Analysis of Enterprise Marketing Performance Based on Stata Software

Xinxin Wang [a]*, Li Zhang [b]

[a]20050230@sict.edu.cn, [b]20201093@sict.edu.cn,

Shandong Institute of Commerce and Technology, Jinan, China

Abstract. This article selects Chinese retail listed companies from 2013 to 2022 as research samples and empirically analyzes the impact of sales expenses on corporate performance using a fixed effects regression model using Stata software. Research has found that marketing expenses have a sustained impact on the performance of retail enterprises. On the one hand, there is a positive correlation between the intensity of marketing investment and the gross profit margin of retail enterprises. The greater the intensity of marketing investment, the more conducive it is to improving the gross profit margin of retail enterprises, and this impact has a longer cross period effect. On the other hand, the total amount of marketing expenditure has a certain promoting effect on operating revenue. So, while ensuring the control of total marketing investment, retail enterprises also need to ensure an appropriate intensity of marketing investment to ensure both the gross profit margin and net profit margin of the enterprise.

Keywords: marketing investment, Enterprise performance, Operating income, Operating gross profit margin, Intertemporal effect

1 Introduction

As market opportunities change, consumers will also change. If companies cannot adapt, they will inevitably encounter a business crisis. Philip Kotler, the father of modern marketing, proposed that the strength of marketing directly affects the speed of economic growth, and strong marketing means strong economic growth; Marketing determines which products and services a society has and which products can succeed in the market; Marketing is crucial for the growth of enterprises, and the scope of marketing goes far beyond advertising. Enterprises cannot rely solely on external advertising companies; There are also good and bad marketing methods. Not all commercial marketing can promote performance growth. The marketing of H2H (human to human) is more important[1].

The retail industry, as an important pillar industry for national livelihood and material security, plays an irreplaceable and crucial role in the development of society. In the first half of 2023, the total retail sales of consumer goods in China reached 2275.88 billion yuan, a year-on-year increase of 8.2%. Both urban and rural areas experienced an increase of over 8%. In addition to the slight slowdown in social consumption during the three years of the epidemic, the overall consumption of consumer goods in China has been on the rise year by year for decades. With the development of the Internet and the improvement of people's living standards, the retail industry is facing tremendous changes and challenges. The competition in the retail industry is

ICEMME 2023, November 17-19, Beijing, People's Republic of China

DOI 10.4108/eai.17-11-2023.2342733

becoming more intense. Many retail enterprises attract customers by providing differentiated services in category combinations, product quality, sales channels, business promotion, and other aspects. The role of marketing in the retail industry is becoming increasingly important in order to make customers recognize their goods and services. Reasonable marketing investment can enhance the competitiveness of retail enterprises, provide better experiences for consumers, and thereby improve the performance of enterprises[2].

Zhu Xiaofang (2023) studied the impact of digital transformation in retail enterprises on their performance[3]. A few scholars have conducted research on the marketing performance of other industry types of enterprises. Chu Yanqing and Cui Neiqun (2023) found that there is a significant inverted "U" shaped relationship between marketing investment and financial performance of agricultural listed companies[4]. Zhang Guanxiong (2022) studied the relationship between marketing investment, brand equity, and corporate performance[5].

Some studies only consider the total amount of marketing expenditure without considering the intensity of marketing expenditure. The expenditure level is an absolute indicator, while the marketing investment intensity is a comprehensive indicator that considers the relative level of marketing investment and operating revenue of the enterprise, and has horizontal comparability. Due to the unique nature of retail enterprises, their main function is to sell goods, so the measurement of marketing effectiveness should be different from that of general manufacturing enterprises.

Based on the above research and existing problems, this article analyzes the impact of the absolute amount of marketing expenditure and marketing investment intensity on the operational performance of retail enterprises from the perspective of the proportion of total marketing investment and sales expenses to operating revenue. The marketing activities of retail enterprises can increase customer flow and increase business revenue. There are various types of marketing activities for retail enterprises, such as promoting and promoting department store products with high gross profit margins, which can promote the overall growth of the enterprise's gross profit margin. On the other hand, the increase in total marketing expenses has promoted the growth of operating revenue, thereby promoting the growth of net profit margin[6]. Therefore, this article proposes the following assumptions:

Assumption 1: The intensity of marketing investment is positively correlated with the current operating gross profit margin of retail enterprises; The greater the intensity of marketing investment, the higher the operating gross profit margin of retail enterprises, and the better their performance. The total amount of marketing investment is positively correlated with basic earnings per share. The larger the total amount of marketing investment, the higher the operating income, and the higher the net profit of the enterprise. The higher the basic earnings per share, the better the performance of the enterprise.

