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AN INVESTIGATION OF THE LONG-RUN IMPACT OF ADVERTISING EXPENDITURE ON SALES

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ABSTRACT

The conventional wisdom is that advertising results in increase in sales. This paper investigates the long-run properties of the sales-advertising expenditure relationship using cointegration methodology. In addition, the causal relationship between sales and advertising expenditure is investigated. The results indicate that there is a long-run relationship between the growth rate in advertising expenditure and sales growth and that causal relationship exist between these two variables. The long-run relationship and causal effect varies significantly across firms within the industry studied. The direction of the causality and the long-run relationship has implication for setting advertising budgets as well as the expensing of advertising expenditures.

INTRODUCTION

Advertising is any paid form of non-personal communication about an organization, product, service, or idea by an identified sponsor, (Alexander, 1965:9). The primary purpose of advertising is to sell something-a product, a service, or an idea. In other words, advertising is supposed to increase sales or market share of the sponsor. The role of advertising within an economy cannot be over-emphasized. Advertising and promotions are an integral part of our social and economic system, evolving into a vital communications system that gives businesses and consumers the ability to deliver carefully prepared messages to target audiences. "Advertising provides nearly all of the financing for commercial domestic broadcast television and approximately half of the financing for domestic cable television", (Blumenthal & Goodenough, 1998: 416). Expenditures in advertising and promotions have experienced tremendous growth in recent years. Between 1980 and 2002, their combined expenditure increased from $102 billion to $490 billion in the United States, (Belch & Belch, 2004:5). The question arises as to the extent and level of benefit provided to the sponsors of these communications. (Batra, Lehmann, Donald, Burke & Pae, 1995) find a strong and significant increase in the effect of advertising when the product category is new and growing. The duration of this effect has not been investigated to the best knowledge of the author.

Advertising expenditure entails the outlay of current resources in expectation of future benefits to the firm. The objective of this study is therefore, to investigate the long-run relationship between advertising and the firm's sales. The rest of the paper is organized as follows: the next section presents a brief literature review; section three deals with the data and methodology; section four results and final section contains the analysis and conclusion.

BRIEF LITERATURE REVIEW

This section presents a brief review of previous studies on the impact of advertising on sales. (Marquardt & Murdock, 1984) found that advertising expenditures appear to have a very significant effect upon retail sales. (Yasin, 1995) show no relationship between advertising and the average market's growth. On the other hand they find that the level of market advertising is associated with higher price premiums for the brand leader.

(Leach & Reekie, 1996) estimated the effect of advertising on the market share of petrol produced by SASOL of South Africa. Their results supported the hypothesis that sales are

determined by past as well as current advertising expenditures. In addition, the cumulative effects of advertising lasts for months rather than years.

(Kamber, 2002) examined the effect of the amount spent on advertising on sales during the recession of 1990-1, and found a measurable relationship between the two, even when controlling for company size and past sales growth.

(Yiannaka, Giannakas & Tran, 2002) examined the effectiveness of advertising in the Greek processed meats sector using unbalanced panel data set of 34 firms during the period 1983-1987. The estimates of the coefficients of the effectiveness of the different advertising media in the heterogeneous model indicate a significant variation across medium.

The literature on the sales and advertising relationship is seems to be unambiguous. Is the advertising expenditure and sales relationship due to the effect of advertising in increasing sales or is it due to the practice of tying advertising expenditure to sales forecast? For example, (Mitchell, 1993) find that 40.4 per cent of the sample firms used the task and objective method of setting advertising budget. The percentage of future sales method was used by 26.9 per cent of the respondents. 7.7 and 5.8 per cent used the percent of past and future sales, and fixed sums, respectively, by the respondents to determine their advertising budget. (Lee, 1994) using the data from the U.S. brewing firms showed that the firm's advertising budget is an increasing function of its risk-taking attitude resulting from its realized poor performance as measured by either its return on equity or market share. (Corfman & Lehmann, 1994) examined how advertising budget setting, framed as a prisoner's dilemma, is affected by information on the competitive situation and characteristics of the decision maker. They found that the participants based their strategy on what they expected their opponents to do, what their opponents did last time, whether the competitive relationship was expected to continue, on market share considerations, and whether the subject's profit objectives were short- or long-term focus. (Fairhurst, Gable & Dickinson, 1996) applied an open-ended interview approach to examine the methods currently used to set advertising budget for large retailers. In an interview of 24 randomly selected manager/directors of advertising, all the respondents said they used the percentage of sales method to establish their advertising budgets.

(Metwally, 1997) developed and tested a number of hypothesis to explain variations in the growth rates of advertising expenditure of consumer goods and services in Australia during the period 1975-1995.The results indicate that growth in advertising expenditure is strongly correlated with growth in sales; that movements in market shares exerted a significant effect on the growth in advertising expenditure, and that the weight of advertising in the marketing-promotional-mix is a strong determinant of growth of advertising expenditure. Joseph and Richardson (2002) use agency conflict to examine the relationship between advertising expenditure, free cash flow and managerial ownership. They find that the fraction of discretionary dollar reinvested in advertising varies systematically with the level of managerial ownership. The pattern is very similar to the basic agency conflict between managers and owners of firms.

