

Linear Relationship between Reported Discretionary Expenditure and Sales Amount – Empirical Approach with IT Related Industry

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Abstract

Financial studies assume linear relationship between discretionary expenses and sales amount. Also previous researches insist that industry having shorter product cycle has strong relationship between them. We investigate linear relationship between them based on financial reports during 2000-2011 of appearing companies in top 100 firms based on advertising amount. We choose food product manufacturing and electronic component manufacturing industry representing industry with short product cycle and IT industry.

The result shows selling & administration expenses generally have a linear relationship with sales amount, while advertising and R&D expenses doesn't. For advertising expenditure, we cannot find any evidence of its linear relationship with sales amount for both selected industries. However, R&D expense has linear relationship with sales amount in Food product industry. We guess it caused by food product's short product cycle.

Keywords: *advertising expenditure, financial report, selling and administration expense, product cycle*

1. Introduction

Financial reporting Standards define advertising as expenditure on advertising and promotion activities for public audience intended to increase the sale of services or products. Companies are also allowed to record of expenditures spent to improve its public image or brand power [1].

From the management view point, it is the primary concern to measure spending expenditure and the effect of advertising. Accurate measurement of the costs and benefits would provide foundations of effectiveness in advertising activities. Based on similar standpoint, other discussion topics on advertising expenditure are the nature of the advertising and manager's discretionary decision on those expenditures.

Many researchers have asked the same question on nature of advertising. Shall it be a onetime cost? Otherwise, shall it be regarded as a kind of investment for future revenue growth? Advertising increases not only the direct sales of products, but also company's brand value. Brand power has indirect positive effects on the firm valuation. Some insists advertising expenditure should be classified as investments on intangible assets same as R&D activities to provide additional information to investors.

Another research topic on advertising is that decisions on advertising are discretionary for each individual company. Previous researches suggested selling and general administration expenses have linear relationship with sales amount [5, 6]. Also it reported companies expecting bad performance in operating profit try to increase reported profit by reducing

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discretionary costs such as general administrative expenses including R & D expenses and advertising expenses. It can be regarded as one of intentional earnings management activity to be associated with the discretionary expenditures [9].

We try to identify proper amount of advertising expenditure and to check differences of expenditures on advertising according to industry. If theoretical linear relationship between discretionary expenditures and sales amount exists in real financial reports, we can find specific ratio between them with cross-sectional analysis for each industry.

To do this, we will use advertising activity reports of the four major media such as TV, radio, newspapers, and magazines during 2000-2011 in Korea. With the report, we will check followings: First, we identify the top 100 companies based on advertising expenses and classify them according to industry. Second, we identify industry to compare with each other if we can see linear relationship between discretionary expenditure and sales amount with the cross-sectional analysis.

2. Theoretical Background and Hypothesis

2.1. Literature Review

We review advertising related literatures based on theoretical assumption on amount of advertising expenditure, earning management associated researches and intangible assets associated researches.

Basically, the purpose of advertising activities is increasing sales amount. The more sales increases as results of advertising activities, the more advertising expenditure will be spent. Several studies introduced the theoretical discussions on the relationship between sales and revenue and it resulted in a linear equation between them [4]. In the middle of discussion, the research assumes general administration expenses have also linear relationship with sales amount. Based on the assumption, the research suggested a linear equation for them. With the linear relationships between sales amount and others, [9] suggested industrial cross-sectional analysis to find intentional reducing discretionary expenditure as one of earning manipulation with real business operations.

Besides spending amount on advertising or R&D, there are many analysis reports on the relationship between those expenditure and firm's market value. To verify intangible asset's positive contribution on firm valuation, [8] selected Tobin's Q value as the representative of firm value. They reviewed its relationship with R & D ratio compared with sales amount and advertising expenditure. The result shows investment on advertising and R&D has positive effects on Tobin's Q. Also they suggested amortization period of 1-5 years for intangible assets generated by advertising expenditures. Hall (1993) also used Tobin's Q value to represent firm valuation and showed the result of regression analysis with R&D expenditures, advertising expenditures variable. The results also showed the advertising expenditure is relevance to the company's market value [7].

Bublitz & Ettredge (1989) selected CAR (Cumulative Abnormal Return) of firm as the representative variable for its market value and reviewed the effect of R&D expenses and advertising on it [2]. As a remedy of difficulties on measuring the result of R&D and advertising expenditure, he suggested to divide industries into Nondurable goods manufacturing and durable goods manufacturing. According to the research, long product cycle is important factor of R&D investment, while advertising does not have positive effects on the suggested firm value variable.

