A Comparative Study on the Financial Performance of Listed Companies in the Semiconductor Industry in the Yangtze River Delta

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Abstract: The sudden outbreak of COVID-19 in early 2020 has had varying degrees of impact on all walks of life. By analyzing the development status, development prospects and needs of the semiconductor industry in the Yangtze River Delta region, the article selects 33 listed companies in the semiconductor industry as a representative sample of the Yangtze River Delta region, selects 12 financial indicators, and uses factor analysis to analyze their performance in 2019 and 2020. The annual financial performance is analyzed and compared, the payment ability, profitability, performance ability and development ability of 33 listed companies in the same period are compared, and the financial performance changes of the same company in different operating periods are evaluated and compared. The results show that due to the impact of the new crown pneumonia epidemic, the financial performance of most sample companies in 2020 is better than that in 2019. Finally, according to the actual bottleneck of the development of the semiconductor industry in the Yangtze River Delta region, corresponding suggestions are put forward.

Keywords: Semiconductor industry, Financial performance evaluation, Factor analysis.

1. Introduction

The sudden outbreak of the new crown pneumonia epidemic in early 2020 has caused varying degrees of impact on all walks of life. As the forefront of contemporary technological development, the semiconductor industry has become one of the important engines of global economic development, playing an increasingly important role in promoting economic development and industrial transformation and upgrading. From 2019 to 2020, China not only experienced the COVID-19 outbreak, a public health emergency, but also analyzing and evaluating the financial performance of listed companies in the semiconductor industry helps us understand the impact of macro-level events such as major public emergencies on the financial performance of micro-level companies, and whether the financial performance of companies operating different products will be affected by social emergencies. At the same time, it helps us to understand the development of the semiconductor industry in the Yangtze River Delta region.

2. Literature Review

Financial performance evaluation is a method of comparative analysis of enterprise performance using financial indicators. According to the actual situation of the selected enterprises, select specific financial indicators, compare the enterprises with the average level of the same industry in the same period, and then score the comprehensive evaluation results according to the selection criteria. The final score is divided into different grades, so as to objectively and intuitively reveal the overall operation status and management level of the enterprise, and provide a reference for managers and investors to make correct investment and financing decisions. The function of financial performance evaluation is to help investors to comprehensively judge the operation status of the enterprise, discover the problems in the operation of the enterprise, and reveal the risks faced by the enterprise.

Zhang Jie(2018) and others used principal component analysis to select and evaluate the financial performance levels of 40 listed companies in the biopharmaceutical industry, and found the ability to pay. Operating capacity affects the financial performance of Listed Companies in the biopharmaceutical industry [1]. Tang Wanyu (2020) conducted a grey entropy correlation analysis on 49 items of financial data in the 2016 annual reports of 197 listed pharmaceutical companies, and made a comprehensive ranking of their overall performance levels. After using the multiple regression equation method, it is believed that the main indicators that affect the financial performance of listed pharmaceutical companies are the total asset profit rate, the current asset profit rate, the total profit and the accounts receivable turnover rate [2]. (2021) used the entropy weight-TOPSIS model and introduced the obstacle factor diagnosis model to analyze the obstacle factors of financial performance evaluation of 20 listed pharmaceutical companies. The results show that the biggest obstacle factors affecting financial performance are the inefficient transportation of total assets and the low level of accounts receivable management [3]. At present, the widely used financial performance evaluation methods are: correlation analysis method, Wall's specific weight score evaluation method, factor analysis method, cluster analysis method, EVA evaluation method, AHP evaluation method, fuzzy comprehensive analysis method, TOPSIS evaluation method, DEA evaluation method, etc. [4]. Each of these evaluation methods has advantages and disadvantages. This paper mainly uses factor analysis to evaluate the financial performance of listed companies in the semiconductor industry.
3. Determination of Samples and Selection of Financial Evaluation Indicators

3.1. Determination of Samples

The data selected in this article comes from the Oriental Fortune Choice financial database, and the financial data of the annual report data of 33 semiconductor listed companies in the Yangtze River Delta region are selected as samples.

