## Credit Rating Agency Reputation and Rating Inflation:

**Evidence from the Chinese Credit Ratings**

**Abstract**

This paper studies the relationship between the rating agency's reputation and its rating behavior, which analyzes whether the reputation of China's credit rating agencies' reputation has played a constrain role in bond rating. The results show that the rating behavior of China's rating agencies is mainly affected by the market competition of rating agencies, which will prompt rating agencies to inflate bond ratings. Prior to the first bond default (2014), the reputation of rating agency did not make sense, which means it did not constrain the rating agency's rating behavior. After the bond default occurs, the constraining role of the rating agency's reputation come into effect, which reflects that the bond default plays a significant role in the reputation mechanism. This paper supports the theory of rating and purchasing and provides direct evidence for studying the behavior of rating agencies in China.

**Key Words：**Credit rating agencies, Credit rating, Reputation, Rating inflation

**1 Introduction**

In recent years, the high ratings of China's credit rating agencies, the slow update of ratings and the failure to disclose the risk of default in a timely manner have exposed problems such as high incidence of misconduct by rating agencies and lack of reputation, which has caused the market to broadly focus on the effectiveness of the reputation mechanism of the rating industry. In particular, in July 2018, Dagong International Rating Co., Ltd. was sentenced from its rating business for one year due to misconduct, which has aroused social doubts on the reputation of rating agencies.

As a gatekeeper of the credit market, credit rating agencies play an important role in revealing risks and regulatory certification. Their honest and prudent behavior based on reputation is the cornerstone of the stable operation of the bond market. Reputation is the core of this cornerstone and plays a key role in determining the survival and behavioral decisions of rating agencies. As a market participant, the rating agency will make rating decisions based on the information of two dimensions in the process of credit rating. On the one hand, from the rating enterprise dimension, the rating agencies will collect the financial information and non-financial information of the rating companies. Then, using professional models and expert models to process information and provide accurate credit rating. On the other hand, from the rating agency dimension, the rating agencies will revise the rating decisions according to the degree of competition in the rating industry and their own reputation. After the tradeoff and analysis from these two dimensions, the rating agency will publish the final rating to the market (Bloton et al., 2012; Bongaerts et al., 2012).

The development of Chinese bond market is still at its early stages, new issues such as bond defaults have arisen, researches on the behavior of domestic credit rating agencies is relatively rare. A small number of studies have also directly studied using research methods in developed markets such as the United States, partially out of the market reality of Chinese credit rating. It is not possible to accurately measure the effectiveness of credit rating agencies' rating actions. Moreover, China's credit rating market is dominated by rating agencies under the issuer's payment system, market rating agencies are highly homogenized, and externally lacking observable information such as default events to discriminate the reputation of rating agencies, which is quite different from the foreign credit ratings market.

Therefore, this paper will analyze the behavioral motives of credit rating agencies and study the relationship between rating institutions' reputation mechanism and rating behavior based on the actual environment of China's credit rating industry in order to supplementing the research in this area. This paper will analyze the rating agencies' rating behavior from two aspects. One is based on the Rating shopping theory to check whether the competition will inflate rating of Chinese rating agencies. The second is based on the Reputation constrain to determine if the constrain mechanism of the rating agency's reputation is effective. The first innovation of this paper is that it constructs the competition index and reputation index of rating agencies and demonstrates the relationship between China's credit rating behavior and reputation constraints, providing a method for the market to discriminate the reputation of rating agencies. The second innovation is the introduction of China debt rating data for empirical analysis which provides direct evidence of the upward rating of Chinese rating agencies. This research is conducive to deepening the understanding of the rating behavior of Chinese credit rating industry, expanding the research methods of quantitative analysis of the credit rating factors, paving the way for the promotion of China's credit rating research.

The structure of this paper is as follows: the first part is the introduction; the second part is the literature review and background introduction; the third part is the research design and data description; the fourth part is the empirical analysis; the fifth part is the robustness test and the sixth part is the conclusion of this paper.

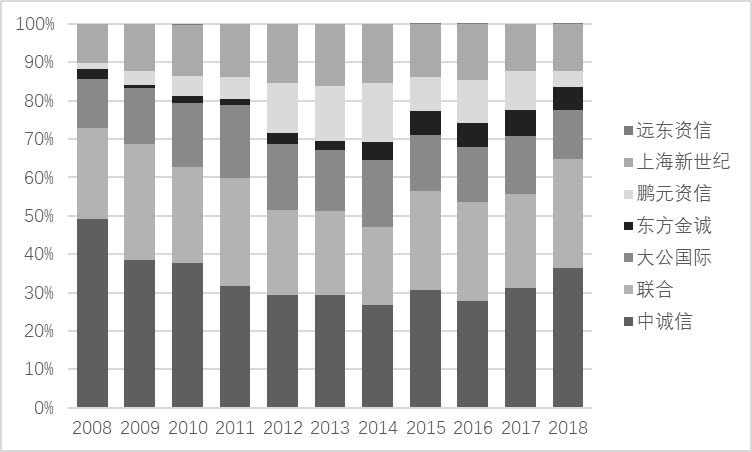
**2 Literature review and background introduction**

Based on the perspective of rating agencies, there are two main mechanisms for determining rating agency rating behavior, rating agency competition mechanism and reputation mechanism. The rating agency competition represents the market conditions of the rating industry, that is, the operating environment of the rating agencies, and the rating agencies will make decisions based on the positioning and reality in the market. Reputation is accumulated by the long-term steady operation of credit rating agencies. It is not only the core competitiveness of rating agencies in the external market competition, but also the soil for their own operation and survival. The function of reputation mechanism will play a crucial role in the behavior of rating agencies (Bloton et al., 2012; Xia, 2014). Therefore, this paper will explore the impact factors and mechanism of the rating agencies' decision-making from the two dimensions of competition and reputation. Moreover, analyzing the upgrade of Chinese credit rating agencies.

Competition is the premise of the market-oriented operation of the rating industry. The degree of competition in the market will directly affect the rating behavior of rating agencies. In the competition process, the rating agencies will sufficiently measure the opponent's strategy to ensure that they can get the most benefit. In foreign studies, there are two factions. Some scholars optimistically believe that competition will prompt the rating agencies pay more attention to the quality of their products and their reputation, thus choosing more prudent behavior for long-term benefits (Goel and Thankor, 2015; Bar-Isaac and Shapiro, 2013; Manso, 2013). However, some scholars believe that in the competitive market, rating agencies will cooperate with issuers in order to guarantee their own market shares, giving higher ratings to gain more market shares, resulting in problems such as rating selection and rating inflation (Camanho et al., 2012). Under the issuer's payment system, such rating upgrade are more common (Hirth, 2014).

China's credit bond rating industry is highly competitive and market share has changed dramatically. Up to December 2018, there are 9 rating agencies in Chinese credit rating market, of which 6 hold the main market share. From Figure 1, it can be observed that accompany with the rapid development of China's bond market, the bond rating industry has presented a trend of multiple developments and intensified competition since 2008. For example, Dagong Global, Union and CCXI took up 87.2% of the market share of credit rating industry in 2008, however, after 2014, five rating agencies were "evenly divided", which showed the intensity of market competition.

Figure 1 Distribution of market share of credit bond rating agencies



Sources from Wind

Reputation is the core asset of rating agencies and the basis for the rating agencies to survive, which can play an important constrain role in their behavior. (Becker and Milbourn, 2011). The reputation of the rating agency can only be achieved through the long-term accumulation. Once the reputation is damaged, it will have an indelible impact on rating agencies. On the one hand, the market will no longer trust the ratings given by the rating agencies, and the function of their ratings in revealing risks, reducing risks and reducing financing costs will decline rapidly, and finally they will be voted away from the market. On the other hand, the regulators will punish the rating agencies for their losing reputation behaviors, such as suspending their rating business. Therefore, the academic circles have reached a consensus on the mechanism of reputation, that is, reputation can regulate the behavior of rating agencies and reduce the bad behavior of rating agencies. Some scholars even believe that the reputation mechanism will make rating agencies tend to downward ratings and refuse to rate for bad companies, making some companies unable to obtain financing and reduce social productivity (Opp et al., 2013). In general, reputation can act as a behavioral constraint for rating agencies and promote prudent rating.