Chauvin & Hirschey (1993) reviewed the effects on stock price of the cash flow, growth, risk, market share, advertising, R & D expenses, and advertising. R&D and advertising expenditure have positive influence on the capital markets and the value of shares [3].

2.2. Hypothesis Development

Based on the linear relationship between earnings and sales amount, we also assume the linear relationship between the general administration expenses and sale amount [4]. Even though selling and administration expenses are discretionary expenditure, we can assume the spending ratios on advertising and R&D are not frequently changed because those expenditures may effect on long-term firm market value. Manager can reduce discretionary expenditures to increase reported profits for short period, but it should back to normal for future performance. Therefore, we can expect linear equations with industry cross-sectional analysis.

If these arguments are right, bigger company will spend more expenditure for advertising or R&D and cross-sectional analysis with linear equation between them will have higher adjusted R² for regression analysis.

***Hypothesis 1:** Reported expenditure in selling and general administration is linearly relevant to firm's sales for each industry.*

***Hypothesis 2:** Reported expenditure in advertising and R&D activities is linear relevant to firm's sales for each industry.*

Even though we assume actually linear relationship between variables is existing, we may not observe it with data in real financial reports. We have to consider when we can identify the result of advertising or R&D activities measured by sales increases. If product cycle is longer than several years, we will observe the sales or profit increases caused by current advertising and R&D investments [2].

Based on it, we may identify linear relationship suggested in above Hypotheses only if investigating industry has shorter product cycle and we can identify the increase of sales or profits within the given financial period. Non-durable goods manufacturing will have shorter product cycle and we will choose proper industry based on amount of expenditure for advertising. In addition, we will compare result of regression analysis for IT related manufacturing with that for non-durable goods manufacturing. With comparisons, we can identify the characteristics of IT related manufacturing industry. Based on that IT related industry has longer product cycle, we expect non-durable goods manufacturing industry has higher probability of linear relationship among them.

***Hypothesis 3:** Non-Durable goods manufacturing industry has higher probability of linear relationship between discretionary expenditures and sales amount than IT related manufacturing industry.*

3. Empirical analysis

3.1. Data

We identified companies ranked high 100 companies for advertising expenses in KADD's (Korea Advanced Digital Data) NMR (Nielson Medial Research) Reports during 2000 -2011. We compared reported advertising expenditure with advertising expenditure within firm's financial reports. Table 1 show the manufacturing companies count included in top 100 advertising company list and their frequencies.

Diverse manufacturing industries identified in KSIC-9 code are appeared in top 100 advertising companies. The most frequent industry is food product, pharmaceuticals and comical products. Electronic components, Beverages and motor vehicles are following. 14 companies (16.7%) appeared in top 100 companies during all 2000-2011 period. 24

companies (28.6%) appeared during more than 10 years in the list, while 18 companies (21.4%) appeared just one time.

We selected food products, beverages, wearing apparel as example of non-durable goods manufacturing based on frequency and characteristics of product. Those industries and IT related industry, electronic component industry, were used for the cross-sectional verification of the hypothesis of this study.

Table 1. Top 100 Companies Classified with Industry and Frequency

Yearly distribution		Industry distribution (KSIC-9)		Frequency distribution		
Year	Company #	Manufacturing #	Detailed manufacturing	Company #	frequency	Manufacturing #
2000	100	40	Food Products	18	1 time	18
2001	100	47	Beverages	8	2 times	7
2002	100	45	Wearing apparel, clothing accessory and fur articles	2	3 times	8
2003	100	43	Pulp and paper products	1	4 times	5
2004	100	44	Coke, hard-coal and lignite fuel briquettes and refined petroleum	2	5 times	4
2005	100	38	Chemicals and chemical products	13	6 times	5
2006	100	47	Pharmaceuticals, medical chemicals and botanical products	14	7 times	5
2007	100	38	Non-metallic mineral products	2	8 times	5
2008	100	38	Basic metal products	1	9 times	3
2009	100	41	Fabricated metal products	1	10 times	3
2010	100	41	Electronic components, computer, radio, television and communication	8	11 times	7
2011	100	41	Electrical equipment	2	12 times	14
			Other machinery and equipment	1		
			Motor Vehicles, trailer and semitrailers	6		
			Other transport equipment	1		
			Furniture	1		
			Other	3		
Total	263	84	Total	84	Total	84