3.2. Establishment of Financial Indicators

This paper selects 12 financial indicators in four areas of profitability, performance capability, development capability, and payment capability to understand and estimate the financial performance of companies in the semiconductor industry, including demonstrating the ability to use companies to obtain operating performance benefits. This paper selects ROA, ROE, Net sales, cost of sales and other indicators to evaluate the audit company's profits: Operational capability mainly estimates the effectiveness of corporate performance, reflects the audit company's efficiency in corporate management, and the use of performance capabilities in the daily operations and performance of listed companies is a headache. This paper selects inventory cycle rate and dealer cycle to evaluate the operating ability of audit companies. The construction of teaching staff is the development potential of an enterprise formed through products and operations. The N-year operating income growth rate and N-year operating cost growth rate of the map are selected to reflect the development of the teacher evaluation company. Solvency refers to the ability of a business to use its assets to repay short-term and long-term debt. Whether an enterprise has the ability to pay cash and repay debts is related to the health and safety of the enterprise.

3.3. Determine the Method and Steps

First, the financial data of 33 listed companies in the semiconductor industry in 2019 and 2020 are provided for factor analysis, and SPSS 26.0 is used for factor analysis. From the 12 financial indicators that reflect the profitability, performance capability, development capability, and payment capability of the company's listing, the basic data related to the original information is extracted, and each factor is clearly identified, scored, and sorted. Then, based on the score of each factor, the 2019 data is compared with the 2020 data, the economic activity of the semiconductor industry companies in 2019 and 2020 is evaluated and compared, and the financial performance of the 33 reviewed companies in the semiconductor industry is compared.

4. Financial Performance Evaluation of Listed Companies in the Semiconductor Industry Based on Factor Analysis

4.1. Applicability Test of Factor Analysis

KMO value and Bartlett’s significance test value are usually used to judge whether the sample data is suitable for factor analysis. When the KMO value is greater than 0.5 and the Bartlett’s significance test value is less than 0.01, it is considered that a reliable conclusion can be drawn through the factor analysis of the sample data. It can be seen from Table 1 that the KMO value in 2020 is 0.597, which is between 0.5 and 0.6, indicating that factor analysis is suitable. The sig value of Bartlett’s sphericity test is less than 0.01, indicating that there is a significant correlation between variables, and common factors can be extracted.

| Element | Initial eigenvalues | Extract the load sum of squares | Rotational load sum of squares |
|---------|---------------------|--------------------------------|-------------------------------|
|         | Total               | Percent variance               | Cumulative %                  | Total               | Percent variance | Cumulative %                  | Total               | Percent variance | Cumulative %                  |
| 1       | 4.685               | 39.040                         | 39.040                        | 4.685               | 39.040          | 39.040                        | 4.061               | 33.842          | 33.842                        |
| 2       | 3.174               | 26.454                         | 65.494                        | 3.174               | 26.454          | 65.494                        | 2.598               | 21.648          | 55.490                        |
| 3       | 2.078               | 17.315                         | 82.810                        | 2.078               | 17.315          | 82.810                        | 2.292               | 19.103          | 74.594                        |
| 4       | .988                | 8.234                          | 91.043                        | .988                | 8.234           | 91.043                        | 1.974               | 16.450          | 91.043                        |
| 5       | .727                | 6.056                          | 97.100                        |                    |                 |                                |                    |                 |                                |
| 6       | .125                | 1.042                          | 98.142                        |                    |                 |                                |                    |                 |                                |
| 7       | .106                | .882                           | 99.024                        |                    |                 |                                |                    |                 |                                |
| 8       | .072                | .602                           | 99.626                        |                    |                 |                                |                    |                 |                                |
| 9       | .040                | .335                           | 99.961                        |                    |                 |                                |                    |                 |                                |
| 10      | .004                | .030                           | 99.991                        |                    |                 |                                |                    |                 |                                |
| 11      | .001                | .006                           | 99.997                        |                    |                 |                                |                    |                 |                                |
| 12      | .000                | .003                           | 100.00                        |                    |                 |                                |                    |                 |                                |

Extraction method: principal component analysis.

The total extraction of common factors can be determined by various interpretations and graphs of the calculation. According to the established principle that the eigenvalue is greater than 1, 4 common factors can be extracted from the financial data of 33 companies in the semiconductor industry by 2020. From this, it can be seen that the sum of rotation squares is shown in Table 2. In 2019, the common load of the first factor is 29.709%, the rotational load of the second factor is 24270%, and the common total rotational load of the third factor is 19.722%; the fourth common factor is the total square rotational load (contribution rate) of 14.557%, the cumulative contribution rate of the total square rotation load.
is 88.259%, which meets the requirements of the general election. Therefore, we extracted 4 common factors that can explain the basic information contained in the 12 financial indicators, with an additional level of 88.259%. In 2020, the total rotational load (contribution rate) of the first common factor is 33.842%, the total rotational load (contribution rate) of the second common factor is 21.648%, and the total rotational load of the third common factor. The coefficient is 21.648%. The rate is 19.103%, the total squared rotational load of the fourth factor is 16.450%, and the cumulative total squared rotational load reached 91.043%, which met the requirements for replacement. Therefore, extracting 4 common factors can explain the basic information contained in 12 financial indicators, and the additional level is 91.043%.