However, in the process of rating China's credit bonds, the role of the reputation mechanism did not make sense. Since the speed of Chinese economic growth has been declining from 2010, the real economy has officially entered a difficult period to compensate for short-boards and adjust structure. However, the proportion of high credit rating of Chinese bonds has been rising. For instance, it can be seen from table 1 that there were 83.2% bonds have AA and above rating degree in 2010, which rose to 92.3% in 2017. In 2018, a year of frequent bond defaults, a large number of bonds are still rated highly. Liu et al. (2018) found that China's credit rating has a strong regulatory dependency problem, and rating agencies give higher ratings to cater to issuers to meet regulatory needs. This paper will focus on solving the problem that whether the reputation mechanism plays a role in the Chinese bond rating process.

Table 1 Changes in the proportion of AA and above rating of credit bonds /%

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
| Proportion | 83.24 | 83.24 | 83.93 | 85.80 | 88.56 | 91.84 | 91.28 | 92.89 | 91.17 |

Source from Wind

Regarding to the reasons for the failure of the reputation mechanism, some foreign literatures have discussed this. Before the subprime mortgage crisis, US rating agencies gave a very high rating for structured financial products. However, after the outbreak of the crisis, the rating agencies rapidly downgraded these products and found that the constraint effect of reputation mechanism was highly correlated with the product category under evaluation. Traditional bond rating products have consistently maintained a stable rating throughout the whole process of financial crisis, but in the case of the emerging structured products, the rating agencies' criteria were notably loose (Rablen, 2013; Mathis et al, 2009).

Since the subprime mortgage crisis, foreign scholars have increasingly studied the behavior of rating agencies. They have studied the rating behavior of rating agencies from multiple dimensions such as rating selection and rating upgrade. China's related researches are mostly analyzed from the market influence of rating agencies (Liu and Luo, 2011; Liu et al., 2018;), He and Jin (2009) first explored the market role of credit ratings. Wang and Zhang (2013) found that the higher reputation rating agencies can significantly reduce the financing costs of bonds. Kou et al. (2015) analyzed the impact of competition on the rating effectiveness of rating agencies. Huang et al. (2017) studied the reputational impact of rating agencies from the perspective of rating agency default events and provided realistic evidence for rating selection. Xing et al. (2016) conducted a systematic summary and analysis of the reputational impact of rating agencies. Most of the above conclusions are discussed from the perspective of the effectiveness of rating agencies, and there is a lack of direct evidence for the study of the internal behavior of rating agencies, which will be supplemented in this paper.

**3. Empirical design and data description**

**3.1 Empirical design**

China's credit rating industry is dominated by the issuer's payment system, and the business homogenization of rating agencies is serious. The main income of credit rating agencies comes from the rating service fee after the bond issuance. However, the numbers of companies that need to be rated in the market is relatively limited, and the highly overlapping sources of income will further intensify competition among rating agencies.

Under the bond issuance approval system, the bond issuer must reach a certain rating to be eligible for bond issuance, while the rating agencies can only obtain the rating income after the issuance of bonds if they give the issuer a satisfactory rating. With the intensification of market competition, rating agencies, as the companies that pursue earnings and is responsible for its own profits and losses, are under the pressure of market share and revenue. Therefore, rating agencies will be motivated to carry out more rating upgrades to gain more market share and revenue. The discussion so far points to the following hypotheses:

**Hypothesis 1**: In the rating industry that is homogenized by the rating agencies, the more intense the market competition, the rating agencies will carry out more rating upwards.

Mathis et al. (2009) 's work on triggering factors of reputation mechanism has provided the fundamental design concepts of this thesis. In the process of structured product rating before the subprime mortgage crisis, there was a premise that the reputation mechanism constraints are invalid that is the market lacks rating product default information. Specifically, this type of derivatives did not have a large number of defaults before, and the market could not identify the existing product ratings, nor could it judge the reputation of the rating agencies.

In such a rating market, market information is heavily asymmetrical. On the one hand, only rating agencies know the true state of the rating products, and even the rating agencies can not accurately measure their risks. On the other hand, market investors lack analytical materials to compare and evaluate the products. Investors cannot understand the authenticity of the products evaluated and cannot judge the behavior of the rating agency. Based on these two reasons, the reputation mechanism of the rating agency is invalid. Through the analysis of the reputation mechanism’ failure of structured product rating institutions, it can be compared with the inflate rating and the failure of reputation mechanism of Chinese bond market. The failure of reputation mechanism mainly caused by three reasons. First, the default of credit bonds is not frequent, so that the validity and accuracy of rating agencies cannot be measured efficiently. Second, the rating mainly plays the role of regulatory compliance, but the function of reflecting market information, disclosing risks and pricing risk has not been fully played. Third, the rating agencies do not pay attention to the rating tracking and risk warning after the issuance.

In short, the failure of the reputation mechanism is essentially due to the rigid redemption is not completely broken. The occurrences of default are more similar to the accidental events. The market cannot accurately judge the behavior of the rating agency. Based on this motivation, the rating agency will have a bigger willing to raise the rating of the companies and conduct a lost reputation act to attract more customers to obtain higher business income.

**Hypothesis 2**: Before the default events break out, reputation mechanism could not play its constraint role. The rating agencies with low reputation tend to conduct more rating upgrades.

If Hypothesis 2 is true, it indicates many misconducts in Chinese bond rating market and the failure of the reputation mechanism are due to the lack of the default events. After default events occurs, the reputation mechanism will begin to play a binding role. When the rating agency's lying rating behavior can be recognized by the market, both external investors and regulators will rate and penalize the bad behavior of the rating agencies. The rating agencies will face huge pressure from both market and regulatory, forcing the rating agencies to pay attention to their reputation. Rating agencies will adopt a prudent rating to reduce their reputational risk.

**Hypothesis 3**: After the outbreak of default events, the market can judge the reputation of rating agencies, meanwhile, rating agencies will start to restrict behavior of rating upgrade.

To further verify that the default events act as core factor in the reputation mechanism, the default ratio indicator will be used to characterize the reputation of the rating compaies and give intuitive evidence of the role of the reputation mechanism. When other conditions remain unchanged, the higher the proportion of defaults on rating agencies' rating bonds, the greater the damage to reputation. At this time, the reputation mechanism of rating agencies will face both regulatory and market pressures, and rating agencies are willing to conduct more prudent ratings behavior. The constraint role of the reputation mechanism will begin to materialize.

**Hypothesis 4**: The higher the default rate of the bond, the rating agencies will be more worried about the reputation damage, the reputation mechanism will further constrain the rating agency's rating upward behavior.

**3.2 Empirical methods**

To verify the four hypotheses proposed, the model used for empirical regression will be set as follow. This paper will explore the impact of rating agency competition and reputation on credit rating results through rating agency behavior and corporate dimension indicators to verify whether China's reputation mechanism is effective. In view of the fact that the explanatory variables are ordinal indicators, the model will mainly be adopted here is the Ordered-logit model.

For the verification of Hypothesis 1, we will use Formula 1 to verify the impact of market competition on the credit rating of rating agencies.

|  |  |
| --- | --- |
|  | （1） |

The interpreted variable in Formula 1 is the frim rating and bond rating when bond i issued, which is represented in order. is the market competition index of the bond rating agency p in the last year, which is measured by HHI index and market share of the rating agency?

is the controlling variable related to the issuer such as bond enterprise attributes and financial indicators. is the bond-related controlling variable such as bond issuance duration and amount. Controls are other controlling variables such as economic environment, bond type, industry variable and year fixed effect. If the market competition of the rating agencies still significantly improves the bond rating after controlling the corporate dimension factors such as the bond issuer's attributes and financial indicators, then the assumption 1 is verified.

After verifying the impact of the rating agency's competition index on the rating agency's credit rating, the new reputation indicator is introduced to verify the validity of the reputation mechanism, and the Formula 2 is introduced.

|  |  |
| --- | --- |
|  | （2） |

is the reputation variable of the rating agency p last year, which selects the rating upgrade index of the rating agency to characterize the reputation of them. In this paper, the impact of the reputation mechanism to rating agencies on the credit rating process will be test by full-sample regression and time-separated sample regression. After controlling the non-rating institutions index, if the companies with more lost reputation behaviors will give higher credit ratings, it means the reputation mechanism cannot play a constraint role, then hypothesis 2 is verified.