Assumption 2: Marketing investment has a sustained positive impact on the performance of retail enterprises[7].

2 Research Design

According to the data from According to the data from CSMAR database and the industry classification of the China Securities Regulatory Commission, this article selected retail enterprises that continued to be listed on A-shares from 2013 to 2022, excluding abnormal enterprises such as ST and * ST, enterprises with incomplete 10-year data, and enterprises delisted in the middle. Finally, 54 retail enterprise information was obtained, with a total of 540 sample data. And all data was subjected to a 1% tail reduction.

By analyzing the performance of enterprise marketing in reference literature, multiple variables related to enterprise marketing performance can be obtained. The random forest algorithm is a very effective variable screening method, which can help us select more relevant variable groups and make research more explanatory. This article establishes a random forest model that includes all control variables and dependent variables. A sequence of variables sorted by Gini importance values is constructed, and two dependent variables (total marketing investment and marketing investment intensity) and three control variables (enterprise size, asset liability ratio, and free cash flow) are selected through machine learning from dozens of related variables[8].

2.1 Variable Description

2.1.1 Basic earnings per share (RET)

Basic earnings per share, also known as post tax profit per share or earnings per share, is an important indicator that comprehensively reflects a company's profitability. It is the ratio of a company's net income to the number of shares in a certain period, which reflects the post tax profit created per share. The higher the ratio, the more profits are created.

2.1.2 Gross profit margin (GROS)

The ratio of gross profit to operating revenue, which is the basis of net profit. The operating gross profit margin is often used to analyze a company's profitability. Because it does not take into account the impact of period expenses, it can more objectively reflect the operating status of the enterprise.

2.1.3 Sales expense ratio(RATIO)

Sale expense ratio is also known as marketing investment intensity, represents the unit sales expense spent by a company to obtain unit revenue, or the proportion of sales expenses to operating revenue. The increase in sales expense ratio often leads companies to expect higher operating income.

2.1.4 Sales expenses (MCOST)

It refers to the total amount of marketing investment, which is calculated as the natural logarithm of the sales expenses of the current year. As many listed retail enterprises have large values, the range of values is reduced by taking the natural logarithm. Taking the logarithm does not change the trend of data increase or decrease, making it easy to calculate.

2.1.5 Enterprise scale (SCALE)

We take the natural logarithm of the total assets of the enterprise.

2.1.6 Asset liability ratio (DEBT)

It is expressed as the ratio of liabilities to total assets.

2.1.7 Free cash flow (CASH)

The natural logarithm of free cash flow. For negative numerical values, first take the natural logarithm of their absolute value, and then add a negative sign before it.

2.2 Model construction

This article constructs the following two fixed effect regression models to analyze the impact of marketing investment on corporate performance[9]. The dependent variable Y is business performance, and this article measures business performance using two indicators. One is Gross Operating Margin (GROS), and the other is Basic Earnings per Share.

The independent variable is sales expense expenditure (SELL). This article measures sales expenses from two perspectives: one is sales expense ratio (RATIO), which is the ratio of sales expenses to operating income; The other is the absolute number of sales expenses (MCOST), which is calculated using the natural logarithm of sales expenses.

According to the reference materials, the control variables include: enterprise size (SCALE), asset liability ratio (DEBT), and enterprise free cash flow (CASH). FE is the annual fixed effect. ε , It is an error term.

$$Y_{i,t}=\alpha_0+\alpha_1 SELL_{i,t}+X_{i,t}+ FE_{year}+\varepsilon \tag{1}$$

$$Y_{i,t}=\alpha_0+\alpha_1 SELL_{i,t}+X_{i,t-n}+ FE_{year}+\varepsilon \tag{2}$$

$$(n=1,2,3,4,5)$$

2.3 Variable statistics

The dependent variable is the performance of retail enterprises, represented by Y in the model. This article measures corporate performance from two perspectives: basic earnings per share (RET) and operating gross profit margin (GROS).

