

The Effect of Network Public Opinion Attention on Bank's Risk Text Information Disclosure Strategy

Abstract: Based on the risk text information data of bank's annual reports from 2009 to 2017, and using machine learning method of content analysis, this paper investigate the network public opinion attention effect on the risk text information disclosure strategy in the bank's annual reports, and explore which is its dominate hypothesis in the new media era, "supply information" hypothesis or "information ambiguity" hypothesis. Moreover, it analyses the joint effects of several factors such as the level of bank's risk taking, the bank's network image maintenance ability, and the bank's regulatory perception. In general, the conclusion showed complexity effect. For the risk text information tone management, the network public opinion attention has significant transparency governance effect on information transmission, which mainly reflects the "information supply" hypothesis. For the risk information density strategy, the network public opinion attention mainly reflects the "information ambiguity" hypothesis.

Keywords: risk text information tone; risk text information density; Network Public
Opinion Attention

1. Introduction

With the slowdown of economic growth and the upgrading of financial regulation, in recent years, the bank has changed from "favorable public opinion" to "embarrassing public opinion"¹, and the risk information has become one of the most concerned topics. For example, in 2017, the cheating incident of pudong development bank chengdu branch was detected by CBRC after market rumors were fermented and reversed, and online public opinions broke out. Among Baidu search results, 384,000 related public opinions were found. According to the public opinion monitoring of sina public opinion online in 2018, after the release of 2018 credit card industry report, among the TOP20 most frequently used negative words in the statistical period, the word "risk" was mentioned nearly 1 million times. However, as an informal mechanism for investor

¹ Huike information industry all media big data and 2017 China banking public opinion analysis annual report

protection, compared with traditional public opinion, online public opinion lacks the mechanism of "gatekeeper", which may reveal the truth or spread rumors, posing unprecedented challenges to the disclosure of risk information of commercial Banks.

As a capital link, the risk information disclosure of commercial banks has the characteristics of public goods for social stability, fairness and effectiveness. According to the information transmission economics theory of "signal supply", if the seller with private information can pass the information to the buyer without information in a certain way, or the buyer can make the seller disclose the information actively, the market resource allocation will reach the optimal standard state, namely pareto improvement (Spence,1974). However, according to the "information ambiguity" hypothesis, when the company is in a bad situation, managers also have a strong incentive to release vague information, so as to hide negative information from investors. As a financial institution strictly controlled by financial regulation rules, the narrative text information of bank annual report has rich connotation, control space and fuzzy convenience that can't be reflected in structured financial data. In the era of new media, we want to know whether and how the risk text information disclosure strategy of banks will be affected by the attention of network public opinion. Is the "information supply" hypothesis or the "information ambiguity" hypothesis dominant? For this debate, the existing literature is still lack of sufficient evidence.

Based on the above considerations, this paper takes 2009-2017 as the research period to investigate the influence of network public opinion concern on the selection of bank risk text information disclosure strategy, as well as the regulatory effect of bank risk taking level and network image maintenance ability. Our analysis is based on *Chinese Emotional Vocabulary* created from the Xiamen university professor You Jiaying. According to the context of bank annual report, we enlarge and perfect the lexicon of the banking industry. According to the context of bank annual report, we enlarge and perfect the lexicon of the banking industry. Furthermore, we use Python's text analysis technology to capture the risk text information of the annual reports of Chinese listed commercial Banks from two aspects of risk text information intonation and risk information density through word segmentation and statistics of jieba

the discipline database, and use artificial intelligence algorithm to judge and identify the risk text information. At the same time, we represent the variables of network public opinion by the netizens' comments and forwarding data in the stock post bar of dongfang fortune,² the most visited and influential financial and securities portal in China.³ In addition, z-value, which is based on ROA, CAR and ROA to measure the stability level of banks, is used to represent banks' level of risk taking. WeChat and weibo are used to represent the network image maintenance ability of Banks.

This paper finds the research results as follows. (1) In terms of intonation strategy of bank risk text information, network public opinion concern has significant transparency governance effect on information transmission, which mainly reflects the "signal supply" hypothesis. The higher the attention of network public opinion, the lower the enthusiasms of bank risk text information tone. Meanwhile, the more stable the bank operation, the lower the risk level, and the more positive the tone of the bank risk text information. The level of bank risk taking has an incremental moderating effect on the network public opinion effect of text intonation. (2) In terms of the information density strategy of bank risk text, network public opinion mainly reflects the "information ambiguity" hypothesis. The higher the attention of network public opinion, and the lower the information density of bank risk text. At the same time, the lower the risk level of the bank, the higher the density of risk text information disclosed by the bank, but the risk level of the bank has no regulatory effect. (3) The stronger the network image maintenance ability is, the less banks need to use positive text tone to induce investors, which reflects the information transparency governance role of "signal supply". However, the stronger the network image maintenance ability is, the lower the disclosure density of bank risk text information is, which reflects the "information ambiguity" hypothesis. At the same time, the bank network image maintenance ability does not have the network public opinion attention effect adjustment function. (4)

² The average daily page view is more than 100 million person-times, and the number of posts in stock bar is the largest among similar stock post bar, such as sina stock bar, so it has strong reliability and representativeness.

