Quality evaluation system based on 3D-indicators-perspective model

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Abstract. The quality evaluation system is based on the perspective of owners, which integrates various resources effectively and reasonably, and evaluates the results after arrangement, reflecting the satisfaction of owners to the results of resource utilization. This paper constructs a quality evaluation system from three dimensions of profitability, security and growth. The monthly transaction data from January 2010 to December 2018 and data from 2010 to 2018 are selected as data research samples. The conclusion is that good quality needs good profitability, safety and growth. The paper also puts forward some countermeasures and suggestions for sample companies with low quality score, in order to provide effective reference.

1. Introduction
With the continuous development of the financial market, the number of listed companies is also increasing, which has gradually improved the financing capabilities of our country’s listed companies in the huge capital market, and has also enabled them to continue to compete in an increasingly competitive environment. Earth makes its own viability gradually enhanced. However, in the development of such a prosperous capital market, there is no shortage of short-term speculation in my country's stock market, and there are many "super-concepts", "speculation in new stocks", and "speculation themes". The above-mentioned situations are constantly emerging because investors’ blind actions in investment decision-making have made them underestimate or even ignore the important meaning of accounting and financial information when investing. Therefore, they do not pay attention to financial information and the utilization rate is not high. At the same time, there has always been a phenomenon of "function lock-in" in the selection of investment objects by investors, which only simply and one-sidedly pays attention to the various indicators of the company's profit, but does not pay attention to other aspects of information on the value of the company Ability leads to insufficient use of financial information. Therefore, the importance of the financial accounting information of listed companies to investors and the company itself needs to be further emphasized and used effectively.

2. The concept of financial quality
First, at present, there is no clear, standardized, authoritative and comprehensive definition of the financial quality of listed companies. Through the study and analysis of the existing literature, we can know that regarding financial quality, domestic and foreign scholars have the following definition: David Cummins (1997) puts forward the definition based on the perspective of insurance pricing as the definition of a company’s financial quality. The pros and cons can be reflected by the size of the default
risk, that is to say, the financial quality of enterprises with high default risk is poor, and the financial quality of enterprises with low default risk is good [1]. Zhang Xinmin (2001) pointed out in his research that the financial status of an enterprise can be understood as financial quality, which can represent the "status" of a company's specific report, or it can be understood as the "status" of a certain report item of the company [2].

Through the study and research defined by the above scholars, this article believes that financial quality is based on the perspective of stakeholders to effectively and rationally integrate the company’s various resources and comprehensively evaluate the financial results achieved after arrangements. To reflect the satisfaction degree of stakeholders with the results of enterprise resource utilization.

3. Construction of evaluation index system
The financial quality of listed companies is affected by a wide range of factors. At present, my country does not have a complete and unified financial quality evaluation index system for listed companies, but there is also a lack of new ideas in the selection of evaluation indicators. This article refers to the processing method of Asness (2013) [3]. On the basis of following the construction principles of systemicy, comparability, feasibility, versatility and scientificity, according to the actual situation of the financial situation of listed companies in our country, the three dimensions of security, safety and growth build a financial quality evaluation system. In the selection of the profitability dimension indicators, in addition to the indicators reflecting the company’s profit situation, the profitability of the company is also considered from the aspects of cash flow and accrued profits.

3.1. Profit indicator

3.1.1. Return on equity (ROE). Return on net assets, also known as return on shareholders’ equity, is the percentage of net profit to average shareholder’s equity. It is the percentage rate of the company’s after-tax profit divided by net assets. This indicator can effectively reflect the pros and cons of shareholder’s equity. Can be used to examine the company’s ability to operate its own capital. This indicator is directly proportional to the return from investment. The larger the indicator, the higher the return from investment. This indicator can show the ability to use own capital to obtain net income.

\[
ROE = \frac{Netprofit}{Equity}
\]

3.1.2. Net sales margin (NPM). Net sales margin is the ratio of net profit to sales revenue. It represents the performance of sales revenue in terms of revenue. It can reflect the direct connection between the net profit obtained by the company and the sales revenue it obtains. It also means that it creates sales through operating sales within a certain period of time. Income ability. This indicator reflects the size of the net profit contained in the dollar when a company creates one dollar. This indicator clearly and concisely reflects the profit level of the company's sales revenue.