Studies have been conducted to test the duration of the advertising impact on sales. (Bublitz & Ettredge, 1989) show that the market assessment of advertising is consistent with its assessment of short-lived assets. (White & Miles, 1996) propose that advertising decision making should be analyzed within a capital budgeting framework since advertising have significant inter-temporal effects on sales by influencing consumption habits.

Overall, the brief review of the literature shows that while advertising expenditure is correlated with sales, the duration of its impact is still a subject of considerable debate. Because a significant proportion of corporations base their advertising budget on sales or profit/earnings forecast, the causal relationship between advertising expenditure and sales needs to be explored. The present study is aimed at filling this gap in the literature.

DATA AND METHODOLOGY

The data for this study, obtained from the Compustat database, are the annual sales (SALE) and advertising expenditure (ADEX) for the period 1960 through 2000, for the household products industry (SIC 335). Of the 98 firms listed in the database, only 18 firms had sufficient continuous data over the study period.

Establishing the long-run relationship between a pair of time series requires that the variables be cointegrated. Cointegration implies that even though the two or more series themselves may contain stochastic trends, the series are linked to form an equilibrium relationship to which the system converges over time. The error term, ϵ_t, can be interpreted as the distance that the system is away from equilibrium at time *t*.

In order to investigate the long-run relationship between sales and advertising expenditure, it is necessary to determine the integration of these variables for the firms under study. To achieve this, the augmented Dickey-Fuller (ADF) test is employed. The selection of the optimal lag length is based on the Akaike Information criterion (AC), multivariate Hannan-Quinn criterion (HQ), and multivariate Schwarz Bayesian (SC) criterion.

Given the integration characteristics of the sales and advertising expenditure variables for the firms, the Johansen maximum likelihood procedure is used to test for possible cointegration between the variables. Lambda-max and Trace tests are used to determine the number of cointegrating vectors based on the maximum likelihood estimates of the cointegrating vectors. The lag length, *k*, is chosen by a combination of AC, HQ, and SC criteria. Standard Granger causality tests that are augmented with error-correction terms, obtained from the cointegrating relationship, are used to investigate the long-run effects.

STATIONARITY TEST RESULTS

The augmented Dickey-Fuller (ADF) test was conducted using the following regression model:

$$\Delta z_t = \alpha_0 + \beta z_{t-1} + \eta T + \sum_{s=1}^{p} \chi_s \Delta z_{t-s} + \mu_t \qquad\qquad 1$$

Where z_t is the time series, T is a time trend, and μ_t is white noise. The null hypothesis is that the time series z_t is a unit root with drift process: $\beta = 0$, against the alternate that z_t is a trend stationary process: $\beta < 0$. The test statistic is the t-value of β. The selection of the optimal *p* was based on the Akaike, Hannan-Quinn and Schwarz information criteria. The results, though not presented in the table, are available upon request. The results of the stationarity or unit root tests indicate that the characteristics of the variables differ considerably across the firms in the households industry. In the nominal form, only two of the firms have the variables integrated of the same order, *I(1)*. In the growth rate form, all of the firms have all the variables integrated of order one. Given the order of integration of the variables, the Johansen procedure will be used to determine the long-run relationship between the growth rates in sales and advertising expenditure for these firms in the household industry.

COINTEGRATION TEST RESULTS

The use of the Johansen procedure requires the selection of the appropriate lag length for the VAR(*p*) model. The Hannan-Quinn and Schwarz information criteria are used to select the order *p* that ensure the errors are approximately white noise. For all the series in the study, *p=1* is the upper bound value that ensures white noise. The tests for the number of cointegrating vectors is based on the lambda-max test and the trace test Both test strongly support the existence of one

cointegrating vector for six of the firms. However the results are mixed, with the two tests arriving at conflicting conclusion, for the remaining nine firms. For these firms, one cointegrating vector was elected based on the results of the lambda-max test.

The Johansen's cointegration analysis was performed with cointegrating restriction on the time trend parameters imposed. The likelihood ratio (LR) tests of the null hypothesis that the imposed cointegrating restrictions on the time trend parameters holds, indicate that the trend restriction is invalid for only one firm, with a p-value of 8.68%. The average p-value for the rest of the firms was 79.36%.