³ We directly use the online comments from the investor group to study the impact of online public opinion concerns on the risk information disclosure strategy of the annual reports of listed commercial Banks, so as to avoid the possible disadvantages of repeated reports from different websites in the network media under the "baidu news search engine", which has a strong logical correlation.

Further research found that the network public opinion attention has a significant negative effect on the ambiguity of bank risk text information. In addition, city commercial banks with little reputation are facing greater pressure from investors and often have stronger motivation to use positive tone management in the text information expression of annual financial reports.

This study contributes to the literature in the following ways. Firstly, which helps strengthen the risk information disclosure, establish a new generation of financial risk reporting mechanism, improve the quality of the risk of commercial bank financial report information disclosure, as well as help investors to better identify risk source and potential opportunities, it is the post-crisis era change trend of international banking regulation and international accounting standards convergence focus. In 2017, the ministry of finance of China issued the revised version of accounting standards for enterprises No. 37 -- presentation of financial instruments, requiring enterprises to fully disclose their risks in a qualitative and quantitative manner to help stakeholders reasonably assess their financial impact. Compared with the quantitative "hard information" of risk data, the qualitative "soft information" of risk text has the characteristics of complexity, ambiguity, ambiguity, difficulty in investigation and no need for audit, which endowing commercial banks with a large space of "information shaping". The problem of the selection of information disclosure of risk text of banks has attracted much attention. Based on existing literatures, this paper constructs the causal chain between network public opinion and bank risk text information disclosure, and introduces the risk level of Banks and the influence of investor relationship management factors under the bank Internet, which helps further enrich the existing theories, expand the text analysis research of existing literature in the field of risk reporting, and improve the related accounting standards of text information disclosure regulation provides a useful reference evidence.

Secondly, the existing literature on risk information disclosure mainly involves the motivation of risk information disclosure and the information content of risk report. However, due to the complexity and controversy of risk information report and the influence of standard provisions, the research conclusions are inconsistent (Elshandidy,

Shrives, Bamber, Abraham, 2018). Compared with researches based on traditional media, relevant researches from the perspectives of new media such as online interactive platforms and we-media are still insufficient. As for the research on the capital market utility of network public opinion, most existing literatures are conducted from the perspective of the impact on stock market asset pricing, financing efficiency as well as corporate governance equity or efficiency. This paper helps expand the research to the impact on bank risk text information disclosure strategy field, which uses machine learning content analysis method to test bank narrative risk information disclosure characteristics, and to confirm that in the new media era, the role of the Internet in the selection of bank risk text information disclosure strategy is an important theoretical topic worthy of in-depth study.

The following parts of this paper are arranged as follows. The second part is a literature review, which reviews the main achievements and shortcomings of existing researches; the third part is the theoretical derivation and research hypothesis. It summarizes the existing research framework, modifies and deduces the theory based on the special institutional background of China, and puts forward the research hypothesis. The fourth part is the research design, which mainly introduces the data source, variable selection and empirical model of this paper. The fourth part is the analysis of empirical results, including descriptive statistical analysis and multiple regression statistical analysis. The fifth part is research conclusion and enlightenment.

2. Literature Review and Hypothesis Presentation

2.1 The Effect of Network Public Opinion Attention: Bank's Risk Text Information Disclosure Strategy

The existing literature focuses on risk information disclosure, mainly covering two areas: the first is to study the motivation of risk information disclosure (Solomon, 1999; Solomon, Solomon, Norton and Joseph, 2000; Beretta and Bozzolan, 2004; Linsley and Shrives, 2006; Abraham and Cox, 2007; Marshall and Weetman, 2007; Deumes and Knechel, 2008; Hill and Short, 2009; Taylor, Tower, and Neilson, 2010; Miihkinen, 2012; Barakat and Hussainey, 2013; Elshandidy, Fraser and Hussainey, 2013; Ntim, Lindop and Thomas, 2013; Elshandidy, Fraser and Hussainey, 2015; Malafrente,

Porzio and Starita, 2016; Al-Hadi, Hasan and Habib, 2016). The second type is the information content of risk report (Rajgopal, 1999; Roulstone, 1999; Hodder and McAnally, 2001; Jorion, 2002; Linsley and Lawrence, 2007; Akhigbe and Martin, 2008; Pérignon and Smith, 2010; Kravet and Muslu, 2013; Abraham and Shrikes, 2014; Bao and Datta, 2014; Elbannan and Elbannan, 2015; Filzen, 2015). Some literatures have also studied these two aspects namely risk reporting motivation and information content (Campbell, Chen, Dhaliwal, Lu, and Steele, 2014; Elshandidy and Neri, 2015; Elshandidy and Shrikes, 2016; Hope, Hu, and Lu, 2016). Among them, regarding the motivation of risk information disclosure, the existing literature's research conclusions are mostly based on the developed market environment and do not exist consistency. For example, some studies find that the improvement of accounting standards and the enhancement of regulatory environment are conducive to the improvement of the quantity and quality of enterprise risk disclosure (Miihkinen, 2012; Abraham, Shrikes, 2014), mandatory disclosure requirements for risk information in annual financial reports, will trigger additional discretionary risk reports (Tamer Elshandidy, Santhosh Abraham, Philip j. Shrikes, 2018). However, some other researches find that the voluntary disclosure exists more in the weak regulatory environment, and the excessive regulation is not conducive to the increase of risk disclosure (Deumes, Knechel, 2008; Marshall, Weetman, 2007).