3.2. Regression Model

We apply previous research assumptions [4, 9] on the linear relationship between sales amount and discretionary expenses. In the assumption, discretionary expenses imply the selling and administration expenses, but we applied it to other expenditures such as

advertising or R&D expenditures. To control the size, given variables are divided by the asset and the linear equation between them can be organized as follows:

$$DisExp_{it}/A_{t-1} = \alpha_0 + \alpha_1 (1/A_{t-1}) + \beta (S_{t-1}/A_{t-1}) + \varepsilon_t \quad (1)$$

Cf) $DisExp_{it}$: Discretionary Expenditure, company i's reported selling and administration expenditure in time t

S_{it} : natural log of company i's Sales amount in time t

A_{it} : natural log of company i's Asset amount in time t

From the equation (1), we expect a positive coefficient for sales amount. In order to test if additional discretionary expenditures has linear relation with sales amount, we will replace $DisExp$ variables with advertising and R&D. We can expect similar sign of coefficient for equation (1) replacing $DisExp$ variables.

3.3. Variables

The statistics of variables used in equation (1) are presented in Table 2.

By comparison of asset variables, Food products and beverage manufacturing is bigger in size of assets than Wearing apparel or Electronic component manufacturing. However, Wearing apparel and Electronic component manufacturing has more variety than others in company assets considering its standard variation. Ratio between sales amount and asset are similar to others except beverage manufacturing, which will have the smallest sales amount if all company has same asset as others.

Table 2. Distribution of Variables (2011)

Industry	Listed company #	Variable	Average	SD	Median	Min	Max
Food products	35	$DisExp_{it}/A_{t-1}$	0.184	0.143	0.132	0.0024	0.711
		$1/A_{t-1}$	10.838	17.543	4.721	0.270	93.40
		S_{t-1}/A_{t-1}	1.058	0.442	1.117	0.0205	1.823
Beverages	10	$DisExp_{it}/A_{t-1}$	0.156	0.121	0.152	0.029	0.413
		$1/A_{t-1}$	9.663	11.050	7.218	0.315	38.63
		S_{t-1}/A_{t-1}	0.647	0.251	0.578	0.378	1.142
Wearing apparel	19	$DisExp_{it}/A_{t-1}$	0.479	0.223	0.500	0.107	0.931
		$1/A_{t-1}$	16.285	23.903	7.339	1.595	106.4
		S_{t-1}/A_{t-1}	1.085	0.468	0.973	0.499	2.115
Electronic components	198	$DisExp_{it}/A_{t-1}$	0.122	0.073	0.099	0.007	0.423
		$1/A_{t-1}$	15.466	13.105	11.042	0.009	65.09
		S_{t-1}/A_{t-1}	1.017	0.705	0.838	0.082	4.486

3.4. Regression Results

We have regression analysis result with expression (1) for each industry and each year. The adjusted R² values of every year are displayed in figure 1 and figure 2 for food product manufacturing industry and electronic components manufacturing industry.

Figure 1 shows overall adjusted R² of regression during 2001- 2011 for food product manufacturing, while Figure 2 shows for electronic component manufacturing industry. If hypothesis I and II are true, we expect all the adjusted R² of regression should be close to 1. For both industries, the higher values of adjusted R² during all period prove the linear relationship between sales amount and selling & administration expenses. On the contrary, the regression for advertising and R&D expenditures resulted in lower adjusted R². It implies the relationship between other discretionary expenses doesn't have linear relationship with sales amount. In other words, companies with lower sales amount may invest more on advertising or R&D activities than companies having much assets or sales amount.

The adjusted R² value for advertising expenses has lower value for both industries while that for R&D is vague yet. It support hypothesis 3 that the food product manufacturing will have higher probability of linear relationship with sales amount. Food product has shorter product cycle than IT industry.

Another interesting area in Figure 1 and Figure 2 is year 2006. In that year, the linear relationship between sales amount and other discretionary expenditure has linear relationship in electronic component manufacturing. We cannot see any specific reason the data in the given industry shows linear relationship for all discretionary expenses - selling & administration expenses, advertising expenses, and R&D expenses.