\[
NPM = \frac{Netprofit}{Sales Revenue}
\]

3.1.3. Profit per unit of assets (GPOA). The profit rate per unit of assets refers to the ratio of the company's total profits to the total assets in a certain period of time. This indicator can reflect the overall profitability of all assets of the company, including net assets and liabilities, and is an important indicator for evaluating the profitability of corporate assets. The profit per unit of assets reflects the efficiency of enterprise asset utilization. The higher the ratio, the higher the efficiency of asset utilization, which means that the enterprise has achieved good results in increasing revenue and reducing expenditures and saving funds; and vice versa. The sources of total assets are the owner's invested capital and borrowing.

\[
GPOA = \frac{GrossProfit}{Assets}
\]
3.1.4. Cash flow unit of assets (CFOA). Unit asset cash flow is the ratio of free cash flow to total assets. If the company’s free cash flow is in a stable and sufficient state, it can be judged that the company has a strong ability to repay debt and interest, and that its production and operation are in good condition. It is safer to borrow from such a company, but if the free cash flow is insufficient, or even negative, it indicates that there may be problems with the company’s operations, and the risk of providing loans for it is higher. The cash flow per unit asset can be used to measure the free cash flow in the unit asset. It is also an important indicator of the profitability of financial quality.

\[
CFOA = \frac{\text{Cash Flow}}{\text{Assets}}
\]

3.1.5. Accrued profit per unit of assets (ACC). Accrued profit refers to those income or expenses (or increase or decrease in net assets) that do not directly from the current cash inflow or outflow, but should be included in the current profit and loss according to the accrual basis and matching principle, such as depreciation expenses, Amortization expenses, increase in accounts receivable, etc.

From the definition of accrued profit, it can be seen that it is also closely related to income. To a certain extent, accrued profit can reflect subsequent sales and profitability.

\[
ACC = \frac{\text{Depreciation} - \Delta \text{Working Capital}}{\text{Assets}}
\]

3.2. Safety indicators

3.2.1. Leverage ratio (LEV). Due to the need for operating capital in daily production and operation, companies need to mix owners' equity and debt. Leverage ratio is a financial measurement indicator used to measure the inflow of funds through debt (loan), and it is also used to measure the ability of a company to repay financial debts. It is one of the important indicators for investigating financial quality and safety.

\[
LEV = \frac{-DLTT + DLC + MIBT + PSTK}{\text{Assets}}
\]

3.2.2. Z score. The Z index was proposed by the American scholar Altman in the mid-1960s. The lower the Z value, the more likely it is that the company will face bankruptcy. By calculating the Z value of the company for several consecutive years, it can be observed whether it has any financial problems. The possibility of crisis. Altman has summarized several critical values that can judge the company’s financial status through a series of empirical analysis, namely: when the Z value is greater than 2.675, it indicates that the company’s financial status is good, and the probability of bankruptcy is small; when the Z value is less than 1.81, it means that the company may have a hidden danger of bankruptcy; when the Z value is between 1.81 and 2.675, it is called a "gray area", indicating that the financial situation of the company at this time is unstable.

\[
Z\text{ Score} = \frac{1.2\text{WC} + 1.4\text{RE} + 3.3\text{EBIT} + 0.6\text{ME} + \text{SALE}}{\text{Assets}}
\]

3.3. Growth indicators

3.3.1. Advertising costs. If a company wants to gain sustained competitiveness in the market, the key lies in three aspects: product, sales and brand. In my country’s sales market, sales channels are a very important factor for many companies. To make the sales channel reasonably and fully exert its due ability, it needs the support of advertising. Effective advertising can make the company's brand awareness, brand equity, etc. continue to improve, so that the company can continue to enhance competitiveness among many companies, and achieve continuous profit. Previous scholars Chan et al. (2010) found through research that the ratio of advertising expenses to equity market value can show a positive correlation with future stock returns[^4]. Scholars also found that even if advertising expenses
are not capitalized, it will be to a certain extent the above makes the current profit somewhat reduced, but it can be beneficial to profit in the future. However, many investors have not paid enough attention to this point, making the profitability of companies with high advertising costs in the future underestimated.