As mentioned above, the occurrence of default events is a key factor for the effectiveness of reputation mechanism. Based on this, this paper will take 2014 as the segmentation point to further explore the role of reputation mechanism. If it is found that the agencies with higher reputation will significantly downgrade bond rating after the occurrence of default, then it represents the rating agency will start to pay attention to its reputation behavior and the reputation mechanism will come into play, which means Hypothesis 3 is verified.

On this basis, this section will use the rating upgrade indicators to test forecasting ability of default. If the rating upgrade cannot predict the credit risk of the bond, it can reveal that the rating upgrade is based on the influence of other factors. The risk revealing effect of rating cannot be realized, which partly explains the rationality of the rating increase as a reputation indicator. Furthermore, this section will conduct a simple empirical analysis of the rating agency's reputation indicators and market share. If the market shares of rating agencies are higher while the rating upgrade behaviors are increased in the next year after controlling the time effect and other factors, then it indicates that the reputation behavior of rating agencies can bring benefits to rating agencies, which provides evidence for the motivation of rating upgrade from the side.

In addition, in order to verify the significant impact of default in the reputation mechanism, this paper will continue to introduce the proportion of default bonds as a reputation indicator to supplement the reliability of the above-mentioned reputation indicators. According to the empirical design mentioned above, the higher the default rate of the rating agencies, the more pressure the rating agencies will face from investors and regulators and will be more worried about the reputation damage. If the empirical results show that the coefficient of default ratio of the rating agencies is significantly negative, then Hypothesis 4 is verified.

Finally, the direct use of bond rating indicators as an explanatory variable to characterize the rating agency's rating behavior may have some endogenous problems. Therefore, the above-mentioned regression models strictly control the related indicators of rating agencies. In order to further enhance the reliability of hypothesis test, this paper will introduce the difference between external rating and internal rating as the explanatory variables for robustness testing. Then introduced Formula 3.

|  |  |
| --- | --- |
|  | （3） |

Where is the difference between the external rating and the internal rating accepted by the same bond entity. Because the behavior of internal rating agencies is not interfered by the market, the rating model is relatively stable and unified. After the control of other impact factors, the change in the explanatory variables can better verify the impact of rating agency competition and reputation mechanism on rating upgrade behavior.

As mentioned above, the determination of rating is determined from both the dimension of rating enterprises and the dimension of rating agencies. Therefore, this paper will integrate the variables of enterprise dimension with reference to the setting of previous traditional rating models, so as to control the influence of enterprise dimension on rating results, and thus check the influence of rating agencies' behaviors on credit rating.

In terms of specific model methods, this paper will carry out ordinal transformation of the rating letter grades and use order-logit model for empirical regression.

**3.3 Data Introduction**

According to China's realistic bond classification and the business characteristics of rating agencies, Chinese credit bonds are mainly divided into five categories: general corporate bonds, corporate bonds, medium-term notes, placement tools, and commercial papers. This paper will select the bond issuance rating data of Chinese general corporate bonds, corporate bonds and medium-term notes from 2009 to 2017 as a research sample, which excludes urban investment bonds and financial corporate bonds, and the data sample frequency is annual. In order to eliminate the endogeneity of the model, this paper will introduce China bond credit rating data to match the previous samples to enhance the reliability of the model. Most of the bond issuance rating data are obtained from the Wind database. The annual GDP data are obtained from China statistical yearbook, and the China’s bond credit data are obtained from the Wind database.

Table 2 represents the distribution of the time and quantity of issued credit bond samples. It can be observed that Chinese credit bond market has achieved tremendous development since 2009, showing the characteristics of rapid growth in the number and amount of bond issuance. With the rapid development of the bond market, as a bond certification threshold, the credit rating business has also achieved rapid development, which provides a research basis for exploring the market behavior and reputation mechanism of credit rating agencies.

Table 2 Distribution of time and quantity of credit bond issuance samples

|  |  |  |
| --- | --- | --- |
| Year | Number of bonds issued | Amount of bonds issued (100 million yuan) |
| 2009 | 405 | 10899.88 |
| 2010 | 443 | 8960.2 |
| 2011 | 707 | 11112.61 |
| 2012 | 1390 | 17681.94 |
| 2013 | 1278 | 13445.225 |
| 2014 | 1770 | 18152.2086 |
| 2015 | 2099 | 26431.629 |
| 2016 | 3653 | 45084.98 |
| 2017 | 2493 | 25125.641 |
| Total | 14238 | 176894.3136 |

In this empirical analysis, there are the following categorization od dependent factors: the bond rating variable, which mainly includes the firm rating and bond rating data of the evaluated company; the rating agencies dimensional explanatory variables, including the competition indicators and the reputation variable of the rating agency; rating enterprise dimensional control variable and the external economic environment control variables, including the financial indicators and non-financial indicators of the issuer's enterprise, the bond characteristics such as the number and the maturity of bond, and other external economic environment characteristic variables such as the growth rate of the national and provincial GDP.

**(1) Bond rating variable**

Credit rating variable (Rating), which is the explanatory variable of this paper, will be measured respectively by the FirmRating and the BondRating of the subject of bond at the issuing time. According to the "Specification for credit rating in the credit market and inter-bank market" promulgated by the People's Bank of China and the credit rating division method of each rating agency, perform ordinal conversion of the letter rating of the FirmRating and the BondRating (AAA, AAA-, AA+, AA, AA- , A+, A, A-, BBB+, BBB, BBB-, BB+, BB, BB-, B+, B, B-, CCC, CC, C) from high to low.

**(2) Explanatory variables of rating agency dimension**

The market competition variable is the main tool to verify the impact of market competition on the behavior of rating agencies. This paper will perform two types of indicators to measure.

The first category is the market competition degree variable. This paper is characterized by the Herfindahl index, which is measured by the number of rating bonds of rating agencies. The Herfindahl-Hirschman Index is a comprehensive index for measuring industrial concentration, which measures the degree of competition in the industry by the sum of square of the respective market subject as a percentage of total industry revenues. The higher the HHI index, the higher the concentration of enterprises on behalf of the industry which representing the stronger the monopoly and the smaller the market competition, and vice versa.

The second category is the market share variable of rating agencies. In this paper, the market share of the bonds rated by rating agencies in the previous year is directly used to calculate. As mentioned above, market share is often used as the representation of reputation mechanism in foreign investment banks’ and accounting firms’ behavior research. As China's rating industry has not yet formed the situation of rating agency selection through reputation, market share more represents the profit motive of rating agencies. In the case of homogenization of rating agencies' business, in order to maintain a higher market share, rating agencies will be more motivated to inflate rating to attract customers.

In terms of the design of reputation variables, different from previous literatures, this paper will construct two new types of variables to represent the reputation of rating agencies. As mentioned in the research method, the method to use market share to represent reputation in traditional researches is unscientific, hence it is necessary to construct reputation indicators that are more consistent with the reality of China's rating industry.

The core of the empirical analysis in this paper is the construction of reputation indicators. Most of the previous researches on credit rating reputation in China used market share, a widely used indicator abroad as a representation of reputation indicators. However, using market share to characterize reputation indicators is not appropriate. The specific reasons are as follows. First, the premise of using market share to characterize reputation is that the degree of market competition in the industry is relatively perfect, and there is sufficient information in the external market to judge the behavior of the rating agencies, thereby generating market selection behavior. In this process, the reputation of the rating agencies has been accumulated, and finally the excellent rating agencies have gained a higher market share. But Chinese credit rating agencies mainly play the role of regulatory certification. Markets and rating agencies pay more attention to the ratings of bond issuance. The focus on rating quality is not strong, so the market competition system in the rating industry is not perfect. Second, bond credit risk disclosure is the main job of rating agencies, but credit bond defaults are not common. The effectiveness and accuracy of rating agencies cannot be easily measured. The market lacks sufficient materials and information to discriminate the reputation of rating agencies. In the case that market information is not completely symmetrical, and the market rating cannot be judged, the rating agencies will not be able to obtain reputation incentives and accumulation. The rating agencies can only switch to higher market share to make profit. Therefore, with the existence of rigid payment and low frequency of default, market is more about the reflection of competition and profit motive of rating agencies, meanwhile, has nothing to do with reputation. As a result, this paper will construct a new index to represent the reputation of rating agencies.

