

A Review and Prospect of Corporate Text Information Tone Management

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Abstract: With the development of society and technological progress, on the one hand, the academic and practical circles are paying more attention to the text information such as the non-financial report of enterprises. On the other hand, the progress of computer technology has made it possible to obtain and quantify text information. Tone is one of the important characteristics of text information, which refers to the positive or negative emotional tendencies while disclosing text information. Enterprises manipulate text messages for profit through tone management, which has certain economic consequences. This paper systematically reviews the acquisition and measurement methods of text information tone, and reviews the existing literature on the influence factors and economic consequences of tone management, so as to provide direction and reference for future research on text information and tone management.

Keywords: Text Information, Tone Management, Information Disclosure, Text Analytics.

1. Introduction

Generally speaking, enterprises disclose information to the market in the form of digital information and text information to convey the business status and development prospects of the enterprise, which is conducive to maintain market competitiveness, obtain more resources and benefits, achieve sustainable and healthy development, as well as effectively alleviate the information asymmetry of the capital market. Digital information, such as corporate accounting statements, is the main form of corporate financial information disclosure, which can objectively and accurately reflect the company's operating conditions, and has been the focus of all stakeholders for long time. With the progress of society and economic development, the importance of text information disclosed by enterprises is increasing day by day. By publishing social responsibility reports, sustainable development reports, annual reports, management discussions, news announcements and other forms, enterprises can refine and supplement the information disclosed by enterprises in the form of texts. It can also help external information users to fully understand the development status of enterprises, thereby influencing their investment decisions. In the past, due to technical limitations, scholars' research often focused on the digital information publicly disclosed by listed companies. With the development and wide application of computer and big data analysis technology, the automatic acquisition and quantification of text information have been realized, and it has been possible to study the behavior of listed companies in the capital market with the help of text analysis technology, which has gradually attracted the attention of more scholars. Especially in recent years, a large number of researchers have begun to use computer technology to study enterprise text information with richer forms and contents.

Tone is an important feature of textual information, which refers to the positive or negative emotional tendencies that are displayed when disclosing text information. Tone is generally divided into positive, neutral, and negative tone (Li, 2010)[1]. Tone management is one of the important means of text information impression management, which is to guide the

reading experience of information readers by using different emotional tones. Tone management usually adopts a positive emphasis strategy, where more positive words are used to describe text information to mobilize the potential enthusiasm of information users and improve the credibility of the report to achieve the expected message delivery effect. Because tone management is a relatively concealed and low-cost means, the management of enterprises has greater discretion in the expression of text information, and can deliberately change the strategic expression of positive or negative words in the text information, as well as use richer rhetorical tone to convey unstructured and non-quantitative information and mislead information users with tone management to achieve their own goals.

2. Textual Analysis Methods

In the early days, text analysis was generally read and recognized by humans, which was inefficient and subjective. With the rapid development of computer technology and information technology, scholars have begun to use computer technology to analyze textual information. There are two mainstream methods of text analysis: machine learning and dictionary.

Machine learning method is essentially a statistical algorithm, which uses training samples for repeated training to obtain a mathematical model with text processing ability, and inputs the target text into the model to obtain the quantitative features of the text. Li (2010)[1] was the first to use the Naive Bayes algorithm for accounting text analysis, which pioneered the use of computer text analysis technology to study the text information disclosed by management. By defining the artificial emotions of some words in the text, and inferring the proportion of the three emotions in the text through sampling statistics, the computer can capture and copy the words in the text information through machine learning, and then calculate the sentences where the words are located through the Bayesian formula to determine the emotional tendency. This method has certain limitations. It only determines the common words and doesn't study the undetermined words, which leads to a very serious problem of missing variables and a certain degree of subjectivity.

The dictionary method is essentially a word frequency statistical method, which maps the words in the target text to each set one by one based on the preset dictionary, and the quantitative characteristics of the text can be obtained through statistical calculation. Loughran and McDonald (2011)[2] improved Li's (2010) textual analysis method to form a specialized accounting sentiment analysis dictionary by analyzing corporate reports, and defined sentiment for 2683 words. Since then, many scholars have borrowed Loughran and McDonald's "bag of words" and updated the dictionary on this basis. Based on dictionaries, the "bag of words" method uses Python and other programming languages to quantitatively analyze different types of information, which greatly improves the objectivity, accuracy and work efficiency of text information analysis, and has become a mainstream text analysis method.