3.3.2. R&D expenses. According to the research of scholars, it can be found that the investment in research and development expenses can directly increase sales. If an enterprise has innovative products or innovative technologies, it will enhance its own competitiveness to a certain extent. Under more favorable conditions, it can obtain more market share than its competitors, thereby maintaining its own competitiveness and the ability to continue production and operation. The large investment in R&D expenses can reflect the company’s planning for long-term production and operation in the future, and the high R&D expenses can provide an important foundation for listed companies to continue to maintain their own high growth, and continuously improve their innovation, Consolidate industry position and market share.

3.3.3. Operating income growth rate. The growth rate of operating income is obtained from the ratio of the increase in operating income of the enterprise this year to the operating income of the previous year. The growth rate of operating income can indicate the change in operating income compared with the previous year. It is also an important indicator to evaluate the growth and sustainable development of the company. It can also measure the status of the company’s operations and the ability to occupy the market. The continuous growth of income is the foundation of the sustainable development of enterprises.

3.3.4. Net profit growth rate. That is, the net profit of this year minus the net profit of the previous year divided by the ratio of the net profit of the previous period. Net profit is the final result of the company's operating performance. The continuous growth of net profit is the basic feature of the company's growth. If its growth rate is large, it indicates that the company has outstanding operating performance and strong market competitiveness. Conversely, a small increase in net profit or even a negative growth does not mean growth.

4. Empirical research on evaluation of financial quality

4.1. Sample selection and data sources
This article selects all the monthly transaction data of Shen Zhen A shares from January 2010 to December 2018 and the financial data from 2010 to 2018 as the data research sample. It is necessary to screen the original sample:

Exclude financial industry companies and insurance companies. Eliminate companies with negative book-to-market value ratios. Eliminate companies with incomplete financial data, abnormal financial indicators, and extreme conditions. Eliminate financially abnormal companies such as ST and *ST.

After a series of screening of the initial sample companies, the final sample number is 574 listed companies.

4.2. Financial quality evaluation based on 2018

4.2.1. Financial quality evaluation process. The 11 indicators are first sorted to meet the same distribution and achieve the goal of averaging the weight of each indicator; then the Z-score standardization process is performed, and the score of each dimension is the sum of the standardized values, and then the sum of the scores of each dimension is the financial quality score.

The sorting formula is as follows:

\[ r_i = \text{rank}(x_i) \]
Among them, $x_i$ is a certain financial indicator of the sample company $i$, and $r_i$ is the ordinal number of the financial indicator of the sample company. Then perform Z-score standardization processing on it, the formula is as follows:

$$Z_i(X_i) = Z_i = (r_i - \mu_i) \div \sigma_i$$

Among them, $\mu_i$ is the average cross-section of $r_i$, and $\sigma_i$ is the standard deviation of $r_i$.

4.2.2. Financial quality evaluation results. By processing the data according to the above method, the comprehensive financial quality scores of 574 sample companies can be calculated. Due to the limitation of the length of the paper, the scores of the top 10 sample companies with comprehensive financial quality scores are listed here for comparative study. Table 1 shows. A company’s comprehensive financial quality score greater than 0 indicates better financial quality, and a higher score indicates better financial quality, a comprehensive financial quality score less than 0 indicates poor financial quality, and a larger absolute value indicates poor financial quality. Table 3 shows the distribution of the comprehensive financial quality scores of 574 sample companies in 2018.

Table 1. Top 20 sample companies ranked by financial quality scores in 2018.

| Abbreviation       | Profitability Rank | Safety Rank | Growth Rank | Financial quality score | Rank |
|--------------------|--------------------|-------------|-------------|-------------------------|------|
| Meijin Energy      | 5                  | 111         | 4           | 1.1635417               | 1    |
| Donghua Energy     | 123                | 18          | 27          | 1.0331995               | 2    |
| China Optics       | 114                | 26          | 43          | 0.9198419               | 3    |
| Cathay Pacific     | 183                | 32          | 21          | 0.8851686               | 4    |
| Meinian Health     | 100                | 22          | 86          | 0.8619493               | 5    |
| Zheshang Zhongtuo  | 169                | 2           | 125         | 0.8614497               | 6    |
| Oriental Yuhong    | 74                 | 95          | 41          | 0.8436648               | 7    |
| Valin Steel        | 26                 | 63          | 118         | 0.8403490               | 8    |
| Inspur Information  | 235                | 15          | 31          | 0.8312040               | 9    |
| Zhejiang Jiaotong Branch | 150   | 78          | 20          | 0.8246784               | 10   |