The first category of reputation behavior indicator is the rating agency bond rating upgrade proportion. Since 2009, Chinese economic situation has gradually moved down to the crucial period of economic restructuring with five priority tasks which are “cutting overcapacity, de-stocking, de-leveraging, reducing costs and improving weak links”. The GDP growth rate has gradually decreased from 9.4% in 2009 to 6.8% in 2017. However, the number of China's bond rating upgrades are growing. s shown in table 4, the number of upgrading firms is much higher than the number of downgrading firms. This trend has not been curbed until 2017, when credit defaults occur frequently, and credit risks are exposed. There are two main reasons for rating agencies to upgrade their ratings instead of downgrade ratings. The first reason is that regulatory standards are becoming more stringent, thus rating agencies need to upgrade the ratings to make rating companies more compliant. For example, China Securities Depository and Clearing Corporation issued a statement to upgrade the bond repurchase agreement rating on December 8, 2014. After that, if rating enterprises cannot obtain AAA bond rating and main rating of AA and above, they will withdraw from the pledge treasury. This will have a bad impact on the bond price and the financing cost of enterprises in the future. Therefore, rating agencies will have the incentive to help rating companies upgrade their ratings to meet the requirements of regulation. The peak was reached in 2015 with a large number of firm rating upgrades. This kind of behavior is one of the main reasons for the regulatory policies failure. Another reason is that under the environment with homogenous competition in China, rating agencies' downgrading of enterprises will lead issuers to choose other rating agencies for cooperation, resulting in losing earning. To sum up, the indicators of rating upgrade can partly reflect the motivation of rating agencies to cater to rating companies. As ratings are generally upgrade in China, this behavior can be regarded as one aspect of the reputation behavior of rating agencies, so as to depict the reputation of rating agencies. The premise of this inference is that the service objects of each rating agency are roughly the same level, without the problem of adverse selection caused by the relatively strong rating company. This paper will strict control the factors of the rating enterprise dimensional in the model, eliminate the influence of this aspect. Moreover, providing the evidence of market share with rating upgrade behavior and default forecast to enhance the reliability of the model.

Table 3 Main rating adjustment data table of rating agencies

|  |  |  |
| --- | --- | --- |
| Year | Upgrade | Downgrade |
| 2009 | 901 | 20 |
| 2010 | 868 | 8 |
| 2011 | 781 | 32 |
| 2012 | 635 | 138 |
| 2013 | 725 | 284 |
| 2014 | 1288 | 318 |
| 2015 | 5915 | 698 |
| 2016 | 5016 | 975 |
| 2017 | 1816 | 870 |
| Total | 17945 | 3343 |

Source from Wind

The second type of reputation indicator is the proportion of default bonds of rating agencies. According to the above model derivation and the conclusion of relevant foreign literatures, it can conclude that default event is the key core of the effectivity of rating agencies’ reputation. Specifically, default event is an important tool for external to measure rating agencies, as well as an intuitive reflection of the reputation of rating agencies. The construction of this indicator is mainly based on the following two reasons. First, from the accuracy of rating default, two international rating agencies Moody's and S&P issue default probability reports of different rating levels each year. The reputation of the rating agency is characterized by publishing the default probability of different rating levels. Specifically, when the default probability of a rating agency's high rating is lower than the low rating, it indicates that the rating agency has a pretty strong predictive ability, and the credit rating has a stronger discriminating power to characterize its reputation. However, the 98% of the bonds defaulted in China are rated AA and AA+. The probability of default between different ratings is relatively difficult to calculate. But due to the same rating letters used by Chinese rating agencies to classify, the proportion of default bonds can be used to characterize the reputation of each rating agency horizontally. Second, the construction of this indicator also influenced by the impact of default events. Chinese default events are relatively scarce. When rigid redemption still exists, default is an important risk event that is concerned by the market and will have a direct impact on the reputation of rating agencies. The external will also use this as a basis for judging the rating agency’s reputation and rating behavior. Since the Chinese bond default originated in 2014, the data sample duration is 2014- 2017, which is relatively short. The introduction of this variable is mainly to further enhance the credibility of the first type of reputation indicators and provide the setting standard for time-series sample regression.

It is worth noting that there may cause some endogenous problems by using rating upgrade as a sign of the impropriety of China's credit rating agencies. It may be that in recent years, approval standards for issuing bonds have become more rigorous so that issuers are more qualified, leading to the rise of market ratings. This section will attempt to eliminate this problem in two aspects.

First, in the empirical analysis, by controlling the year and the financial information of the rated enterprises, eliminating the influence of enterprises' own factors on the behavior of rating agencies.

Second, this paper will introduce internal rating (Chinese debt credit rating) as the rating benchmark in the robustness test and use the difference between external rating and internal rating as the explained variable to provide the basis for agencies to upgrade rating from the side. To be specific, Chinese Debt Credit Rating Company is an internal rating agency established by China inter-bank association, which adopts the mode of investors' payment. Under this payment method, the function of competition and reputation mechanism is different from the issuer approval system, and the constraint of reputation mechanism will become stronger. A bond issue needs to be rated by external rating agencies in order to get the qualification issuance, meanwhile, the bond is also rated by an internal rating agency. The difference in internal and external ratings provide evidence for behavioral inquiry of different rating agencies. Because Chinese Debt Credit Rating Company is the only internal rating agency, its rating model and rating method are relatively uniform. The difference between the external rating and the internal rating is more reflected in the impact of the rating agency's behavior. This data sample provides direct evidence to prove the upward rating of China's rating agencies and the lack of reputation mechanism, which can partially solve the measurement error caused by the endogeneity of the sample. This method is partly based on Xia (2014).

**(3) Rating firm dimensional control variables and external economic environment control variables**

The establishment of the rating firm dimensional control variable is mainly to control the influence of the enterprise dimension information on the rating result. The selection of the firm dimensional control variables will be based on the impact factors of the rating agencies’ model in the literature review (Shumway, 2001; Huang et al., 2017). The financial indicators of the issuing company are, Leverage, Sleverage, Cover, Growth, Size, Roe, CASH, and CFO. The characteristics of the issued bonds are Duration, Amount, Type, Big4, and Guarantee. External economic environment indicator is GDP.

This paper collected credit bond rating data in 2009-2017, covering all general corporate bonds, medium-term notes, and corporate bonds issued during the sample period, excluding financial corporate bonds, city-related bonds (defined by Wind and the main subject of issued bond is the local financing platform), which resulted in an observation of 14258 bond issuance data. After removing missing values of rating information and financial information and extreme values, a total of 10,979 valid sample values were obtained in the period.

Table 5 reports the statistical description of the main data indicators in this paper. Among them, FirmRating and BondRating are the subject rating and debt rating at the time of bond issuance. From the mean value of rating indicators, it can be observed that the rating level of Chinese bonds is relatively high. Specifically, the average level of FirmRating is AA and the average rating of the BondRating corresponds to AA+.

Table 4 Statistical description of the data

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variable |  | Observation | Average | Standard deviation | Minimum | Maximum |
| FirmRating |  | 10,979 | 5.668 | 1.342 | 0 | 8 |
| BondRating |  | 10,979 | 6.022 | 1.251 | 1 | 8 |
| List |  | 10,979 | 0.185 | 0.388 | 0 | 1 |
| Nature |  | 10,979 | 0.775 | 0.417 | 0 | 1 |
| Duration |  | 10,979 | 5.064 | 1.873 | 0.986 | 15 |
| Amount |  | 10,979 | 2.211 | 0.800 | -3.507 | 5.298 |
| Leverage |  | 10,979 | 56.93 | 17.22 | 0.314 | 97.96 |
| Cover |  | 10,979 | 138.4 | 176.1 | -65.6 | 274.5 |
| Growth |  | 10,979 | 36.41 | 302.1 | -100 | 19,220 |
| Size |  | 10,979 | 24.01 | 1.327 | 15.53 | 29.77 |
| Roe |  | 10,979 | 6.517 | 9.130 | -54.3 | 49.3 |
| Sleverage |  | 10,979 | 33.43 | 17.91 | 0.0157 | 93.56 |
| Cash |  | 10,979 | 0.114 | 0.0768 | 0.035 | 0.789 |
| CFO |  | 10,979 | 0.0124 | 0.0707 | -0.874 | 0.456 |
| Big4 |  | 10,979 | 0.0671 | 0.250 | 0 | 1 |
| Guarantee |  | 10,979 | 0.245 | 0.510 | 0 | 1 |
| Share |  | 10,979 | 20.85 | 8.450 | 0.0608 | 50.52 |
| HHI |  | 10,979 | 0.214 | 0.0298 | 0.190 | 0.345 |
| Repu (Up) |  | 10,979 | 0.106 | 0.0699 | 0 | 0.493 |
| Repu (Default) |  | 6,642 | 0.00312 | 0.00379 | 0 | 0.0148 |
| Repu (Default) |  | 6,642 | 0.00166 | 0.00231 | 0 | 0.0091 |

The sample selection starts at 2009 because the Chinese bond market began to develop rapidly in 2008, providing the possibility to calculate the competition and reputation indicators of rating agencies. The market data used in the 2009 rating samples was measured in 2008.