The independent variable is sales expenses, represented by SELL in the model. This article measures sales expenses from two aspects: one is the sales expense ratio, which represents the intensity of marketing investment, and the other is the total sales expense, which represents the total marketing investment. The natural logarithm of sales expenses is used in the calculation.

The control variable X includes several characteristic variables, including enterprise scale SCALE, enterprise debt DEBT, and cash flow level CASH. Table 1 is the variable Definition and statistics.

Table 1 Variable Statistics

Variable type	Variable name	code	Mean	Std. dev.	Min	Max
dependent variable	Basic earnings per share RET	RET	0.43	0.66	-3.05	4.18
	Gross operating profit margin GROS	GROS	24.74%	0.13	0.80 %	85.65 %
independent variable	Sales expense ratio RATIO	$SELL_1$	11.27%	0.07	0.12 %	37.01 %
	Natural logarithm of sales expenses MCOST	$SELL_2$	19.97	1.50	15.98	23.53

control variable	Natural logarithm of total assets (enterprise size) SCALE	SCALE	22.62	1.08	20.42	26.01
	Asset liability ratio DEBT	DEBT	0.52	0.17	0.07	0.89
	Natural logarithm of free cash flow CASH	CASH	12.69	15.48	-23.74	23.66

3 Correlation Analysis

This article conducted a correlation analysis on the dependent variables, independent variables, and control variables involved. The correlation coefficient between basic earnings per share and sales expenses is positive, and the correlation coefficient between operating gross profit margin and sales expense ratio is positive. The absolute values of the correlation coefficient between basic earnings per share and various variables, as well as the correlation coefficient between operating gross profit margin and various variables, are all less than 0.5. Therefore, we can proceed with the next step of data regression analysis. Table 2 is the variable correlation analysis.

Table 2 Variable correlation analysis

Variables	RET	GROS	RATIO	MCOST	SCALE	DEBT	CASH
RET	1.000						
GROS	0.015	1.000					
RATIO	-0.082*	0.488***	1.000				
MCOST	0.330***	-0.067	0.372***	1.000			
SCALE	0.333***	-0.071*	0.037	0.372***	1.000		
DEBT	-0.021	-0.362***	-0.099**	0.037	0.460***	1.000	
CASH	0.122***	0.155***	0.115***	-0.099**	0.020	-0.088**	1.000

Remarks: * * *, * *, * respectively represent significant levels of 1%, 5%, and 10%

4 Current Regression Data Analysis

Table 3 shows the regression results of the current period data.From the perspective of the intensity of marketing investment, the coefficient between the intensity of marketing investment and the operating gross profit margin of retail enterprises is 1.466, which is significantly positive at the 1% level. This indicates that increasing the intensity of marketing investment by retail enterprises can significantly increase their operating gross profit margin. However, the increase in marketing investment intensity significantly reduces the basic earnings per share, which is the return on shareholders. Because marketing investment belongs to sales expenses and is included in operating costs, fixed return is calculated using net profit, and an increase in enterprise costs will inevitably reduce the net profit of the enterprise.

From the perspective of total marketing expenditure, the impact of total marketing expenditure MCOST on shareholder returns and operating gross profit margin is not significant. The regression data of the control variables indicate that the size of the enterprise and sufficient cash flow reflect the comprehensive strength of the enterprise, and are positively correlated with the performance of the enterprise; The correlation between the debt level of a company and its performance is often negative, indicating that high debt is not conducive to the improvement of company performance.