Nowadays, with the increasing influence of network public opinion in the new media era, the research on online public opinion as an informal mechanism for small and medium investors' protection is gradually carried out. Most of its research content involves the influence of network public opinion on stock market asset pricing, financing efficiency and the governance role of online media (Wysocki, 1998; Yin, Xiong, 2017; Yang, Shen, Li, 2017). In this paper, I believe that since online media is an important place for information exchange and dissemination of retail investors, it is easy to quickly form a public opinion with strong inclination⁴.

⁴ China Internet Network Information Center (CNNIC) released the 41st 《Statistical Report on China's Internet Development Status》. According to the report, as of December 2017, the Internet users had climbed to 772 million, and the Internet penetration rate was 55.8, of which were 753 million mobile Internet users. The proportion of mobile Internet users increased from 95.1 in 2016 to 97.5. In 2018, HCR Huichen Information's

Therefore, the network communication between small and medium-sized shareholders has formed a network public opinion concern, which will strengthen the bank risk information disclosure governance, and will also stimulate the bank's motivation to use the text information disclosure strategy to maintain its reputation and public image. Among them, intonation characteristics and risk information density characteristics are two important options for bank risk text information disclosure. As the most basic feature of text information disclosure, the tone is composed of optimistic or pessimistic, favorable or unfavorable, positive or negative. The existing literature research topics involve information disclosure tone and corporate risk, media reports and CEO compensation, managerial tone management, managerial characteristics and text tone, the influence of tone on investor pricing, the relationship between tone and the company's future performance, etc. (Core et al,2008;Henry,2008;Feldman et al,2009;Kothari,2009;Loughran,McDonald,2011;Davis et al,2012;Larcker,Zakolyukina,2012;Price,2012;Jegadeesh,Wu,2013;De Franco et al,2014;Huang et al,2014;Davis, et al,2015), I expects that network public opinion concerns have significant external governance effects on bank risk information tone management, and thus mainly reflects the "information supply" hypothesis. Based on this, the paper proposes the following hypothesis:

H1-1: Network public opinion attention have a significant correlation with bank risk information tone management. The bank risk information tone is less positive subsequent to the higher degree of concerns.

With the rapid development of text analysis technology in financial accounting and financial research⁵, some research uses automatic content analysis to study the risk text information disclosure. Existing literature studies show that risk text information reports are prone to disclose historical information and good news. Since risk is the sensitive point and pain point of bank public opinion risk, I expect that the risk text

Wistron media monitoring platform data shows that the hottest topic "CCB sells 27 village bank shares, industry development will enter the integration period" is mainly spread by the network, with the network accounting for 87.2%, the forum accounting for 6.4%, WeChat accounting for 5.5%, and the media accounting for 0.9%.

⁵ In 2018, Li Feng, the former professor of University of Michigan's Ross School of Business, was awarded the "Outstanding Research Contribution of Accounting Literature" by the American Accounting Association for his pioneering contribution to text analysis.

information density is obviously affected by the network public opinion concerns. I state the second hypothesis as follows:

H1-2: Network public opinion attention have a significant correlation with bank risk information density. The risk information density of banks is lower subsequent to the higher degree of concerns.

2.2 The Joint Effect of the Bank's Risk taking and the Bank's Network Image Maintenance Ability

According to the research on the needs of investor risk information, companies with different risk levels have significant characteristics in risk disclosure. Those with poor performance will undertake more pressure from investors to provide high-quality risk information(Miihkinen,2012), while based on their company's risk level, high-risk companies are more likely to disclose mandatory and voluntary risk information (Elshandidy et al,2013). This discussion leads to the hypothesis 2-1:

H2-1: Bank's risk taking level has a moderating effect on the network public opinion attention effect of risk text information disclosure strategy.

The bank's network image in the new media era refers to the public's comprehensive evaluation and impression of the bank generated by the two-way interaction between the bank and investors in the role of online media. Among them, on the official website setting of the bank, Weibo is the social information network focusing on information reception, and WeChat is the interaction of social networking. Due to the rapid nature of network communication, the information published on the bank's online media platform can often be quickly reprinted by many websites and received by many investors. In some bank negative public opinion incidents, if banks use online media platforms for more rigorous representation and guidance, it is possible to prevent the development of the situation to seriously affect the bank's reputation. Therefore, I believe that setting up of Weibo or WeChat on the online media platform of its online homepage is not only responsible for the positive guidance of lyrics, but also a manifestation of brand maintenance and image maintenance. This paper expects that banks with strong network image maintenance capabilities can effectively guide investors' public opinion through multi-channels with the help of online media

platforms, and improve the transparency of “information supply”. Based on this, this paper proposes hypothesis 2-2:

H2-2: Bank network image maintenance capability has a moderating effect on the network public opinion attention effect of risk text information disclosure strategy.