The way to screen the extreme values is to shrink 1% of the overall data of financial indicators.

It should be noted that, for example, the HHI index and the market share index are measured by using the full sample data rather than valid samples. Reputation indicators like Repu(up) are calculated by the sample number of market stock of bonds in the current year, rather than the number of valid samples.

**4 Empirical results**

**4.1 Rating Agencies’ Competition and Bond Rating**

According to the results of the previous theoretical model, the competition will prompt the rating agencies to choose the lying behavior (rating upgrade). Using Ordered-logit regression according to the formula (1), the empirical results shows in the Table 5. Comparing regression (1) with regression (2), after controlling the indicators from bond-issuing campany dimension, the market concentration index of rating agencies will significantly reduce the credit rating. Its estimation coefficient is significantly negative at 1%, reflecting the degree of market competition will significantly increase the rating given by rating agencies. Similar to the conclusion of the above model, fierce market competition will prompt rating agencies to choose more aggressive rating behaviors. On this basis, the market share of rating agencies is introduced for further empirical regression and the results are as follows regression (3)-(4). After controlling the bond issuers and bond characteristics, the rating agencies with higher market share will significantly give higher market rating. This indicates that in the context of the homogenization of rating agencies, market share is the embodiment of competition between rating agencies, and rating agencies will tend to give higher firm ratings to maintain a higher market share. But the above conclusion may be caused by the fact that the debt-issuing companies with better fundamentals have chosen a rating agency with a higher market share, which is due to the sample self-selection. In this regard, this paper will make the robustness test later for analyzing. In summary, the results of regression (1)-(4) show that the more intense the market competition, the rating agencies tend to give higher credit ratings. And higher the market share of agencies, the more incentive rating companies have to upgrade credit rating to maintain higher market share. Hypothesis 1 is verified.

In terms of control indicators, the role of corporate attribute indicators and financial indicators on credit ratings is similar as in previous literatures. State-owned enterprises and listed companies have higher credit ratings, mainly because these two types of enterprises have more government support and capital sources than others. Such enterprises can have more financing channels to solve the problem of fund repayment, so that bond credit risk is lower and should have a higher credit rating.

Table 5 Impact of market share on bond credit rating under competitive mechanism

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) |
| VARIABLES | FirmRating | BondRating | FirmRating | BondRating |
| HHI | -4.233\*\*\* | -8.765\*\*\* | -4.457\*\*\* | -7.903\*\*\* |
|  | (-4.206) | (-7.884) | (-3.800) | (-6.074) |
| Share |  |  | 0.00672\*\*\* | 0.00950\*\*\* |
|  |  |  | (3.945) | (5.133) |
| Nature | 1.635\*\*\* | 1.711\*\*\* | 1.673\*\*\* | 1.744\*\*\* |
|  | (24.47) | (24.04) | (24.44) | (23.88) |
| List | 0.649\*\*\* | 0.773\*\*\* | 0.628\*\*\* | 0.745\*\*\* |
|  | (9.544) | (10.55) | (9.035) | (9.951) |
| Size | 1.596\*\*\* | 2.343\*\*\* | 1.593\*\*\* | 2.355\*\*\* |
|  | (50.66) | (52.73) | (48.93) | (51.33) |
| Roe | 0.0227\*\*\* | 0.0390\*\*\* | 0.0234\*\*\* | 0.0391\*\*\* |
|  | (7.432) | (12.32) | (7.454) | (12.03) |
| Leverage | -0.0355\*\*\* | -0.0388\*\*\* | -0.0344\*\*\* | -0.0385\*\*\* |
|  | (-14.38) | (-14.47) | (-13.45) | (-13.82) |
| Sleverage | 0.0221\*\*\* | 0.0192\*\*\* | 0.0227\*\*\* | 0.0203\*\*\* |
|  | (10.22) | (8.184) | (10.17) | (8.385) |
| Cash | 0.624\* | 2.110\*\*\* | 0.579 | 2.026\*\*\* |
|  | (1.803) | (5.786) | (1.635) | (5.417) |
| CFO | 2.573\*\*\* | 3.002\*\*\* | 2.769\*\*\* | 3.025\*\*\* |
|  | (6.501) | (7.388) | (6.781) | (7.233) |
| Cover | -3.26e-06 | 4.00e-07 | -3.05e-06 | 5.06e-07 |
|  | (-0.703) | (0.0823) | (-0.643) | (0.104) |
| Growth | 4.88e-05 | 4.54e-05 | 3.03e-05 | 3.45e-05 |
|  | (0.645) | (0.561) | (0.389) | (0.424) |
| Big4 |  | 0.714\*\*\* |  | 0.721\*\*\* |
|  |  | (6.740) |  | (6.688) |
| Guarantee |  | -1.380\*\*\* |  | -1.395\*\*\* |
|  |  | (-23.15) |  | (-22.14) |
| Amount |  | 0.420\*\*\* |  | 0.418\*\*\* |
|  |  | (9.529) |  | (9.278) |
| Duration |  | 0.170\*\*\* |  | 0.173\*\*\* |
|  |  | (9.042) |  | (8.952) |
| Time | Control | Control | Control | Control |
| Industry | Control | Control | Control | Control |
| Type of Bond | Control | Control | Control | Control |
| Number of samples | 9,370 | 9,370 | 9,370 | 9,370 |
| R-squared | 0.288 | 0.485 | 0.294 | 0.492 |

Notice: The values in parentheses are z test statistic, \*\*\* represents significant at 1% level, \*\* represents significant at 5% level, \* represents significant at 10% level.

**4.2 Reputation Mechanism and Bond Rating**

**(1) Rating companies’ reputation-related behavior and bond rating**

Firstly, according to formula (11), the role of the reputation mechanism is tested to verify that the reputation mechanism of Chinese rating agencies is invalid before the default event happens. The relevant results are shown in Table (6). By comparing regression 1 and regression 4, the empirical results show that after controlling the company dimension index and the rating agency competition index, the reputation behavior of upgrading rating by agencies will significantly affect the firm rating of the rating bond. The reputation behavior and firm rating are significantly positive at the 1% confidence level. According to the previous assumptions, this indicates that the more the rating agency's reputation behavior, the higher the firm rating will be given in the next year, which means that the reputation mechanism is ineffective in constraining the rating agencies’ behavior. At the same time, in the full sample, the rating agency's reputation behavior did not have a significant impact on the bond rating. However, this conclusion cannot fully explain that the reputation mechanism of the rating agencies is invalid. There are two possibilities for this situation. One possibility is that the selected reputation indexes do not represent the reputation of the rating agencies. It is the influence of some unknown factors. This paper will introduce the default indicator later and conduct a sub sample regression analysis. The second reason could be that the companies with higher rating upgrade will have higher fundamentals in the next year, resulting in endogenous problems. This paper will analyze this in the robustness test.