Next is the estimation of the error correction model. Since the number of lagged variables necessary to obtain white noise in the cointegrating equation is one, the error correction model takes the form:

$$z(t) - z(t-1) = B.H'[z(t-1)',t-1]' + c + u(t) \qquad\qquad 2$$

for the case in which cointegrating restrictions on the time trend parameters are imposed
1. $z(t)$ is a 2-vector with components: $z(1,t) = SALES(t)$ and $z(2,t) = ADEX(t)$
2. $H'[z(t-1)', t-1]' = e(t-1)$, is the 1-vector of error correction terms, with H the 3x1 matrix of cointegrating vector
3. $H'z(t-1) = e(t-1)$, is the 1-vector of the error correction terms, with H the 2x1 matrix of cointegrating vectors.
4.   c is a 2-vector of constants
5. $d(t)$ is the 2-vector of deterministic variables, with components $d(t,1) = 1$, and $d(t,2) = t$
6. $u(t)$ is the 2-vector of error terms.
7. $t = 2$ (= 1961), ……., 41 (= 2000).

The result of the VECM estimation is used to test the direction of causality between sales and advertising expenditure. A causal link exists between the variables if the coefficient of the error correction term, β_1 and/or β_2, are statistically significant. Significance of the error correction term reflects long-run causality. For each firm, if both coefficients are significant, it indicates that causality is bi-directional.

The results indicate that causality runs very strongly from sales to advertising expenditure. In all but two of the firms studied, the coefficient of the error-correction term (β_2) in the advertising expenditure VECM are significant at the 5% level or better. The average R^2 for the remaining firms studied is 48.36%, with a high of 97.21% and a low of 10.7%. In contrast, the error-correction term is not significant for five of the firms in the change in sales VECM. The average R^2 for the firms where the term is significant is 39.57%, with a high of 66.02% and a low of 8.36%. A strong bi-directional causality exists between sales and advertising expenditure for three of the firms although the causality is much stronger flowing from sales to advertising expenditure as evidenced by the magnitude R^2.

To further evaluate the effect of sales on advertising expenditure, the coefficient of the error correction term is multiplied by the coefficient of the sales in the cointegration vector. The resulting product is an estimate of the long-run impact of sales on advertising expenditure. It measures the rate of change of the change in growth rate of advertising expenditure with respect to change in sales growth. The result of the analysis indicates that there is a long-run relationship between the growth rate advertising expenditure and growth rate in sales. The direction of this effect is not uniform across the firms studied. For seven of the fifteen firms, the slope of the SALES VECM is negative, for these firms, the results seems to suggest that increase in growth rate of advertising expenditure leads to a decrease in sales growth. The reverse holds for the remaining eight firms. The magnitude of the slope varied from a high of 1.261 to a low of −0.15, with an average of the absolute values of 0.3863.

For the advertising expenditure VECM, the impact of changes in growth rate of sales on advertising expenditure growth rate is much higher than the SALES VECM. The magnitude of the slope ranged from a high of 3.906 to a low of -0.0136, with an average of 1.032 of the absolute values. The results indicate that for eight of the firms, increase in sales growth resulted in increase in advertising expenditure while the reverse holds for the remaining firms

ANALYSIS AND CONCLUSION

The result obtained from applying the Johansen procedure on the relationship between sales and advertising expenditure, provides a mixed insight into the relationship between sales and advertising expenditure in the household products industry. Firstly, the results indicate that there is no significant long-run relationship between the levels of sales and advertising expenditure rather, it is the growth rates that are relevant. Secondly, the impact of time on the long-run relationship between these variables is highly significant. Of the firms studied only one of them rejected trend restriction on the cointegrating vector. This implies that time is a relevant variable in establishing the long-run relationship between sales growth and the growth rate of advertising expenditure.

Thirdly, the Granger causality test provides mixed results on the impact of sales on advertising expenditure and vice versa. The result indicates that, for six of the firms studied, causality runs strongly from sales to advertising expenditure. This implies that the growth rate of advertising spending is determined to a significant degree by the growth rate in sales. This supports studies by (Mitchell, 1993; Fairhurst, Gable & Dickinson, 1996) on the method firms use in setting their advertising budget. On the other hand, for five firms, the tests indicate and support the dependence of sales growth on advertising expenditure growth rate, a clear support for the study by (Leach and Reekie, 1996). For the remaining four firms, there exists a strong bi-directional Granger causality between growth rates in sales and advertising expenditure. This mixed relationship can be an explanation to the findings of (Yasin, 1995) in a cross-sectional study of advertising expenditure and the average markets' growth in which no relationship was found between the two variables.

Fourthly, the slope of the VECM equation is mixed for the firms studied, with eight of the fifteen firms having a positive value. This provides strong evidence in support of the varying nature of the role of and use of advertising by various firms within the same industry. Even though there is a strong evidence of causality between sales and advertising expenditure, the direction of the effects is non-uniform across firms. A negative slope of the advertising expenditure VECM on sales implies the use of advertising to boost declining sales, while a positive slope indicates a possible use of sales to set advertising budget. Finally, this study seems to suggest that there is a a long-run relationship between sales and advertising expenditure inferring the use of capital budgeting procedure to evaluate advertising expenditure rather than the prevailing percentage of sales approach.

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