A rubble diagram is a rubble argument to demonstrate the importance of each factor: the horizontal axis is the number of factors, and the vertical axis is the size of the true root. The front slope corresponds to a wider root scar, and the effect is obvious: the positive root on this platform is smaller and the force is weaker. Factors can be extracted from the annual financial data of 33 semiconductor companies in 2020. As can be seen from Figure 1, 4 common factors can be extracted from the annual financial data of 33 listed companies in the semiconductor industry in 2020.

![Figure 1. Factor Analysis Gravel Chart](image)

### 4.3. Common Factor Naming and Economic Explanation

From Table 3, the first factor is the public burden of the total net interest rate of assets, return on equity and net sales interest rate, which reflects the profit of the audited company, which can be called profitability (F1). The second common factor, which has a larger weight in quick accounting, current accounting and cash accounting, reflects the solution of the auditing company and can be called performance capability (F2). The third factor has a heavier burden on the N-year operating profit growth rate and N-year total growth rate, reflecting the auditing company’s profit growth and development capabilities, which can be called development capabilities (F3). The fourth common factor in inventory turnover (times) and today’s business turnover (times) has a large weight (time), it reflects the efficiency of investment asset review companies, and can be called ability to pay (F4).

### Table 3. Rotated composition matrix

| Financial indicator | variable | 1     | 2     | 3     | 4     |
|---------------------|----------|-------|-------|-------|-------|
| Return on Equity ROE (weighted) (%) | X1       | 0.091 | 0.956 | 0.154 | 0.099 |
| ROA(%)              | X2       | 0.131 | 0.963 | 0.031 | 0.069 |
| Sales margin(%)     | X3       | 0.405 | 0.649 | -0.077| -0.415|
| Inventory turnover rate (times) | X4       | 0.085 | -0.180| 0.063 | 0.810 |
| Total asset turnover rate (times) | X5       | -0.209| 0.449 | 0.170 | 0.776 |
| Current asset turnover rate (times) | X6       | -0.415| 0.130 | 0.521 | 0.683 |
| Current ratio (%)   | X7       | 0.980 | 0.114 | 0.064 | -0.066|
| Cash ratio (%)      | X8       | 0.982 | 0.067 | 0.099 | -0.100|
| Quick ratio (%)     | X9       | 0.987 | 0.084 | 0.063 | -0.066|
| Operating profit N-year growth rate (%) | X10      | 0.181 | 0.048 | 0.961 | 0.142 |
| Total profit N annual growth rate (%) | X11      | 0.219 | 0.073 | 0.954 | 0.143 |
| Total assets N-year growth rate (%) | X12      | 0.818 | 0.230 | 0.326 | -0.036|

Extraction method: principal component analysis.

### 4.4. Calculate Factor Scores and Compare Rankings

The factor analysis function module of SPSS can automatically calculate the SPSS scores of four common factors, but each common factor reflects different aspects of the economic performance of listed companies, so it is
difficult to use one common factor for comprehensive estimation. Therefore, by taking the contribution rate corresponding to each factor as a common weight, calculating the comprehensive financial performance scores of the 33 sample companies in 2019 and 2020 can better illustrate the contribution of common factors to financial performance. The SPSS program corresponds to the composite factor score calculation and has the following:

\[
\text{Factor total score} = 0.3717 \text{FAC1}_1 + 0.2378 \text{FAC2}_1 + 0.2098 \text{FAC3}_1 + 0.1807 \text{FAC4}_1
\]

After the comprehensive score is calculated, the year is ranked according to the comprehensive score, and the results are shown in Table 4. Then, construct 2020 based on the composite scores in Table 4.