Table 6 Impact of upgrade behavior on bond credit rating under the reputation mechanism

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | （1） | (2) | （3） | （4） |
|  | Subject rating | Subject rating | Debt rating | Debt rating |
| Variables | Whole sample | Whole sample | Whole sample | Whole sample |
| Repu (Up) | 1.507\*\*\* | 1.670\*\*\* | 0.280 | -0.156 |
|  | (3.472) | (3.940) | (0.600) | (-0.342) |
| HHI |  | -4.536\*\* |  | -9.855\*\*\* |
|  |  | (-2.383) |  | (-4.676) |
| Share |  | 0.00830\*\*\* |  | 0.0101\*\*\* |
|  |  | (4.731) |  | (5.263) |
| Nature | 1.507\*\*\* | 1.676\*\*\* | 2.012\*\*\* | 1.742\*\*\* |
|  | (3.472) | (24.24) | (26.03) | (23.57) |
| List | 1.804\*\*\* | 0.602\*\*\* | 0.753\*\*\* | 0.733\*\*\* |
|  | (25.23) | (8.553) | (10.05) | (9.659) |
| Size | 0.601\*\*\* | 1.604\*\*\* | 2.414\*\*\* | 2.371\*\*\* |
|  | (8.658) | (48.38) | (52.07) | (50.77) |
| Roe | 1.617\*\*\* | 0.0236\*\*\* | 0.0390\*\*\* | 0.0389\*\*\* |
|  | (49.90) | (7.376) | (11.97) | (11.71) |
| Leverage | 0.0235\*\*\* | -0.0339\*\*\* | -0.0366\*\*\* | -0.0385\*\*\* |
|  | (7.486) | (-13.08) | (-13.22) | (-13.60) |
| Sleverage | -0.0336\*\*\* | 0.0232\*\*\* | 0.0164\*\*\* | 0.0208\*\*\* |
|  | (-13.28) | (10.29) | (6.746) | (8.472) |
| Cash | 0.0205\*\*\* | 0.610\* | 1.768\*\*\* | 1.990\*\*\* |
|  | (9.197) | (1.695) | (4.716) | (5.225) |
| CFO | 0.359 | 2.690\*\*\* | 2.495\*\*\* | 2.951\*\*\* |
|  | (1.012) | (6.497) | (5.936) | (6.938) |
| Cover | 2.228\*\*\* | -3.75e-06 | 2.29e-07 | 5.17e-07 |
|  | (5.473) | (-0.810) | (0.0479) | (0.106) |
| Growth | -4.12e-06 | 3.69e-05 | 3.26e-05 | 4.04e-05 |
|  | (-0.910) | (0.478) | (0.398) | (0.490) |
| Big4 |  |  | 0.595\*\*\* | 0.696\*\*\* |
|  |  |  | (5.436) | (6.313) |
| Guarantee |  |  | -1.389\*\*\* | -1.382\*\*\* |
|  |  |  | (-22.34) | (-21.50) |
| Amount |  |  | 0.419\*\*\* | 0.424\*\*\* |
|  |  |  | (9.297) | (9.277) |
| Duration |  |  | 0.176\*\*\* | 0.183\*\*\* |
|  |  |  | (9.038) | (9.289) |
| Time | Control | Control | Control | Control |
| Industry | Control | Control | Control | Control |
| Type of Bond | Control | Control | Control | Control |
| Number of Sample | 9,370 | 9,370 | 9,370 | 9,370 |
| R-squared | 0.294 | 0.296 | 0.496 | 0.495 |

Notice: The values in parentheses are z test statistic, \*\*\* represents significant at 1% level, \*\* represents significant at 5% level, \* represents significant at 10% level.

According to the results of the theoretical model, the emergence of default events is the core condition for rating agencies to choose an honest strategy. Before the default, the constraints of rating agencies' honest rating behavior are difficult to achieve. The first default of Chinese credit bonds appeared in 2014. The specific distribution of default bonds is shown in Table 7. On the one hand, the emergence of bond default events provides a basis for the external evaluation of the rating agencies' reputation. On the other hand, it will also cause rating agencies to start worrying about their reputational damage, and reputation mechanisms may begin to play a role.

Table 7 Distribution of time and quantity of default bonds

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | Number of bonds | Number of defaulted bonds | Number of companies | Number of defaulting companies | Proportion of defaulting companies |
| 2014 | 6281 | 5 | 1880 | 4 | 0.21% |
| 2015 | 7946 | 24 | 1942 | 21 | 1.08% |
| 2016 | 11302 | 51 | 3100 | 23 | 0.74% |
| 2017 | 9041 | 35 | 1982 | 10 | 0.50% |
| Total | 34570 | 115 | 4316 | 58 | 1.34% |

Source from Wind

In this section, the sample will be segmented according to the 2014 bond default time node to verify whether the reputation mechanism works. The empirical results are shown in Table 8. The results of regressions (4)-(6) show that after controlling bond-related indicators, rating agency competition, and time-fixed effects, the reputation mechanism has no significant effect on the whole sample, but the results of the segmented sample are more illustrative. In the sample before the default, the estimated coefficient of the rating agencies’ reputation behavior was significantly positive at the 1% level, indicating that the reputation mechanism could not play a constrain role. On the contrary, the reputation behavior of rating agencies would prompt them to give higher rating. Hypothesis 2 was verified. At the same time, the regression (6) shows that after the default, the rating agency's reputation behavior will significantly reduce the credit rating given by agencies. The reputation index and the rating index are significantly negatively correlated at the 1% level, indicating that the reputation mechanism is beginning to play a role. Companies with more negative reputation behaviors began to worry about the security of the bonds rated and began to downgrade bond ratings to control risk. Hypothesis 3 was verified.

Table 8 Impact of upgrade behavior on bond credit rating under the reputation mechanism

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | （4） | （5） | (6) |
|  | Subject rating | | | Debt rating | | |
| Variables | Whole sample | 2010-2013 | 2014-2017 | Whole sample | 2009-2013 | 2014-2017 |
| Repu (Up) | 1.670\*\*\* | 1.668\*\*\* | 1.207 | -0.156 | 1.632\*\*\* | -3.817\*\*\* |
|  | (2.940) | (3.117) | (1.146) | (-0.342) | (2.814) | (-5.179) |
| HHI | -4.536\*\* | -7.611\*\*\* | -3.114\*\*\* | -9.855\*\*\* | -12.18\* | -6.719\*\*\* |
|  | (-2.383) | (-3.344) | (-9.234) | (-4.676) | (-1.857) | (-8.088) |
| Share | 0.00830\*\*\* | 0.00540\*\* | 0.00986\*\*\* | 0.0101\*\*\* | 0.00229 | 0.0170\*\*\* |
|  | (4.731) | (2.036) | (4.109) | (5.263) | (0.806) | (6.445) |
| Nature | 1.676\*\*\* | 1.798\*\*\* | 1.581\*\*\* | 1.742\*\*\* | 1.969\*\*\* | 1.668\*\*\* |
|  | (24.24) | (12.48) | (19.69) | (23.57) | (12.88) | (19.02) |
| List | 0.602\*\*\* | 0.206 | 0.513\*\*\* | 0.733\*\*\* | 0.763\*\*\* | 0.522\*\*\* |
|  | (8.553) | (1.243) | (6.197) | (9.659) | (4.194) | (5.798) |
| Financial control variable | control | control | control | control | control | control |
| Debt control variable | control | control | control | control | control | control |
| Time | control | control | control | control | control | control |
| Industry | control | control | control | control | control | control |
| Type of bond | control | control | control | control | control | control |
| Number of samples | 9,370 | 2,230 | 7,140 | 9,370 | 2,230 | 7,140 |
| R-squared | 0.296 | 0.303 | 0.301 | 0.495 | 0.478 | 0.517 |

Notice: The values in parentheses are z test statistic, \*\*\* represents significant at 1% level, \*\* represents significant at 5% level, \* represents significant at 10% level.

There are two main reasons to explained why the reputation mechanism plays a role in the bond rating but has no obvious effect on the main rating. First, the default risk is mainly reflected on the specific bond, and the bond rating is the reflection of the credit risk of a bond. Bond rating plays a major role in the pricing of bond issuance. Therefore, the constraint behavior on bond rating can serve as a reminder of credit risk. Second, the firm-rating is the benchmark for the rating used. Downgrading the frim rating will have a serious impact on the bond issuer. Meanwhile, the rating agency presents a homogenous competition. Selecting a downgrade of the firm may result in the risk of losing the client. In summary, the choice of downgrading the bond rating can not only remind the risk, but also partially eliminate the damage to its own reputation. Therefore, downgrading the bond rating is the common transitional behavior of Chinese bond rating agencies before the normalization of bond default has been formed. As shown by regression (3), reputation mechanism began to play a constraining role in the firm rating, and the significance and effect degree of reputation index to improve the firm rating decreased obviously.

**(2) Other evidence: rating agency's rating upgrade behavior and default forecast**

This paper selects the rating upward index to distinguish the level of the rating agencies’ reputation. This article expounds the rationality and standardization of the index selection from the perspective of reality and theory in the previous discussion, but does not directly give quantitative argumentation, which may cause some doubts. For example, one doubts could be that the rating upgrade is not the consideration of the rating agency's self-interest but may cause by the reducing of the credit risk of the rating bond itself. This paper will carry out supplementary verification according to the bond credit default prediction model proposed by Yao and Shi (2018) and Shumway (2001) to prove that the rating upgrade does not reveal the reduction of the credit risk of the rating bonds, but the result of other factors. It indicates that the rating upgrade is the influence of the rating agency's reputation factor.