3 .Research Design

3.1 Sample and data

The sample consists of China's listed commercial banks, the research year covers the 2009-2017 period. The paper uses the computer to capture the risk text information data of the samples' annual report, and then studies the network public opinion concern effect of the commercial bank risk text information supply. After excluding commercial banks without data, the final sample consists of 234. We winsorize all continuous variables at the 1 percent and 99 percent levels to mitigate the influence of outliers.

The data source is as follows: I . Risk word frequency statistics, tone statistics, which are obtained through annual language natural language processing by Python. II . Vocabulary tone judgement using dictionary method, based on the Chinese Emotional Vocabulary of Professor You of Xiamen University, which is combined with the text of bank's annual report, expanded and improved by supplementing the professional vocabulary of the banking industry. The dictionary method is essentially a word frequency statistics method. Based on predefined dictionary and rules, it maps words in the target document to each set one by one and obtains quantitative features of the text through statistical calculation (Li,2010) . III. The data of network public opinion concern comes from the comments of netizens in the Eastmoney Network, which is China's most visited and most influential financial and securities portal, with more than 100 million page views per day. According to Huikexun's all-media big data platform, in the top ten online media in 2017, Eastmoney Network reported the most. Its "Guba Network" is currently the largest stock post in China, with the highest number of posts compared to other stock bars (such as Sina stocks, etc.). (4) The remaining financial data and corporate characteristic data are from the CSMAR database.

3.2 Models and Variable Definitions

H1 regression equation: The effect of network public opinion attention

$$TONE_{i,t} = \beta_0 + \beta_1 TONE_{i,t} + \beta_2 Netwopinion_{i,t} + \beta_3 Asset_{i,t} + \beta_4 EPS_{i,t} + \beta_5 Bank_{i,t} + \beta_6 Year_{i,t} + \varepsilon_{i,t} \quad \text{Model 1-1}$$

$$RiskDensity_{i,t} = \beta_0 + \beta_1 TONE_{i,t} + \beta_2 Netwopinion_{i,t} + \beta_3 Asset_{i,t} + \beta_4 EPS_{i,t} + \beta_5 Bank_{i,t} + Year_{i,t} + \varepsilon_{i,t} \quad \text{Model 1-2}$$

Dependent Variable Risk text information tone ($TONE_{i,t}$): Taking the text of the bank annual report as the analysis object, referring to the dictionary method of Huang et al. (2014), this paper uses the existing Chinese word segmentation module "jieba" to automatically segment the text used in this article, and then perform word frequency. The list of words in this paper refers to different categories words. Among them, "positive vocabulary, strong modal particle, positive word + positive adjective" are classified as "Positive mood" tone; "negative vocabulary, weak modal particle, positive word + negative adjective, Negative words + positive adjectives" are classified as "negative mood" tone. The annual report text information tone (TONE) is calculated as: (number of positive words - number of negative words) / Full text vocabulary. The greater the TONE value, the more positive the tone of the company's annual report text message.

Dependent Variable Risk Text Information Density ($RiskDensity_{i,t}$): Following prior literature Robert M. Bushman (2014), this paper use the ratio of the number of words in "risk, risk management" and the total number of words in the annual report text to measure the risk text information density of commercial banks.

The main explanatory variables Network Public Opinion Attention ($Netwopinion_{i,t}$): this paper takes the Eastmoney Network's 2009-2017 sample bank stocks as the data source, and counts the number of posts as annual data of samples.

Control variable: Bank size and profitability are important factors influencing the quality of risk reporting mechanism (Bischof, 2009; Ford, Sundmacher, Finch, & Carlin, 2009; Helbok & Wagner, 2006; Linsley, Shrivess, & Crumpton, 2006; Oliveira, Rodrigues, & Craig, 2011a; Oliveira et al., 2011b; Woods, Dowd, & Humphrey, 2009; Yong, Chalmers, & Faff, 2005; Elbannan, Elbannan, 2015; Al-Hadi et al, 2016). At the same time, compared with high-profile banks, commercial banks with lower visibility

face higher investment pressure, so they have a stronger need to maintain their reputation and social image. Therefore, this paper takes the bank size represented by the logarithm of the total assets of the bank, the bank profitability represented by the earnings per share, and the bank type represented by whether the bank belongs to the city commercial bank as the main control variable of the model.