3. Tone Measurement Methods

The current study mainly measures tone management in two ways: net positive tone and abnormal tone.

Net tone is the most widely used concept of tone in the current literature, which refers to the positive or negative affective tendencies expressed in the report. It is calculated in two mainstream ways: the first is measured by using the proportion of the difference between the number of positive and negative words in the report to the total number of words (Davis et al., 2012a, Davis et al., 2015)[3][4], and the second is the ratio of the difference between the number of positive and negative words in the report to the sum of the number of positive and negative words, or the difference between the number of positive and negative words to the sum of the number of positive and negative words plus one (Price et al., 2012)[5].

However, net tone is not always a means of information manipulation and impression management by management, and may include two parts: one part refers to a neutral expression of current and future good performance, and the other part is a part of management manipulation, which is an overly positive description or even exaggerated beautification of current performance. This part reflects the management of tone, which is called abnormal tone. The mainstream measurement method of abnormal tone is generally similar to the Jones model in earnings management. The net tone is decomposed into two parts: normal tone and abnormal tone, and the model residual term is used as a proxy variable for abnormal tone (Huang et al., 2014)[6].

4. Influence Factors of Tone Management

At present, there are not many studies on the influence factors of tone management, mainly focusing on three aspects: business conditions, governance and management characteristics.

First of all, the business situation of the enterprise will affect the tone management. Li (2010) [1] found that the better the company's future profitability, the more optimistic the tone of the accounting text. Ibrahim et al. (2019)[7] found that the lower the cost of capital and the higher the growth rate of a listed company, the more pessimistic the narrative tone in the annual report will be. Brown and Tucker (2011)[8] compared MD&A content over time and found that the greater the change in a firm's economic conditions, the greater the change in MD&A content. Larcker and Zakolyukina

(2012)[9] found that managers of financially fraudulent companies tend to use language that conveys positive emotions and less likely to use negative emotions or uncertainties in their presentations on quarterly earnings calls.

Second, corporate governance affects tone management. Lee et al. (2019)[10] and D'Augusta et al. (2020)[11] found that the robustness of accounting information and the financial expertise of audit committee members can suppress management tone manipulation. Bassyouny et al. (2020)[12] found that board independence and the proportion of female directors inhibit optimism in the tone of information disclosure. DeBoskey et al. (2019)[13] looked at the tone of earnings announcements and found that the tone of earnings announcements is closely related to CEO power, and the greater the CEO's power, such as the longer the CEO tenure or the CEO is also the chairman, the more optimistic and radical they are in the earnings announcement.

Finally, the characteristics of the management of the enterprise affect the tone management. Huang et al. (2014)[6] found that when listed companies disclose to the public, management will manipulate the tone of the annual report out of self-interested motives. Davis et al. (2015)[4] explored the influence of managers' personal characteristics and experiences on the tone of text, and found that the optimistic or pessimistic tendency of managers' traits affects the tone used by managers in earnings conference calls, and found that managers' early professional experience, such as whether they participated in charitable organizations, also significantly affected the tone adopted by managers. Marquez-Illescas et al. (2019)[14] found that narcissistic CEOs are more inclined to reinforce their grandiose self-image by making more positive earnings announcements, a desire that wanes as CEOs age.

5. Economic Consequences of Tone Management

The economic consequences of corporate tone management are mainly concentrated in two levels: enterprise internal and market reactions.