In this regard, this paper will conduct an empirical analysis using the data of credit bond default and the data of rating upgrade from 2014 to 2018. In specific methods, this paper refers to the empirical model from Yao and Shi (2018) 's paper and uses the Probit model to conduct a regression analysis of bond default. The empirical results are shown in table 9. Compared the results between regression (1) and regression (2), it can be observed that the upgrade cannot effectively explain the rating bonds’ credit risk reduction. The upgraded indicators estimated coefficient is not significant and it is positive, which suggests that the rating upgrade is caused by other factors rather than the reduction in credit risk of rated bonds. As mentioned above, the main function of credit rating is to reveal credit risk. The empirical result points out that the credit rating upgrade fails to reveal credit risk and provides quantitative evidence for the rationality of selecting the rating upward index to characterize the reputation of the rating agencies.

Table 9 Rating Upgrade Behavior and Bond Default Forecast

|  |  |  |
| --- | --- | --- |
|  | (1) | (2) |
|  | Default probability | |
| Inflation |  | 0.075 |
|  |  | (-0.556) |
| BondRating | -0.126\*\*\* | -0.161\*\*\* |
|  | (-3.385) | (-3.277) |
| Nature | -0.938\*\*\* | -0.888\*\*\* |
|  | (-4.058) | (-3.970) |
| List | -0.890\*\*\* | -0.815\*\*\* |
|  | (-2.810) | (-2.680) |
| Roe | -1.520 | -2.661 |
|  | (-0.399) | (-0.707) |
| Cash | -1.006 | -1.036 |
|  | (-0.826) | (-0.848) |
| CFO | 0.126 | 0.113 |
|  | (0.732) | (0.660) |
| Leverage | 1.322 | 1.323 |
|  | (1.301) | (1.310) |
| Sleverage | 0.0563 | 0.0513 |
|  | (0.764) | (0.688) |
| Size | -0.0266 | -0.00435 |
|  | (-0.243) | (-0.0401) |
| Constant | -3.818 | -3.946 |
|  | (-0.474) | (-0.153) |
| Time | control | control |
| Number of samples | 5,779 | 5,779 |
| R-squared | 0.425 | 0.472 |

Notice: The values in parentheses are t test statistic, \*\*\* represents significant at 1% level, \*\* represents significant at 5% level, \* represents significant at 10% level.

**(3) Other evidence: rating agency's rating upgrade behavior and market share**

In addition, this section uses the rating agencies’ reputation indicators to empirically analyze the market share to explore the impact of reputational behavior on the market share of rating agencies. The empirical results are shown in Table 10. Compared the results between regression (1) and regression (3), it can be concluded that the rating agency's reputation behavior can significantly increase the rating agency's market share before the breakout of default events. Reputation indicators and market share are significantly positive at the 5% confidence level, indicating that rating agencies will choose actions that cater to issuers, such as rating upgrade, to gain higher market share. However, after the outbreak of default, the effect of this behavior began to fade, which indicated that the market began to recognize the effect of this behavior on the reputation of rating agencies and began to worry about it. This empirical conclusion can provide some motivation evidence for the bad reputation behavior of rating agencies. Specifically, when the reputation mechanism fails to constrain the behavior of rating agencies, the bad reputation behavior will lead to a higher market share, and rating agencies will naturally be motivated to conduct this kind of behavior.

Table 10 Rating Upgrade Behavior and Market Share

|  |  |  |  |
| --- | --- | --- | --- |
|  | (1) | (2) | (3) |
|  | Market share | | |
| Variables | Whole sample | 2009-2013 | 2014-2017 |
| Share | 0.825\*\*\* | 0.826\*\*\* | 0.275 |
|  | (22.57) | (27.18) | (1.13) |
| HHI | 0.273 | -0.286 | 0.724 |
|  | (1.422) | (-1.086) | (1.028) |
| Repu (Up) | 0.0363 | 0.104\*\* | -0.0165 |
|  | (1.282) | (2.614) | (-0.414) |
| Constant | 0.0215 | 0.0243 | 0.0647 |
|  | (0.971) | (0.393) | (1.085) |
| time | control | control | control |
| Number of samples | 81 | 45 | 36 |
| R-squared | 0.906 | 0.948 | 0.860 |

Notice: The values in parentheses are t test statistic, \*\*\* represents significant at 1% level, \*\* represents significant at 5% level, \* represents significant at 10% level.

**(4) Default behavior of rating companies and bond rating**

In order to verify the importance of default in the theoretical model, this paper will introduce the default bonds proportion as a reputation index. The empirical results are shown in Table 11. Since the default event started in 2014, the regression period of the empirical sample was selected from 2015 to 2017. By comparing regression (1) and regression (8), it can be found that the conclusion is consistent with the empirical design above, that is, the higher the default rate of rating agencies is, the more pressure the agencies will face from investors and regulators, and the more worried they will be about reputation damage. The estimated coefficient of default rate of rating agencies is significantly negative, and hypothesis 4 has been verified.

Table 11 Impact of default on the credit rating of bonds under the reputation mechanism

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | （4） | （5） | (6) | (7) | (8) |
| Variables | Subject rating | Subject rating | Subject rating | Subject rating | Debt rating | Debt rating | Debt rating | Debt rating |
| Default(M) | -23.32\* |  | -19.30\* |  | -13.59\*\*\* |  | -16.77\*\*\* |  |
|  | (-1.738) |  | (-1.723) |  | (2.853) |  | -(3.377) |  |
| Default(B) |  | -11.07\* |  | -8.568\* |  | -7.441\*\*\* |  | -8.982\*\*\* |
|  |  | (-1.745) |  | (-1.690) |  | (-2.593) |  | (-3.031) |
| Repu (Up) |  |  | 0.635\* | 0.730\*\* |  |  | -0.512\*\* | -0.466\*\* |
|  |  |  | (1.921) | (2.228) |  |  | (-2.259) | (-2.074) |
| HHI | -31.96\*\*\* | -33.92\*\*\* | -30.96\*\*\* | -32.58\*\*\* | -15.06\*\*\* | -15.53\*\*\* | -16.04\*\*\* | -16.54\*\*\* |
|  | (6.388) | (6.750) | (6.155) | (6.441) | (4.161) | (4.285) | (4.402) | (4.526) |
| Share | 0.0103\*\*\* | 0.0110\*\*\* | 0.0104\*\*\* | 0.0110\*\*\* | 0.0191\*\*\* | 0.0197\*\*\* | 0.0181\*\*\* | 0.0190\*\*\* |
|  | (3.799) | (4.072) | (3.846) | (4.079) | (6.442) | (6.690) | (6.057) | (6.446) |
| Nature | 1.531\*\*\* | 1.533\*\*\* | 1.528\*\*\* | 1.529\*\*\* | 1.610\*\*\* | 1.612\*\*\* | 1.618\*\*\* | 1.622\*\*\* |
|  | (17.87) | (17.88) | (17.83) | (17.82) | (17.13) | (17.15) | (17.18) | (17.21) |
| List | 0.486\*\*\* | 0.489\*\*\* | 0.487\*\*\* | 0.490\*\*\* | 0.461\*\*\* | 0.463\*\*\* | 0.456\*\*\* | 0.461\*\*\* |
|  | (5.467) | (5.504) | (5.479) | (5.509) | (4.777) | (4.806) | (4.719) | (4.771) |
| Financial control variable | control | control | control | control | control | control | control | control |
| Debt control variable | control | control | control | control | control | control | control | control |
| Time | control | control | control | control | control | control | control | control |
| Industry | control | control | control | control | control | control | control | control |
| Type of bonds | control | control | control | control | control | control | control | control |
| Number of samples | 5,597 | 5,597 | 5,597 | 5,597 | 5,597 | 5,597 | 5,597 | 5,597 |
| R-squared | 0.303 | 0.303 | 0.304 | 0.303 | 0.519 | 0.519 | 0.521 | 0.521 |

Notice: The values in parentheses are z test statistic, \*\*\* represents significant at 1% level, \*\* represents significant at 5% level, \* represents significant at 10% level.