Table 3 Benchmark regression analysis of current data

Variable	RET	GROS	RET	GROS
RATIO	-2.770***	1.466***		
	(-6.87)	(20.88)		
MCOST			0.047	-0.021
			(0.88)	(-1.71)
SCALE	0.099	0.055***	-0.029	0.121***
	(1.96)	(6.19)	(-0.50)	(9.06)
DEBT	-0.563**	-0.207***	-0.616**	-0.182***
	(-2.89)	(-6.13)	(-2.98)	(-3.85)
CASH	0.001	0.001*	0.001	0.001*
	(0.65)	(1.98)	(019)	(2.41)
Constant	-1.231	-1.054***	0.474	-1.986***
	(-1.10)	(-5.39)	(0.39)	(-7.23)
Annual fixed effect： yes				
Observations： 540				

5 The Cross Period Impact Of Marketing Investment Intensity On The Operational Performance Of Retail Enterprises

5.1 The cross period impact of marketing investment intensity

Table 4 presents cross period data regression analysis with lags of 1-5 periods. The dependent variables are shareholder returns and operating gross profit margin, while the independent variable is the intensity of marketing investment, i.e. the ratio of RATIO sales expenses to operating income.

Table 4 The cross period impact of marketing expenditure intensity and total marketing expenditure on business performance (lag 1-5 periods)

Variable	**RET**	**GROS**	**RET**	**GROS**	**RET**	**GROS**	**RET**	**GROS**	**RET**	**GROS**
	Lagging for one period		Lagging for two period		Lagging for three period		Lagging for four period		Lagging for five period	
RATIO	-1.289***	1.077***	-0.920*	0.643***	-0.313	0.146***	-0.604	0.149***	-0.771	0.126***
	(-3.51)	(13.12)	(-2.45)	(8.22)	(-0.84)	(3.68)	(-1.47)	(3.79)	(-1.74)	(3.51)
observations	486		432		378		324		270	
Variable	**RET**	**GROS**	**RET**	**GROS**	**RET**	**GROS**	**RET**	**GROS**	**RET**	**GROS**
	Lagging for one period		Lagging for two period		Lagging for three period		Lagging for four period		Lagging for five period	

MCOST	0.128**	-0.062***	0.049	-0.036***	0.074	-0.005	0.131*	-0.009	0.086	-0.008
	(2.69)	(-5.83)	(1.00)	(-3.51)	(1.46)	(-0.95)	(2.29)	(-1.74)	(1.40)	(-1.70)
observations	486		432		378		324		270	

When the dependent variable is Gross Operating Margin (GROS), the coefficients of marketing investment intensity are 1.077, 0.643, 0.146, 0.149, and 0.126, which are significant at the 1% level, respectively, when lagged for one to five periods. This indicates that the intensity of marketing investment can significantly improve the operating gross profit margin of retail enterprises, and this positive impact has a longer duration.

When the dependent variable is shareholder return RET, the coefficient of marketing investment intensity in the first lagged period is negative -1.289, and it is significant at the 1% level. However, from the data of lagged periods 2 to 5, the negative impact of marketing investment intensity on shareholder return is only significant at the 10% level when lagged periods 2, and this negative impact is no longer significant when lagged periods 3, 4, and 5.

Therefore, the increase in marketing investment intensity of retail enterprises is conducive to the growth of operating gross profit margin, and this promoting effect has a long-term positive impact. Although the intensity of marketing investment will temporarily reduce the net profit of retail enterprises, this negative effect only has a certain impact on the current and lagging periods. As the reputation and operational efficiency of retail enterprises increase, their revenue situation will gradually improve.

5.2 The Cross period impact of total marketing investment

When the dependent variable is the shareholder return RET, the coefficients of the total marketing expenditure in the lag period of one to five are 0.128, 0.049, 0.074, 0.131, and 0.086, respectively. Although the coefficients are all positive, the values are small, and are only significant at the 5% level in the lag period, while the others are basically not significant. When the dependent variable is operating gross profit margin (GROS), the coefficients of total marketing expenditure lagging behind the first to fifth periods are -0.062, -0.036, -0.005, -0.009, and -0.008, respectively. The coefficients lagging behind the first and second periods are significant at the 1% level, while the coefficients lagging behind the third, fourth, and fifth periods have not passed the significance test.

The results of the data indicate that the total amount of marketing expenditure has a one to two period intertemporal impact on the performance of retail enterprises, and has no significant impact on the later stage of business performance. So the total amount of marketing expenditure has a weak inhibitory effect on the operational performance of retail enterprises, and the most significant impact is on two periods.

6 Conclusion

6.1 The cross period impact of marketing investment intensity

The intensity of marketing investment is positively correlated with the current operating gross profit margin of retail enterprises; The total marketing investment is positively correlated with the basic earnings per share; Marketing investment has a sustained positive impact on the performance of retail enterprises. This is consistent with the previous two assumptions.