The first perspective comes from within the enterprise. A large number of studies have shown that the tone characteristics of text information can effectively predict enterprise performance. Loughran and McDonald (2011)[2] were the first to study the economic consequences of the tone of a firm's annual report and found that the net tone of the annual report was significantly positively correlated with the firm's future earnings. Davis et al. (2012b)[15] analyzed the MD&A text of the annual report and found that the tone information can reflect the attitude of managers towards the future development of the enterprise, and show the future performance level of the enterprise to a certain extent. Huang et al. (2014)[6] found a positive relationship between unusually positive tones and negative future earnings and cash flows. Mayew et al. (2015)[16] found that the tone of management discussions can predict a firm's future sustainability. Many scholars have found that the tone of text information can effectively predict corporate risks. When enterprises disclose information, increasing the use of negative vocabulary and reducing the use of positive vocabulary may reflect risks such as financial crisis and deteriorating business environment. Hajek and Henriques (2017)[17] combined structured financial data with unstructured text tone data to construct a financial fraud prediction model to predict the risk of corporate financial

fraud. Kothari et al. (2009)[18] found that firms' disclosure of good news reduces firm risk and thus reduces analysts' forecast dispersion. Conversely, when firms increase risk disclosures, analyst predictions become more discrete (Kravet and Muslu, 2013)[19].

Secondly, judging from the reaction of investors. Investors will have a positive reaction to the positive tone of the text and a significantly negative reaction to the negative tone. Positive tone can convey good news and improve investors' positive reactions, while negative tone can bring additional negative information and signals to enterprises, making investors react more negatively, which in turn affects their value judgment. Cardinaels et al. (2019)[20] found that the earnings announcement summaries disclosed by managers tend to have a stronger tone bias, in which case investors will have more aggressive valuation judgments. Brockman et al. (2013) [21] found a significant correlation between the tone of conference call texts and insider trading risk. Before selling stocks, management often uses a more positive tone in conference calls to mislead investors into making correct judgments about the company's value and conceal insider trading risks. The tone usually implies the potential information that insiders will sell stocks in the future. Baginski (2015)[22] argues that management will create a positive or negative tone atmosphere through the setting of emotional words, which will affect investors' judgment of information.

The last aspect is from the reaction of investors to the market stock price. A large number of studies have found that investors make mistakes in their judgment of the company's value, which in turn will reflect and affect the risk of stock price changes and stock price crashes. The positive tone of text messages can show the good prospects of the company's development to the outside world, increase investor confidence, and thus increase stock returns, while the negative tone is often accompanied by a decrease in stock returns. Kothari et al. (2009)[18] found that if companies publish good news in their annual reports, it can reduce risk and reduce stock price volatility. Feldman et al. (2010)[23] found that changes in the tone of accounting text information can affect the short-term stock price performance of firms, and the more optimistic the tone, the stronger the short-term reaction of the market. Ertugrul et al. (2017)[24] found a positive relationship between the degree of tone management by listed companies and the risk of stock price crash. Davis (2015b)[15] also found that, managers have the flexibility to change the frequency of use of tone words to minimize the impact of negative news on stock prices. In addition to influence the change in the stock price, the tone of the text also affects the change in the trading volume of the stock in the short term. Sandulescu (2015)[25] found that the more positive the tone of the management discussion and analysis section of a U.S. company's periodic report, the more shares insiders will buy and the fewer shares they will sell after the announcement.

6. Conclusion and Outlook

With the development of computer technology and text analysis technology, the research on the intonation of text information is in the ascendant. The existing literature has carried out research on the acquisition of text information, the method of tone scheduling, the influence factors and the economic consequences, which enriches the scope of text information research and provides research evidence on the

usefulness of text tone information. However, there are still areas of improvement in the current research.

First, there is a lack of research on the abnormal tone. However, net tone is not always a means of information manipulation and impression management by management, and abnormal tone is an exaggerated beautification of corporate performance, which can better reflect corporate tone management. Whether the market can recognize and react to the abnormal tone of the company will be worth exploring further in the future.

Secondly, there is insufficient research on the influence factors of tone. There are relatively few studies on the influence factors of corporate text information tone in the existing literature, and most of them are concentrated within enterprises. However, there are still other perspectives that can be further enriched and improved. In the future, it is necessary to explore and study the influence factors in more aspects of the tone of accounting texts, such as whether macro aspects, such as external policies, laws, and economic environment, will have an impact on the tone of the text.

Finally, the sources of textual information remained to be enriched. Current research generally focuses on text information such as corporate annual reports and conference calls, while text information reflecting the business status of enterprises should be richer and more diverse. In the future, research can be carried out from more perspectives, such as non-financial information of enterprises such as ESG reports, media reports, texts published on public platforms like Weibo, and social comments.

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