| Securities name       | Factor total score | 2019 ranking | Securities name       | Factor total score | 2020 ranking |
|-----------------------|--------------------|--------------|-----------------------|--------------------|--------------|
| Nanda Optoelectronics | 1021.1767          | 1            | Changdian Technology  | 3969.0543          | 1            |
| ZhuoShengwei          | 485.3580           | 2            | Thrive                | 3489.4310          | 2            |
| Awinic Electronics    | 459.2430           | 3            | Puran shares          | 1878.3351          | 3            |
| Weir Shares           | 457.6467           | 4            | Weir Shares           | 1603.2055          | 4            |
| Shanghai Belling      | 388.5321           | 5            | ZhuoShengwei          | 693.5754           | 5            |
| China Micro Corporation| 172.4426           | 6            | China Micro Corporation| 677.7569           | 6            |
| Broadcom integration  | 153.0641           | 7            | Anji Technology       | 345.9742           | 7            |
| New Clean Energy      | 150.1229           | 8            | Chippen Micro         | 260.8884           | 8            |
| Leon Micro            | 140.8198           | 9            | Crystal Technology    | 255.4150           | 9            |
| Anji Technology       | 129.7476           | 10           | Awinic Electronics    | 215.4707           | 10           |
| Jiejie Microelectronics| 124.1032           | 11           | Shanghai Belling      | 209.9065           | 11           |
| Chippen Micro         | 123.7132           | 12           | New Clean Energy      | 198.8524           | 12           |
| Zhongjing Technology  | 103.7621           | 13           | Nanda Optoelectronics | 180.3988           | 13           |
| Crystal Technology    | 100.8932           | 14           | Broadcom integration  | 165.6391           | 14           |
| Zhongying Electronics | 81.2538            | 15           | Jiangfeng Electronics | 163.8755           | 15           |
| Changdian Technology  | 81.1977            | 16           | Zhongjing Technology  | 141.9583           | 16           |
| Austron Electronics   | 54.7864            | 17           | Leon Micro            | 133.5918           | 17           |
| Kangqiang Electronics | 50.7673            | 18           | Jiejie Microelectronics| 126.3332           | 18           |
| Zhengyuan Wisdom      | 48.4908            | 19           | Tongfu Microelectronics| 111.3000           | 19           |
| Thrive                | 47.4225            | 20           | Zhongying Electronics | 70.5637            | 20           |
| Fullhan Micro         | 43.5013            | 21           | Dagang Shares         | 62.6441            | 21           |
| Jiangfeng Electronics | 37.9739            | 22           | Austron Electronics   | 58.1141            | 22           |
| Shanghai Silicon Industry | 34.9609        | 23           | Yangjie Technology    | 53.7064            | 23           |
| Yangjie Technology    | 26.2777            | 24           | Galaxy Microelectronics| 39.1351           | 24           |
| Galaxy Microelectronics| 26.1680           | 25           | Shanghai Silicon Industry | 36.2862           | 25           |
| Puran shares          | 22.2100            | 26           | Fullhan Micro         | 22.4419            | 26           |
| Suzhou solid technetium| 22.0112           | 27           | Kangqiang Electronics | 12.8172            | 27           |
| Fudan Microelectronics| -5.6212           | 28           | Zhengyuan Wisdom      | 12.7094            | 28           |
| Runxin Technology     | -23.7416           | 29           | Fudan Microelectronics| -1.5593            | 29           |
| Tongfu Microelectronics| -54.8364          | 30           | Suzhou solid technetium| -2.1684            | 30           |
| Tony Electronics      | -151.4583          | 31           | RunxinTechnology      | -3.0062            | 31           |
| Silan Micro           | -337.7105          | 32           | Tony Electronics      | -8.2766            | 32           |
| Dagang Shares         | -755.8000          | 33           | Silan Micro           | -56.5527           | 33           |

4.5. Evaluation of Factor Analysis Results

It can be seen that most of the listed companies in the semiconductor industry have a higher composite score of financial performance in 2020 than in 2019. This shows that, affected by the new crown pneumonia epidemic and the Sino-US trade war, most listed companies in the semiconductor industry have accelerated their development due to internal and external pressures, resulting in better financial performance in 2020 than in 2019. It can be seen that, as the semiconductor industry on the supply side, in the face of internal and external pressures, if it can adjust production in time to produce the supply required by the demand side, its financial performance will be improved compared to the entire industry. On the contrary, its financial performance will be improved. Relative to the entire industry will be balanced or even decline.

From Table 5, the number of companies with a comprehensive score, profitability score, payment ability score, development score, and operational capability score greater than 100 in 2020 has increased compared with 2019, indicating that the entire semiconductor industry in 2020 The financial performance of listed companies is good in 2019. The number of companies with a composite score, profitability and solvency scores greater than 0 in 2020 has increased compared to 2019; the number of companies with a development capability score greater than 0 is the same as in 2019 and 2020; this shows that, compared to 2019, 2020 The
payment ability and operating ability of listed companies in the entire semiconductor industry have not changed significantly. But companies with a development capability of less than 0 also gained 1 point. This shows that due to the impact of the epidemic, in 2020 compared with 2019, the development capabilities of listed companies in the entire semiconductor industry have declined slightly, but the profitability, operating capabilities and payment capabilities of listed companies have improved.

