for the first time are satisfied with the magazine and become customers. In addition, we show that these results are also an effective tool for promotional dynamic decision making in the long term. Finally, 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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