H 2-1 regression equation: The joint effect of bank's risk taking ($zscore_{i,t}$)

$$TONE_{i,t} = \beta_0 + \beta_1 TONE_{i,t} + \beta_2 Netwopinion_{i,t} + \beta_3 zscore_{i,t} + \beta_4 zscore_{i,t} \times \\ NETOPINION_{i,t} + \beta_5 Asset_{i,t} + \beta_6 EPS_{i,t} + \beta_7 Bank_{i,t} + \beta_8 Year_{i,t} + \varepsilon_{i,t} \quad \text{Model 2-1-1}$$

$$RiskDensity_{i,t} = \beta_0 + \beta_1 TONE_{i,t} + \beta_2 Netwopinion_{i,t} + \beta_3 zscore_{i,t} + \beta_4 zscore_{i,t} \times \\ NETOPINION_{i,t} + \beta_5 Asset_{i,t} + \beta_6 EPS_{i,t} + \beta_7 Bank_{i,t} + \beta_8 Year_{i,t} + \varepsilon_{i,t} \quad \text{Model 2-1-2}$$

Bank's risk taking level Variable: this paper chooses the Z index which measures the bank's stability as the representative of bank risk-taking level. The Z value is equal to the sum of the bank's return on assets (ROA) and capital adequacy ratio (CAR) divided by the variance of ROA. The larger the Z value, the more stable the bank's operations and the lower the risk.

$$Zscore = \ln \left[\left(ROA + \frac{Equity}{TotalAssets} \right) / \sigma(ROA) \right]$$

H 2-2 regression equation: The joint effect of bank's network image maintenance ability ($OnLinePresence_{i,t}$)

$$TONE_{i,t} = \beta_0 + \beta_1 TONE_{i,t} + \beta_2 Netwopinion_{i,t} + \beta_3 OnLinePresence_{i,t} + \\ \beta_4 OnLinePresence_{i,t} \times NETOPINION_{i,t} + \beta_5 Asset_{i,t} + \beta_6 EPS_{i,t} + \\ \beta_7 Bank_{i,t} + \beta_8 Year_{i,t} + \varepsilon_{i,t}$$

Model 2-2-1

$$RiskDensity_{i,t} = \beta_0 + \beta_1 TONE_{i,t} + \beta_2 Netwopinion_{i,t} + \beta_3 OnLinePresence_{i,t} \\ + \beta_4 OnLinePresence_{i,t} \times NETOPINION_{i,t} + \beta_5 Asset_{i,t} + \beta_6 EPS_{i,t} \\ + \beta_7 Bank_{i,t} + \beta_8 Year_{i,t} + \varepsilon_{i,t}$$

Model 2-2-2

The variable of bank's network image maintenance ability ($OnLinePresence_{i,t}$): We use the Dumb variable, Namely, whether the bank set up Weibo or WeChat on its official online media platform as the representative variable of the bank's ability to

maintain network image. When Weibo or WeChat is set on the bank's homepage, $OnLinePresence_{i,t}$ variable takes 1, otherwise is 0.

Table 1 Variables Definitions

| | Variables | Variable symbol | Definition |
|-----------------------|--|------------------------|---|
| Dependent variables | Risk Text Information tone | $TONE_{i,t}$ | (number of positive words - number of negative words)/ Full text vocabulary |
| | Risk Text information density | $RiskDensity_{i,t}$ | the ratio of the number of words in “risk, risk management” and the total number of words in the annual report text |
| Independent variables | Network Public Opinion Attention | $Netwopinion_{i,t}$ | the number of posts about the banks in the Eastmoney Network |
| | Bank’s Risk taking level | $zscore_{i,t}$ | $Zscore = \ln \left[\left(ROA + \frac{Equity}{TotalAssets} \right) / \sigma(ROA) \right]$ the sum of the bank's return on assets (ROA) and capital adequacy ratio (CAR) divided by the variance of ROA |
| | Bank’s Network Image Maintenance Ability | $OnLinePresence_{i,t}$ | 1 if Weibo or WeChat is set on the bank's homepage, and 0 otherwise |
| Control variable | Bank Size | $Asset_{i,t}$ | The natural logarithm of total assets |
| | Bank Profitability | $EPS_{i,t}$ | Earnings per share |
| | Bank Type | $Bank_{i,t}$ | 1 if the firm is city commercial bank, and 0 otherwise |
| | Year | $Year_{i,t}$ | The annual values for the period 2009-2017 are 1 to 9 respectively |

4. Empirical Results

4.1 Summary Statistics and Pearson Correlation Analysis

Table 2 provides the descriptive statistics for the variables used in this paper, and table 3 shows the result of Pearson analysis. We find $NETOPINION_{i,t}$ is negatively correlated with $TONE_{i,t}$ and $RiskDensity_{i,t}$, but it is positively correlated with $zscore_{i,t}$. Furthermore, $OnLinePresence_{i,t}$ is negatively correlated with $TONE_{i,t}$ and $RiskDensity_{i,t}$, this results preliminary supported our hypothesis.

