

The application of financial engineering in marketing trend analysis

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Abstract. With the continuous expansion of the influence of the new economic era, China's competition in marketing is increasingly fierce. If an enterprise wants to occupy a place in the fierce competition, it must constantly innovate its marketing strategy. This paper takes Shanghai Liangxin Electric Co., Ltd. as an example, combining with financial engineering analysis technology, analyzes the trend of the company's business situation in the next three years. First of all, we use Python to check and process the data. As a creative way, the main financial indicators of the balance sheet of the enterprise in 2015-2017 are analyzed in terms of the ring comparison analysis method, which shows that the operation status of the enterprise in the next three years is getting better and better. This method can effectively promote enterprises to improve their own economic benefits and has a good marketing analysis trend.

Keywords: financial engineering; marketing; link analysis; Python.

1. Research background and significance

1.1 Background

With the advent of big data era, the connection between various industries is becoming closer and closer^[1]. Especially with the development of information technology, the combination of Internet and financial industry is more and more close. The financial industry has gradually changed from the traditional operation mode to the new mode, and gradually realized the development and integration. The current financial market system is undergoing changes. The single traditional financial mode can not adapt to the new changes^[2]. The era of personalized and comprehensive financial industry has come. In the development of financial industry, financial engineering plays a more and more important role in the prediction of marketing trend. The competition among enterprises is the competition among operation modes. Financial engineering is becoming an important work to promote the integration of traditional financial sector and marketing trend prediction.

In this context, based on the product promotion work carried out by financial engineering, a suitable financial product service scheme is provided. In the current business environment, financial engineering has become an effective tool to promote the marketization of interest rate and strengthen financial supervision. The traditional profit model that relies on the traditional business operation of big customers to earn interest margin is difficult to adapt to the future development.

1.2 Significance

This paper combines theoretical analysis with practical cases^[3]. In theory, scholars at home and abroad have studied Internet financial innovation from market, industry integration, risk pricing and other aspects. Most of them are based on their own concerns in a certain field, or for the macro research of financial engineering, combined with the research of a company's financial practice, especially the research of e-commerce financial practice is still not common in academic articles. This paper hopes to explore the new economic theory connotation in the era of financial engineering development by selecting domestic companies involved in the field of electrical industry as a case.

2. Financial Engineering and data preprocessing

2.1 Financial engineering

Financial engineering first appeared in the 1950s. It is a relatively early concept of financial industry and widely used in the theoretical research of financial engineering. However, many theories of financial engineering technology are constantly developed and widely used, but there are still different views on the concept of "financial engineering".

In a broad sense, introducing the idea of financial engineering into the financial field, we should fully consider the risk of customer transactions and control the risk, and financial engineering is an effective tool to achieve structural management. The broad sense of financial engineering is a relatively effective financial engineering tool with narrow scope. From the technical level, the narrow definition of financial engineering focuses on the tools and technologies of risk management, which is the core of trend prediction.

2.2 Data preprocessing

First of all, Python is used to check and analyze all data on a monthly basis. It is found that the data of 06:00 on March 30 and 17:00 on September 27 are missing. Because of the obvious time correlation of the measured data, and considering the practical significance behind the data, the missing and abnormal data can be predicted from the previously measured data, and the time interval between the data and the data is small, and the cycle is affected. The impact of sex change is small, and there is no irregular change and fluctuation. Therefore, a simple time series moving average method is used to predict and then to correct and repair the abnormal and missing data.

Let the observation sequence be $M_t^{(1)}$, and take the moving average number N . A simple moving average calculation formula is:

$$M_t^{(1)} = \frac{1}{N}(y_{t-1} + \dots + y_{t-N}) + \frac{1}{N}(y_t - y_{t-N}) = M_{t-1}^{(1)} + \frac{1}{N}(y_t - y_{t-N}) \quad (1)$$

When the basic trend of the prediction target is fluctuating at a certain level, a simple moving average method can be used to establish the prediction model:

$$\hat{y}_{t+1} = M_t^{(1)} = \frac{1}{N}(\hat{y}_t + \dots + \hat{y}_{t-N+1}), t = N, N+1, \dots \quad (2)$$

The standard error of data prediction is:

$$S = \sqrt{\frac{\sum_{t=N+1}^T (\hat{y}_t - y_t)^2}{T - N}} \quad (3)$$

The average value of the latest N-Period sequence value is taken as the prediction result of each period in the future. General n value range: $5 \leq N \leq 200$. Compare the prediction errors of several models, take N as 5, get the prediction results and repair.