Table 2. Distribution of financial quality scores of 574 listed companies in 2018.

| Financial quality score less than 0 | Financial quality score greater than 0 |
|-------------------------------------|----------------------------------------|
| Interval                           | Quantity | Percentage | Interval             | Quantity | Percentage |
| Less than -1                       | 4        | 0.7%       | 0 to 0.5             | 214      | 37.3%      |
| -1 to -0.5                         | 64       | 11.1%      | 0.5 to 1             | 67       | 11.7%      |
| -0.5 to 0                          | 223      | 38.9%      | Greater than 1       | 2        | 0.3%       |
| Total                              | 291      | 50.7%      | Total                | 283      | 49.3%      |

From Table 1, the 2018 comprehensive financial quality score ranking shows that companies with higher comprehensive financial quality scores have higher scores on the three dimensions of profitability, safety, and growth. As shown in Table 2, from the distribution of the comprehensive financial quality scores of 574 listed companies in 2018, the comprehensive financial quality scores of 291 listed companies are
less than 0, accounting for 50.7% of the total sample number; 2835 listed companies have comprehensive financial quality scores Greater than 0, accounting for 49.3% of the total sample number, basically the same as the enterprises less than 0. This shows that the overall financial quality of the 574 sample companies is average, and the financial quality needs to be improved. However, there are also three companies with outstanding performance, namely: Meijin Energy, Donghua Energy and China Optics. The comprehensive financial quality scores of these three listed companies are 1.163541775, 1.03319959 and 0.919841972, which shows that there are 574 companies. In comparison with the sample companies, these three listed companies have higher financial quality.

As shown in Table 1, Yifan Pharmaceutical, ranked 17th comprehensively, has a safety dimension score of -0.286273034 that is less than 0, making its safety dimension rank lower at 411, but its growth dimension score is higher at 1.502920199. And the ranking is high at 13, which finally makes it rank relatively high in its comprehensive financial quality score; Hualian Holdings, ranked 12th, has a higher score of 1.56877543 on the profitability dimension, and ranks first in the profitability dimension score. Its security dimension is less than zero, -0.379697256 and the lower ranking is 446. In the end, its ranking is not relatively high, only the 12th; Yunda shares ranked 20th, although its profitability and security dimension scores are not High, with scores of 0.289281689 and 0.3800011 respectively, ranking 190th and 117th respectively, but its growth dimension score is higher at 1.575277441, so its final comprehensive financial quality score ranks higher, being 20th; Comprehensive Finance The reason why Meijin Energy ranked No. 1 in terms of quality was able to rank No. 1 because of its high scores in the three dimensions of profitability, safety and growth, and the top rankings, ranking No. 5 respectively, 111th and 4th.

5. Suggestions
For the business managers of listed companies, if they want to effectively improve their own financial quality, they need to find out the shortcomings and make targeted improvements and upgrades; and they must continue to maintain and improve their outstanding performance. To Enhance the company's daily production, operation and management methods and efficiency, so as to effectively improve the financial quality of the company, thereby effectively enhancing its competitiveness and enhancing its sustainable development capabilities.

For investors, it is necessary not only to pay attention to the profitability of the company, but also to comprehensively examine the developmental prospects and capabilities of the company; and to have a correct investment concept without investing blindly.

6. Conclusions
Good financial quality needs joint role of the three dimensions of good profitability, security and growth. From each dimension, there are enterprises with good performance in single profitability, security or growth, but excellent performance in one dimension alone can not make their financial quality good. Only enterprises with excellent performance in all three dimensions can have good market competitiveness. Although profitability is one of the most concerned dimensions of financial quality, it can not be considered as the sole one dimension, but needing to consider comprehensively from the whole.

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