Table 2 Summary Statistics

| Variable | Mean | Std. Dev. | Min | Max |
|--------------|-------|-----------|-----|-------|
| $TONE_{i,t}$ | 2.279 | 1.4094 | 0 | 12.31 |

| | | | | |
|------------------------|--------|---------|---|---------|
| $RiskDensity_{i,t}$ | 0.7335 | 0.7335 | 0 | 1.92 |
| $NETOPINION_{i,t}$ | 1.8343 | 2.0875 | 0 | 4.9729 |
| $OnLinePresence_{i,t}$ | 0.4231 | 0.49511 | 0 | 1 |
| $EPS_{i,t}$ | 1.1215 | 0.6719 | 0 | 3.28 |
| $Asset_{t,i}$ | 12.026 | 0.8087 | 0 | 13.4164 |
| $Bank_{t,i}$ | 0.5427 | 0.4992 | 0 | 1 |
| $zscore_{i,t}$ | 4.5726 | 0.7999 | 0 | 8.0789 |

Table 3 The Pearson Analysis

| | $NETOPINION_{i,t}$ | $OnLinePresence_{i,t}$ | $RiskDensity_{i,t}$ | $TONE_{i,t}$ | $EPS_{i,t}$ | $Asset_{t,i}$ | $Bank_{t,i}$ | $zscore_{i,t}$ |
|------------------------|--------------------|------------------------|---------------------|--------------|-------------|---------------|--------------|----------------|
| $NETOPINION_{i,t}$ | 1.0000 | | | | | | | |
| $OnLinePresence_{i,t}$ | 0.0773 | 1.0000 | | | | | | |
| $RiskDensity_{i,t}$ | -0.1748 | -0.2915 | 1.0000 | | | | | |
| $TONE_{i,t}$ | -0.2168 | -0.2182 | 0.7046 | 1.0000 | | | | |
| $EPS_{i,t}$ | 0.176 | -0.1793 | 0.1066 | -0.0031 | 1.0000 | | | |
| $Asset_{t,i}$ | 0.1335 | 0.1404 | -0.1919 | -0.098 | -0.1259 | 1.0000 | | |
| $Bank_{t,i}$ | 0.1594 | 0.0644 | 0.3022 | 0.2013 | 0.0799 | -0.7151 | 1.0000 | |
| $zscore_{i,t}$ | 0.1816 | 0.0175 | 0.1791 | 0.268 | 0.1074 | 0.2849 | -0.0682 | 1 |

4.2 Regression Tests Results

The first is the regression result of the effect of network public opinion attention on bank's risk text information disclosure strategy. Table 4 shows $TONE_{i,t}$ is negatively correlated with $NETOPINION_{i,t}$, which clearly demonstrate that the bank's risk text information disclosure strategy have significant network public opinion attention effect. Meanwhile, $RISK_{i,t}$ is negatively correlated with $NETOPINION_{i,t}$, which shows that the higher network public opinion attention is, the lower bank's risk text information density be disclosed.

Table 4 Bank's Risk Text Information Disclosure Strategy:

The Effect of Network Public Opinion Attention

| | $TONE_{i,t}$ | $RiskDensity_{i,t}$ |
|--|--------------|---------------------|
|--|--------------|---------------------|

| | | |
|----------------------------------|------------------------|------------------------|
| C | -9.143*** (-3.2257) | 0.22 (0.4113) |
| <i>NETOPINION</i> _{i,t} | -0.1109* (-1.6847) | -0.0239** (-1.9197) |
| <i>EPS</i> _{i,t} | 0.1245 (0.753) | 0.0539* (1.8443) |
| <i>Asset</i> _{t,i} | 0.946*** (4.0491) | 0.0405 (0.9287) |
| <i>Bank</i> _{t,i} | 1.0339*** (2.9871) | 0.186*** (3.0711) |
| <i>Year</i> _{t,i} | -0.0614 (-1.339) | -0.0091 (-1.1127) |
| <i>R</i> ² | 0.096778 | 0.131484 |
| Adjusted- <i>R</i> ² | 0.0711 | 0.104 |

Notes: *, **, ***denote significance levels at 10%,5%,1% levels.

Table 5 gives the regression result of the *zscore*_{i,t} joint effect on the bank's risk text information disclosure strategy. It shows that *zscore*_{i,t} is negatively correlated with *TONG*_{i,t}, and significant positive with *RISK*_{i,t}. The bank's risk taking has an incremental joint effect on the tone of bank risk text information.

Table 5 The Joint Effects of Bank's Risk Taking

| | <i>TONE</i> _{i,t} | | <i>RiskDensity</i> _{i,t} | |
|----------------------------------|----------------------------|-----------------------|-----------------------------------|--------------------|
| C | 0.8191 (0.28) | 3.638 (0.9412) | 0.5414 (0.91) | 0.5595 (0.92) |
| <i>NETOPINION</i> _{i,t} | -0.0918* (-1.98) | -0.9148* (-1.9091) | -0.0163* (-1.77) | -0.0321 (-0.58) |

| | | | | |
|---|---------------------|----------------------|---------------------|--------------------|
| $zscore_{i,t}$ | 0.1077* (1.84) | 0.7038* (-1.7306) | 0.0715*** (2.80) | 0.0617* (1.71) |
| $zscore_{i,t}$ $\times NETOPINION_{i,t}$ | | 0.1802* (1.7087) | | 0.0034 (0.29) |
| $EPS_{i,t}$ | -0.02423 (-0.17) | -0.02137 (-0.15) | 0.0307 (1.09) | 0.0353 (1.27) |
| $Asset_{t,i}$ | 0.0974 (0.39) | 0.1835 (0.6459) | -0.0149 (-0.30) | -0.0128 (-0.26) |
| $Bank_{t,i}$ | 0.3713 (1.29) | 0.6706** (2.005) | .124 (2.16) | 0.1231** (2.13) |
| $Year_{t,i}$ | 0.0038 (0.09) | -0.0249 (-0.4947) | -0.0025 (-0.3) | -0.0033 (-0.40) |
| R^2 | 0.0507 | 0.0794 | 0.1472 | 0.1498 |
| Adjusted- R^2 | 0.0139 | 0.03095 | 0.1142 | 0.1112 |

Notes: *, **, ***denote significance levels at 10%,5%,1% levels , respectively.