3. Analysis of marketing trend based on Financial Engineering

The author selects Shanghai Nader Electric Co., Ltd. to analyze its financial statements. Shanghai Nader Electric Co., Ltd. is a company specializing in the manufacture of high and low voltage electrical appliances, one of the leading companies in the medium and high-end market of the domestic low-voltage electrical appliances industry, focusing on the research, development, production and sales of products in the medium and high-end market.

3.1 Analysis on the asset change trend

From the perspective of total assets, the total assets of Nader from 2015 to 2017 showed an increasing trend year by year. The total assets of Nader in 2016 increased by 53.50% month on month

compared with 2015, and the total assets of Nader in 2017 increased by 7.51% month on month compared with 2016, with a significant decrease in the percentage change on month. From the composition of total assets, compared with non current assets, the growth and change of current assets in 2015-2017 is larger, the current assets in 2016 increased by RMB 558567244.2300000 compared with 2015, and the current assets in 2017 increased by 64957 compared with 2016, 568.5900002 yuan, mainly due to 549.14% and 600.99% month on month changes in interest receivable and other current assets in 2016. In addition, notes receivable and other receivables have increased. In 2017, the growth rate of interest receivable and other current assets has decreased, and the month on month changes have declined significantly. In addition, the amount of notes receivable, accounts receivable, other receivables and inventory has increased rise.

In 2016, non current assets increased by 100674124.4 yuan compared with 2015, a 21.07% increase on a month on month basis, mainly due to the large increase in long-term equity investment, construction in progress, deferred income tax assets compared with 2015; in 2017, non current assets increased by 77084 yuan compared with 2016, 875.0 yuan, an increase of 13.32% on a month on month basis. The construction in progress and deferred income tax assets of the enterprise have continued to rise. In addition, the amount of fixed assets, intangible assets, long-term deferred expenses and other non current assets has increased in this year. Nader's current assets are far greater than non current assets, indicating that Nader's assets are in good condition and its asset structure is reasonable.