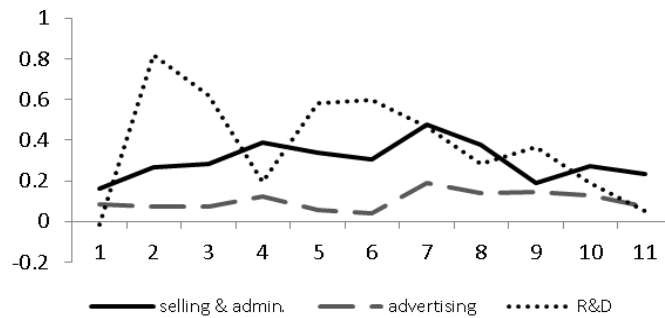


Figure 1. adj. R² of Regression for Each Year (food product)

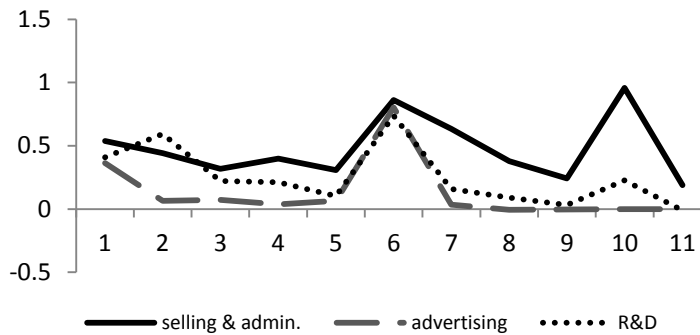


Figure 2. adj. R² of Regression for Each Year (electronic component)

The details on regression result with financial reports from 2006 for selected industry are described in Table 3 and Table 4.

Table 3. Regression Results with Expression (1) with Each Expenditure in Year 2006, Food Product

	Expression (1) with selling and admin. expenses	Expression (1) with Advertising	Expression (1) with R&D
Constant	0.0683 (0.1165)	0.0086 (0.6243)	0.0049 (0.1157)
1/A	0.0004 (0.6269)	-0.0005 (0.1601)	0.0004 (0.0000)***
S/A	0.1243 (0.0003)***	0.030151 (0.2321)	-0.0040 (0.0723)*
F value	8.5429	1.6358	21.9737
Adj R ²	0.3073	0.042	0.5997

Cf) p-value in ()
 N=35; * p < .05, ** p < .01, *** p < .001.

Table 4. Regression Results with Expression (1) with each expenditure in Year 2006, Electronic Component, Computer, Radio, Television and Communication

	Expression (1) with selling and admin. expenses	Expression (1) with Advertising	Expression (1) with R&D
Constant	0.0309 (0.05792)*	-0.0056 (0.0000)***	0.0022 (0.7721)
1/A	0.0027 (0.0000)***	0.0002 (0.0000)***	0.0008 (0.0000)***
S/A	0.0500 (0.0536)*	0.0041 (0.0000)***	0.0080 (0.1959)
F value	614.9291	349.6636	230.5864
Adj R ²	0.8617	0.8040	0.7368

Cf) p-value in ()
 N=198; * p < .05, ** p < .01, *** p < .001.

The result of regression described in Table 3 and Table 4 shows that selling & administration expenses and advertising expenses for electronic component manufacturing industry are linearly relative to sales amount. It is uncertain why every discretionary expense has linear relation with sales amount for electronic component manufacturing only in 2006. We guess it caused by temporal bad business. The companies with fewer assets and less sales amount decrease advertising and R&D expenditures to overcome the recession while healthy companies keep ordinary investments in advertising and R&D.

4. Discussions

This study investigates the relationship between several discretionary expenditures and sales amount. We reviewed the theoretical assumption of linear relationship between them with actual financial reports of listed companies in Korean capital markets. According to the assumption, company spent more on discretionary expenditures as it has more sales amount and asset. Theoretical research identified only selling and general administration expenses as discretionary expenditure, but we also reviewed if advertising and R&D expenditures have also linear relationship with sales amount.

Identified industry having most frequent appearances in top 100 companies based on advertising expense size, food products manufacturing, is reviewed if it has suggested relationships. Also we compare it with IT related manufacturing industry analysis.

Obtained conclusions through data analysis are following.

First, food product manufacturing and IT related manufacturing both have linear relationship between sales amount and general administration expenses. However, reported advertising and R&D expenditures are different from administration expenses in a sense that they didn't show linear relationship with sales amount

Second, advertising and R&D expenditures has more liner relations with sales amount for industry with shorter product cycle. The shorter product cycles, higher probability we can observe the effect of advertising or R&D in given financial period.

We found a certain period all discretionary expenses have linear relationship with sales amount. We guess it is connected to temporal recession when smaller companies actually reduce advertising or R&D activities.

The empirical results of this study provide a concrete case study for the linear relationship between expenses and sales amount. In addition, we need more case studies and specific data analysis to identify actual factors effect on relations between discretional expenses and sales amount.

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