Table 6 demonstrates that the bank's network image maintenance ability has a joint effect on the bank's risk text information tone strategy, but there is not in the risk text information density strategy.

Table 6 The Joint Effects of Bank's Network Image Maintenance Ability

| | $TONE_{i,t}$ | | $RiskDensity_{i,t}$ | |
|--------------------|-----------------------|----------------------|---------------------|----------------------|
| C | -11.8212 (-4.54) | -11.9064 (-4.60) | -0.9866* (-1.84) | -1.0259* (-1.91) |
| $NETOPINION_{i,t}$ | -0.7341*** (-3.68) | -0.1539** (-2.51) | -0.014* (-1.62) | -0.0249** (-2.03) |

| | | | | |
|--|-----------|------------|------------|------------|
| $OnLinePresence_{i,t}$ | -0.7341* | -1.0175*** | -0.1665*** | -0.2081*** |
| | (-1.84) | (-3.92) | (-4.24) | (-4.00) |
| $OnLinePresence_{i,t} \times NETOPINION_{i,t}$ | | 0.145* | | 0.0209 |
| | | (1.69) | | (1.24) |
| $EPS_{i,t}$ | 0.0778 | 0.0733 | 0.041 | 0.0451* |
| | (0.58) | (0.56) | (1.59) | (-2.03) |
| $Asset_{t,i}$ | 1.1728*** | 1.1902*** | 0.1378*** | 0.1426*** |
| | (5.46) | (5.58) | (3.14) | (3.25) |
| $Bank_{t,i}$ | 1.1157*** | 1.1117 | 0.2565*** | 0.2568 |
| | (3.75) | (3.76) | (4.50) | (4.52) |
| $Year_{t,i}$ | -0.0607 | -0.0597 | -0.0076 | -0.0084 |
| | (-1.56) | (-1.53) | (-1.02) | (-1.11) |
| R^2 | 0.1637 | 0.1762 | 0.1962 | 0.2058 |
| Adjusted- R^2 | 0.1369 | 0.1452 | 0.1683 | 0.1735 |

Notes: *, **, ***denote significance levels at 10%,5%,1% levels, , respectively.

5. Robustness check

First, we use the variable $Regulation_{i,t}$ to proxy the bank's risk supervision stress perception, which is equity to the number of regulation words divided by the number of full text vocabulary, and find it is negatively correlated with $TONE_{i,t}$, but *significant positive with* $RiskDensity_{i,t}$.

Table 7 The Bank's Regulatory Perception Incremental Effect

| | $TONE_{i,t}$ | | | $RiskDensity_{i,t}$ | | |
|--------------------|--------------|----------|-----------|---------------------|---------|-----------|
| | | | | | | |
| C | -1.3493 | 1.3437 | -5.6215** | -0.9344* | 0.58687 | -5.6012** |
| | (-0.53) | (0.45) | (-2.14) | (-1.74) | (0.98) | (-2.12) |
| $NETOPINION_{i,t}$ | -0.0946** | -0.0907* | -0.1448** | -0.2023*** | -0.016* | -0.0911** |
| | (-2.15) | (-1.97) | (-2.41) | (-3.90) | (-1.73) | (-2.13) |
| $Regulation_{i,t}$ | 0.2044* | 0.0279 | 0.1804* | 0.0393* | 0.0274* | 0.0215 |
| | (1.80) | (0.5391) | (1.65) | (1.76) | (1.75) | (0.14) |

| | | | | | | |
|-------------------------------|----------|---------|------------|-----------|----------|------------|
| $zscore_{i,t}$ | | 0.0412* | | | 0.0635** | |
| | | (1.9) | | | (2.27) | |
| Regulation _{i,t} | | 0.0446 | | | 0.0008 | |
| × zscore _{i,t} | | (0.44) | | | (0.04) | |
| OnLinePresence _{i,t} | | | -0.2023*** | | | -0.8286*** |
| | | | (-3.90) | | | (-4.19) |
| OnLinePresence _{i,t} | | | 0.01823 | | | 0.3725* |
| × Regulation _{i,t} | | | (1.08) | | | (1.67) |
| EPS _{i,t} | 0.005 | -0.0302 | 0.039 | 0.0543** | 0.0333 | -0.032 |
| | (0.04) | (-0.21) | (1.52) | (2.06) | (1.20) | (-0.25) |
| Asset _{t,i} | 0.3097 | 0.0717 | 0.1337*** | 0.0516 | -0.0171 | 0.6911*** |
| | (1.52) | (0.29) | (3.04) | (1.24) | (-0.34) | (3.20) |
| Bank _{t,i} | 0.6193** | 0.4039* | 0.2612*** | 0.1794*** | 0.131** | 1.0166*** |
| | (2.27) | (1.70) | (4.61) | (3.22) | (2.27) | (3.65) |
| Year _{t,i} | -0.0268 | 0.0145 | -0.0064 | -0.002 | -0.0016 | -0.0581 |
| | (-0.70) | (0.35) | (-0.86) | (-0.26) | (-0.19) | (-1.55) |
| R ² | 0.0725 | 0.0706 | 0.2177 | 0.1329 | 0.1594 | 0.1597 |
| Adjusted-R ² | 0.0403 | 0.022 | 0.1811 | 0.1029 | 0.1155 | 0.1202 |