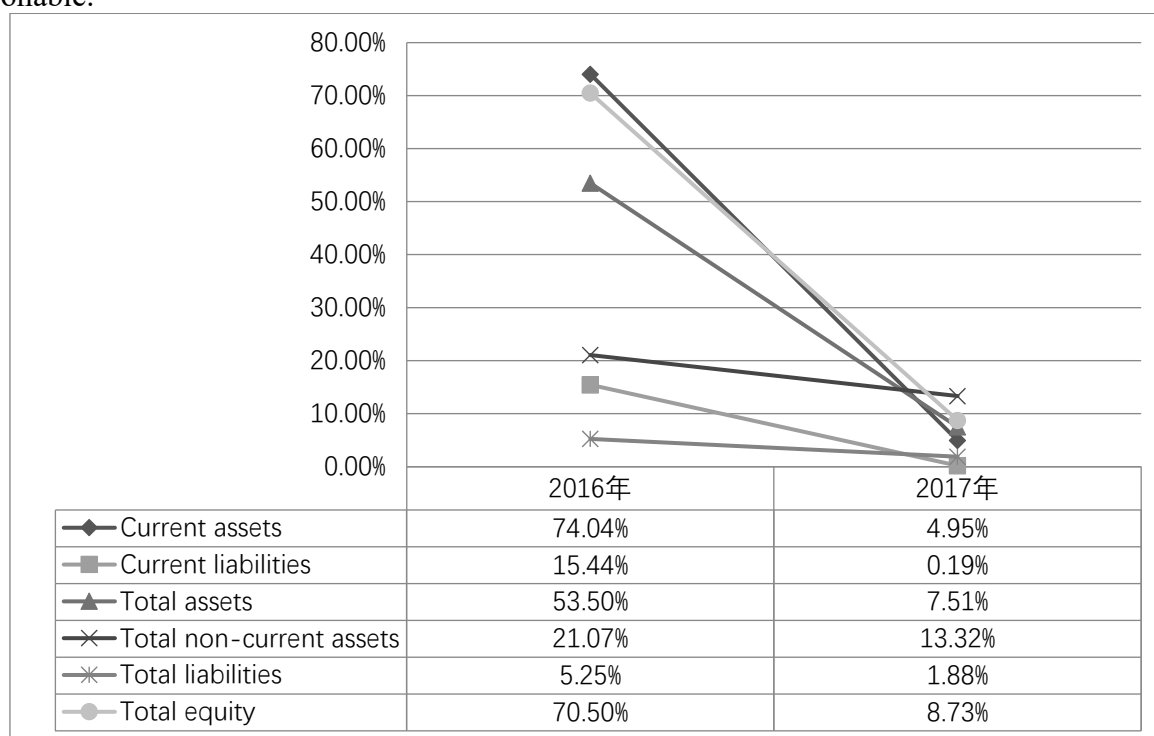


Figure 1 change trend of debt index month on month

3.2 Analysis on the change trend of liabilities

From the perspective of total liabilities, the changes in 2016 and 2017 are relatively small, with total liabilities increasing by 5.25% on a month on month basis in 2016 and decreasing to 1.88% on a month on month basis in 2017, indicating that Nader's debt paying ability is strong and improved, and its financial risk is reduced. From the perspective of liability structure, the current liabilities in 2016 increased by 15.44% month on month compared with 2015, and decreased to 0.19% month on month in 2017, mainly due to the increase of accounts payable, advance receipts, employee compensation payable and taxes payable compared with 2015, while the accounts payable, advance receipts, taxes payable and dividends payable of enterprises in 2017 decreased compared with 2016.

Nader has no short-term loans, long-term loans and non current liabilities due within one year in 2015-2017, with a very low debt ratio. On the one hand, Nader's debt paying ability is strong, and on the other hand, it will reduce the role of financial leverage.

(3) Analysis on the change trend of owner's equity

In terms of total owner's equity, in 2016, the owner's equity increased by 70.50% month on month, while in 2017, the growth dropped to 8.73% month on month, mainly due to the substantial increase of Nader's equity in 2016, which increased by 124.53% month on month compared with 2015. In addition, the capital reserve, surplus reserve and undistributed profit of the enterprise increased, and the inventory stock of the enterprise decreased by 52.78% month on month, which was good in 2017. The share capital of credit appliance is still increased significantly, with an increase of 102.59% on a month on month basis compared with 2016.

However, at the same time, the Company repurchased a large number of shares, with an increase of 188.67% on a month on month basis. The capital reserve of the company decreased, the surplus reserve and the undistributed profit increased, with little change on a month on month basis. Therefore, the change in the owner's equity of Nader decreased significantly on a month on month basis in 2017, which to some extent shows that Enterprises need to improve the ability to create return on investment for shareholders.