6.2 Suggestions

6.2.1 Fully recognize the dual nature of marketing investment

Reasonable marketing expenses have a significant positive promoting effect on corporate performance.

Marketing expenses are presented as sales expenses in the financial statements of enterprises. As a very important cost expenditure, sales expenses should be reasonably controlled in order to improve business performance.

6.2.2 Reasonable marketing expenditure to improve enterprise performance

According to the research data in this article, a reasonable intensity of marketing investment is conducive to the long-term and sustained growth of retail enterprises' gross profit margin. Therefore, marketing expenditure has potential and long-term capital investment characteristics. Overall, marketing expenditure, especially a reasonable intensity of marketing investment, is beneficial for improving the performance of retail enterprises, achieving simultaneous growth of operating gross profit margin and revenue, The research conclusion of this article can have a certain reference value for today's retail enterprises.

6.2.3 Strengthen marketing innovation

Marketing is an important aspect of improving a company's competitive strength. Only with strong marketing capabilities can a company successfully sell products or services to customers, meet their diverse needs, cultivate loyal customers, and ultimately improve company performance. Retail enterprises can take the following marketing measures: first, use digital and omnichannel means to carry out diverse marketing activities[10], expand sales channels, and improve consumer experience. Second, set up a professional team, and use the retail enterprise's own platform, or third-party platforms such as Tiktok, to promote the integrated marketing model of cross category, cross format, cross platform, cross store, etc., so as to significantly improve online marketing capabilities[11]. Thirdly, a series of themed marketing activities can be carried out around the target customer group, combined with major marketing nodes, to assist stores in expanding sales and increasing efficiency through innovative IP marketing, deepening cross industry cooperation, and strengthening self media operations; Fourthly, strengthen the construction of member operation system, upgrade and optimize member system tools, utilize CRM and other systems to explore the data value of member systems, and effectively enhance member precision marketing capabilities[12].

References

[1] Philip Kotler,Waldemar Pfoertsch,Uwe Sponholz.H2H Marketing. M. ISBN 9783030595302.2023.07.

[2] Jiang Yuanyuan. Marketing Duality, Absorption Ability and Enterprise Marketing Performance, Journal of Guizhou University of Finance and Economics. J. 2021.02.

[3] Zhu Xiaofang, The Impact Path of Digital Transformation on the Performance of New Retail Enterprises - Based on the Intermediary Effect of Consumption Upgrading, Business Economics Research . J. 2023.08.

[4] Chu Yanqing, Cui Bingqun, Empirical Study on the Relationship between Marketing Investment, Executive Incentives, and Corporate Performance in M: Based on Data from 159 Agricultural A-share Listed Companies, Science and Industry. J.2023.12.

[5] Zhang Guanxiong, Research on the Relationship between Marketing Investment, Brand Equity, and Corporate Performance, Business Exhibition Economics . J. 2023.07.

[6] Niu Zhiyong, Wang Jun. Market competition, marketing investment, and corporate performance: an empirical study based on data from Chinese industrial enterprises,Journal of Shanxi University of Finance and Economics. J. 2017.06.

[7] Zhang Yang. Empirical Analysis of Marketing Investment and Enterprise Performance. Market Research.J. 2020.04.

[8] Sun Weifeng, Huang Zuhui.Advertising expenses, research and development expenses, and corporate performance, Research Management. J.2013.02.

[9] Xu Fang, Yu Guoxin. Economic Policy Uncertainty, Regional Differences, and Investment Efficiency: Based on the Fixed Effects Panel Model, Mathematical Practice and Understanding. J.2019.10.

[10] Homburg Christian, Wielgos Dominik.The value relevance of digital marketing capabilities to firm, The Academy of Marketing Science. J. Volume 50 , Issue 4 . 2022.

[11] Sodero Anníbal C,Good cause, not so good business? Sales and operations performance of cause-related marketing,Business Logistics . J. Volume 43 , Issue 4 . 2022.

[12] Suryanarayana Sharadhi Alape;Sarne David;Kraus Sarit. Autonomous Agents and Multi-Agent Systems.J.Volume 35 , Issue 2 . 2021.