Notes: *, **, ***denote significance levels at 10%,5%,1% levels , respectively.

Secently, table 8 shows the robustness check result of explanatory variables and the study period, and the results also have proved the effect of network public opinion attention on bank's risk text information disclosure strategy.

Table 8 The Effect of Network Public Opinion Attention:
Explanatory variable Robustness

| | $TONE_{i,t}$ | $RiskDensity_{i,t}$ |
|--------------------|--------------|---------------------|
| C | -2.26768 | -0.2258 |
| | (-0.75) | (-0.38) |
| $NETOPINION_{i,t}$ | -0.0791* | -0.0135* |
| | (-1.78) | (-1.75) |

| | | |
|--------------------------------------|-----------------------|-----------------------|
| <i>OnLinePresence</i> _{i,t} | -0.7145*** (-3.57) | -0.1699*** (-4.32) |
| <i>zscore</i> _{i,t} | 0.0478* (1.8) | 0.0608** (2.47) |
| <i>Regulation</i> _{i,t} | 0.2* (1.77) | 0.0309 (1.39) |
| <i>EPS</i> _{i,t} | -0.0983 (-0.72) | 0.0138 (0.51) |
| <i>Asset</i> _{t,i} | 0.3958 (1.55) | 0.0581 (1.16) |
| <i>Bank</i> _{t,i} | 0.768** (2.61) | 0.215*** (3.72) |
| <i>Year</i> _{t,i} | -0.0126 (-0.31) | -0.0072 (-0.90) |
| <i>R</i> ² | 0.1407 | 0.2492 |
| Adjusted- <i>R</i> ² | 0.0958 | 0.2099 |

Notes: *, **, ***denote significance levels at 10%,5%,1% levels, respectively

Table 9 The Effect of Network Public Opinion Attention: narrow Study Period Robustness

| 2009-2014 | <i>TONE</i> _{i,t} | | <i>RiskDensity</i> _{i,t} | |
|--|----------------------------|-------------------------|-----------------------------------|-------------------------|
| C | -15.9307*** (-4.6295) | -1.4552 (-0.3081) | -0.8261 (-1.3963) | 0.3251 (0.4138) |
| <i>NETOPINION</i> _{i,t} | -0.3753*** (-3.6036) | -1.5927*** (-2.7703) | -0.1127*** (-6.4333) | -0.2861*** (-2.9928) |
| <i>zscore</i> _{i,t} | | 0.8518* (1.7287) | | 0.0869* (1.65) |
| <i>zscore</i> _{i,t} × <i>NETOPINION</i> _{i,t} | | 0.22* (1.80139) | | 0.0333* (1.6417) |

| | | | | |
|---------------|------------------------|-----------------------|-----------------------|---------------------|
| $EPS_{i,t}$ | 0.3826* (1.9714) | 0.2266 (1.1718) | 0.0834*** (2.6828) | |
| $Asset_{t,i}$ | 1.5661*** (5.42775) | 0.8027*** (2.1919) | 0.1432 (2.9151) | 0.0987* (1.6206) |
| $Bank_{t,i}$ | 1.0137** (2.5726) | 0.3646 (0.9576) | 0.1553 (2.5018) | 0.1045* (1.6543) |
| $Year_{t,i}$ | -0.1256* (-1.6353) | -0.0826 (0.9507) | 0.0133 (1.0537) | -0.0124 (-0.871) |
| R^2 | 0.1915 | 0.2604 | 0.3962 | 0.4687 |
| Adj- R^2 | 0.1619 | 0.2086 | 0.3709 | 0.4319 |

Notes: *, **, ***denote significance levels at 10%,5%,1% levels , respectively

7. Conclusions

Risk text information is an important content of the bank's annual financial report under the dual control of financial regulatory rules and accounting standards. It is also a convenient channel for the bank's risk information transmission with rich connotation and fuzzy manipulation compared with structured financial data. In general, the conclusion of this paper showed complexity effect. Specifically, for the risk text information tone management, the network public opinion attention has significant transparency governance effect on information transmission, which mainly reflects the "information supply" hypothesis. For the risk information density strategy, the network public opinion attention mainly reflects the "information ambiguity" hypothesis.

Reference

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