5. Realistic Bottleneck

5.1. Lack of Special Funds

Since the semiconductor industry is characterized by high investment, high risk and high output, the development path of the industry is highly related to policy and financial support. The well-developed areas of China's semiconductor industry are closely related to the introduction of policies, the attention of enterprises, the introduction of talents, and the implementation of special funds.

5.2. Lack of Original Innovation

In terms of supply of the current industrial chain, although existing enterprises in the Yangtze River Delta have formed their own production systems and are subdivided into innovative product positions in the industry, many high-end products still rely on a large number of imports and require long-term technical challenges. In terms of intermediate manufacturing, the semiconductor industry in the Yangtze River Delta involves integrated circuits, radio devices and other businesses. Many companies are known as Changjiang Electronics Technology and National Taiwan University Optoelectronics Innovation and Exploration Industry, and the gap with the international market continues to widen. Tightening, but the development of the semiconductor industry in the Yangtze River Delta lacks original innovation and has not yet taken the first step. The industrial chain has low links and thin links.

5.3. The Semiconductor Industry Lacks Cooperation and Linkage

In recent years, although the semiconductor industry in the Yangtze River Delta region has developed rapidly, attracting leading enterprises in the industry such as Changjiang Electronics Technology, NTU Optoelectronics, and Srip Semiconductor, the total number of enterprises is still small. More than half of the existing related enterprises are concentrated in Jiangsu Province. The overall level of the semiconductor industry in the Yangtze River Delta is still relatively weak, and the concentration of the industrial chain is low. The main business of the company is chip design, packaging materials, and power electronic devices. It has not yet formed an industrial cluster, and its radiation driving ability is not strong.

6. Conclusions and Recommendations

Based on the foundation and status quo of the semiconductor industry in the Yangtze River Delta region, it is necessary to make up for the shortcomings of the semiconductor industry in the development of potential semiconductor complete machines, semiconductor packaging, semiconductor equipment and materials. Focus on industrial chain investment, strengthen investment and institutional financing cooperation, pay attention to the intersection of industry and semiconductor capital, attract investment through enterprises, and arrange financing through education. With finance as the axis, projects are connected in series to form an industrial chain, a large-scale industry, and a new cluster. The explanation of each link can be answered from the gap between domestic and international.

(1) Establish an industrial fund to optimize the industrial ecology. The Yangtze River Delta region is trying to invest in small and medium-sized electronic projects in the semiconductor industry as soon as possible to overcome the temporary bottleneck, and must vigorously raise funds from the public. Stand firm on the banks of the besieged city. In order to encourage local development projects and attract external projects to Tianjin, efforts are made to develop and develop sufficient resources to support and develop semiconductor projects of different scales and industrial subsidies. In the Yangtze River Delta region, optimize the environment required for the development of the local semiconductor industry.

(2) Strengthen talent cultivation and introduce leading enterprises. The Yangtze River Delta should rely on the leading scientific research institutes and projects in the region to establish a semiconductor industry technology research institute, consolidate the comprehensive environment, and target the culture of high-end talents and technical leaders. Which industry is working urgently. The company is classified as high-end talent and technical leader.

Improvement of Residents’ Consumption Level in Anhui

Table 5. Factor scores and comprehensive score statistics

| Project | F1 (Profitability) | F2 (Performance Capability) | F3 (Development Capability) | F4 (Ability to pay) | Total Score |
|---------|-------------------|---------------------------|--------------------------|-----------------|------------|
|         | 2019   | 2020   | 2019   | 2020   | 2019   | 2020   | 2019   | 2020   | 2019   | 2020   |
| Score > 1 (00) (pieces) | 4    | 21    | 17    | 13    | 19    | 22    | 0     | 7     | 14    | 20     |
| Score < 0 (100pieces) | 24   | 11    | 10    | 9     | 3     | 12    | 8     | 13    | 8     |        |
| Average score | 35.7075 | 437.542 | 158.419 | 154.40 | 206.517 | 1110.37 | 8.11 | 142.665 | 98.7419 | 458.1157 |
| Maximum score | 276.3445 | 3951.835 | 832.9416 | 1171.088 | 3446.813 | 1205 2.46 | 1799.928 | 1021.177 | 3969.054 |
| Minimum score | 226.788 | 3.6099 | 502.314 | 1.2123 | 2398.96 | 230.633 | 138.82 | 37.4545 | 755.8 | 56.5528 |

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