4. Analysis of profit change based on Financial Engineering

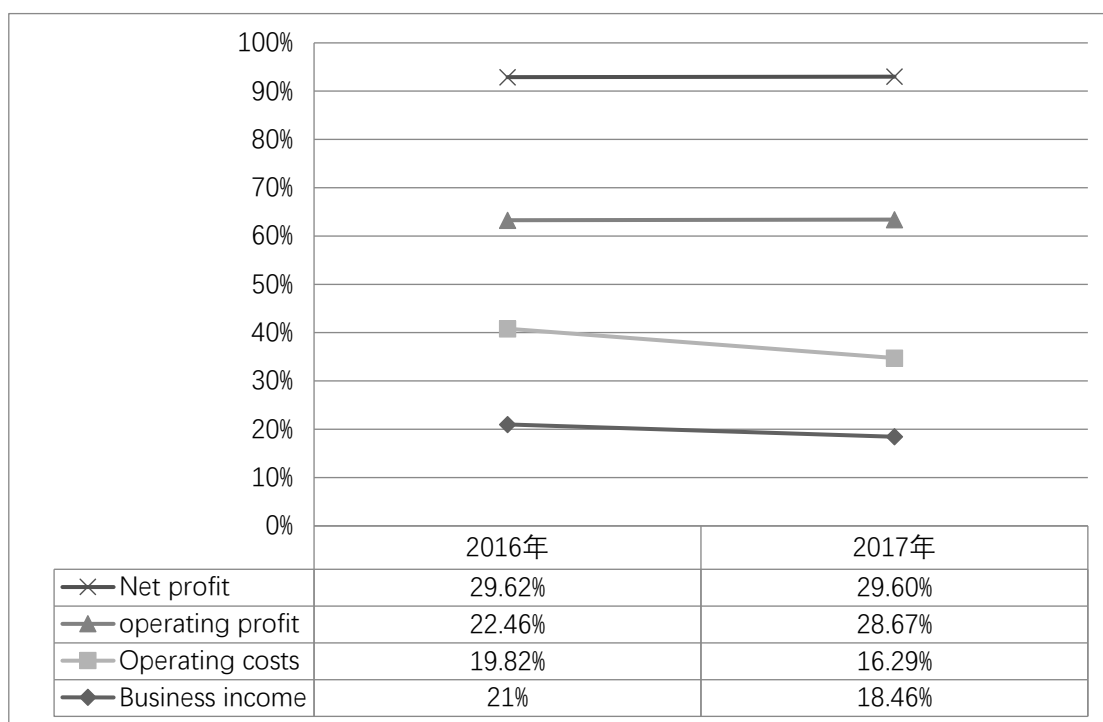


Figure 2 change trend of profit index month on month

In 2015-2017, Nader's net profit increased year by year, with more growth in 2016 and 2017. Compared with 2015, the net profit in 2016 increased by 29.62% month on month and 2017 by 29.60% month on month, indicating that Nader's profitability is still strong. In 2017, the growth of Nader's operating revenue on a month-on-month basis was lower than that in 2016. Although the operating revenue continued to grow in these three years, the growth rate in 2017 was relatively small, and the change in operating cost on a month-on-month basis in 2017 was also lower than that in 2016. Therefore, the net profit of the enterprise continued to grow, and the change in operating profit on a month-on-month basis in 2017 also increased.

According to the data in the above table, Nader's sales and management expenses continued to rise in 2016 and 2017, and the percentage of change on a month on month basis was relatively stable. Its financial expenses changed a lot. In 2016, Nader's financial expenses increased 11.36% on a month

on month basis compared with 2015, and the increase on a month on month basis compared with sales and management expenses was relatively small. However, its financial expenses decreased significantly in 2017, compared with that on a month on month basis in 2016. The sharp decline in changes, showing a negative value, in this year Nader's increase in operating costs may be related to this reduction. This shows that Nader's profitability is still strong.

Through the trend analysis, we can roughly see the change trend of each financial index in different years and the gap between adjacent years, which provides the analysis basis for the internal management personnel to improve operation management and external investors to carry out value evaluation.

5. Conclusion

As Nader has less debt in 2015-2017 and has no short-term and long-term borrowings, it is predicted that its financial debt in the next three years will be 0 and its debt paying ability will still be high. In the next three years, the turnover rate of current assets and the turnover rate of total assets of Nader have increased by a large margin compared with that in 2017, which shows that the ability of the enterprise to create business income in the next three years has been enhanced, and the overall use efficiency of assets has been improved.

The change range of Nader's sales gross profit rate in the next three years is very small, almost in a straight-line trend, indicating that the profitability of the enterprise in the next three years is relatively stable, and there will be no huge fluctuations, which may be due to the fact that the enterprise has less liabilities, no long-term loans and short-term loans, and less operating costs, so the enterprise's profit rate is higher. The rate of return on shareholders' equity and the rate of return on total assets will rise in the next three years, indicating that the ability of enterprises to create returns for shareholders will be enhanced.

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