In summary, this section studies the relationship between the rating agencies’ constraint mechanism and the rating upgrade. It also verifies the conditions of the reputation mechanism. The results show that the more competitive the rating agencies are, the more likely they are willing to upgrade rating. The default event is an important premise for the rating agency's reputation to play a constrain function. The function of the rating agency's reputational constraint mechanism is significantly different before and after the default. After the default, the rating agency will begin to worry that its reputation is discriminated by the external. Then, agencies begin to choose a prudent rating behavior and the reputational constraint mechanism come into effect.

1. **Robustness test: based on internal rating data**

As mentioned above, in the empirical analysis using credit rating as the result of rating agency behavior, there will be endogeneity problems such as sample self-selection. Hence, the robustness test of this paper will introduce the Investor-paid agency indicator, partially eliminate the situation that good rating companies choose rating agencies with higher market share and lower reputation. The internal rating agencies are not affected by factors such as market competition. The internal rating reflects the credit risk of the issuing companies, and the credit rating model it used is relatively constant. By using the internal rating as the benchmark, simultaneously obtaining sample data of external and internal rating of the rating firm, to exclude the endogenous of sample self-selection.

Chinese internal ratings are all provided by China Bond Credit Rating Co., Ltd., which is established in December 2010. This section will match the bond samples[[1]](#footnote-3) with both external and internal ratings. The time and quantity distribution of the samples are shown in Table 12. It can be seen that the number of bonds with internal rating ratings since its establishment has increased, providing data support for the robustness test of this paper. This paper will discuss the impact of rating agencies competition and reputation on the behavior of rating agencies according to the previous empirical analysis and test.

Table 12 Time and quantity distribution of internal rating samples

|  |  |  |
| --- | --- | --- |
| Year | Number of rating bonds | Rating bond amount (100 million yuan) |
| 2011 | 4 | 48 |
| 2012 | 26 | 1207.7 |
| 2013 | 53 | 1577.7 |
| 2014 | 211 | 3936.3 |
| 2015 | 334 | 4899.9 |
| 2016 | 691 | 9429.36 |
| 2017 | 484 | 4960.61 |
| Total | 1803 | 26059.57 |

Source from Wind

Adopting the Order-logit regression according to formula (1), table 13 shows the empirical results of the robustness test. Through the results comparation between regression (1) and regression (2), after controlling the indicators of the bond-issuing enterprises’ dimension, the market concentration index of the rating agencies will significant decrease the rating difference. The estimated coefficient is significantly negative at 1% confidence level, reflecting that the degree of market competition will significantly increase the rating agency's rating upgrade. Similar to the previous regression results, the higher degree of market competition will significantly increase the rating upgrade behavior of external rating agencies. Moreover, the higher the market share of rating agencies is, the more rating upgrade will be conducted. It can explain the inappropriate use of market share to characterize the rating agencies' reputation indicators. It can also prove the phenomenon that the rating agency will choose more rating upgrade in order to maintain a higher market share. In summary, the empirical results in Table 13 can eliminate the rating upgrade is due to the endogenous of the self-selection of the rating enterprise sample, which enhances the reliability of the conclusion of hypothesis 1.

Table 13 Impact of market competition on rating upgrade

|  |  |  |
| --- | --- | --- |
|  | (1) | (2) |
| Variables | Ratingdiff | Ratingdiff |
| HHI | -13.48\*\*\* | -25.06\*\*\* |
|  | (-3.332) | (-3.439) |
| Share |  | 0.00781\*\* |
|  |  | (1.970) |
| Nature | -0.600\*\*\* | -0.634\*\*\* |
|  | (-4.602) | (-4.818) |
| List | -0.185 | -0.193 |
|  | (-1.464) | (-1.513) |
| Financial control variable | Control | Control |
| Debt control variable | Control | Control |
| Time | Control | Control |
| Industry | Control | Control |
| Number of samples | 1,662 | 1,662 |
| R-squared | 0.296 | 0.306 |

Notice: The values in parentheses are z test statistic, \*\*\* represents significant at 1% level, \*\* represents significant at 5% level, \* represents significant at 10% level.

Next, this section will use the reputation indicators constructed in this paper to analyze the difference between the external and internal ratings and conduct the robustness test for hypothesis 2 and 3. The empirical results are shown in Table 14. The results show that after controlling the financial indicators and competition indicators of the bond-issuing enterprises, the coefficient of the reputation indicators is significantly positive at 10% confidence level in the whole sample, which indicates that the rating agencies’ reputation mechanism does not play a constraint role, instead, it will promote the rating upgrade movement. However, this phenomenon may be due to the fact that the explained variable is measured by the firm rating, and the firm rating is not the preferred adjustment method for rating agencies to concentrate on reputation risk. Hypothesis 2 is supported and verified. The result of regression (3) shows that after the occurrence of default, the reputation index will significantly reduce the rating upgrade behavior of rating agencies, and even more downgrade the firm rating, so as to decrease their own reputation risk. Hypothesis 3 was verified.

Table 14 Impact of reputation mechanism on rating upgrade

|  |  |  |  |
| --- | --- | --- | --- |
|  | (1) | (2) | (3) |
| Model | Whole sample | 2011-2014 | 2015-2017 |
| Repu (Up) | 0.852\* | 1.989\* | -1.167\*\* |
|  | (1.787) | (1.792) | (-2.463) |
| HHI | -56.62\*\* | -34.98\* | -89.40\*\*\* |
|  | (-2.011) | (-1.675) | (-7.383) |
| Share | 0.00794\*\* | 0.0109\* | 0.0103\*\* |
|  | (2.001) | (1.651) | (1.990) |
| Nature | -0.642\*\*\* | -0.432 | -0.728\*\*\* |
|  | (-4.879) | (-1.430) | (-4.794) |
| List | -0.201 | -0.123 | -0.242 |
|  | (-1.579) | (-0.479) | (-1.575) |
| Financial control variable | Control | Control | Control |
| Debt control variable | Control | Control | Control |
| Time | Control | Control | Control |
| Industry | Control | Control | Control |
| Number of samples | 1,662 | 587 | 1054 |
| R-squared | 0.339 | 0.296 | 0.306 |

Notice: The values in parentheses are z test statistic, \*\*\* represents significant at 1% level, \*\* represents significant at 5% level, \* represents significant at 10% level.

Finally, this section introduces the default indicator to test the robustness of hypothesis 4. This section will use the reputation index constructed in this paper to empirically analyze the difference between the ratings and the robustness test for hypothesis 2-3. The empirical results are shown in Table 15. The default indicators are significantly negative at the 5% and 10% confidence levels respectively, indicating that the default reputation index can significantly suppress the rating upgrade behavior. The empirical results are stable, which is consistent with the conclusion of the hypothesis 4. And it will not be repeated here.

Table 15 Impact of default on reputation ratings in the reputation mechanism

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) |
| Model | Rating difference | Rating difference | Rating difference | Rating difference |
| Repu (Default)Amount | -12.77\*\* |  | -5.176\* |  |
|  | (-2.344) |  | (-1.844) |  |
| Repu (Default)number |  | -15.18\* |  | -7.231 |
|  |  | (1.763) |  | (-1.597) |
| Repu (Up) |  |  | -2.550\*\*\* | -2.226\*\*\* |
|  |  |  | (-3.026) | (-2.721) |
| HHI | -75.49\*\*\* | -70.21\*\*\* | -76.67\*\*\* | -70.31\*\*\* |
|  | (-6.908) | (-6.350) | (-7.032) | (-6.374) |
| Share | 0.00569\*\* | 0.00548\*\* | 0.00624\*\* | 0.00577\*\* |
|  | (2.290) | (2.222) | (2.514) | (2.344) |
| Nature | -0.378\*\*\* | -0.375\*\*\* | -0.382\*\*\* | -0.382\*\*\* |
|  | (-5.154) | (-5.119) | (-5.217) | (-5.227) |
| List | -0.152\*\* | -0.151\*\* | -0.158\*\* | -0.157\*\* |
|  | (-2.082) | (-2.059) | (-2.165) | (-2.146) |
| Financial control variable | control | control | control | control |
| Debt control variable | control | control | control | control |
| Time | control | control | control | control |
| Industry | control | control | control | control |
| Number of samples | 1054 | 1054 | 1054 | 1054 |
| R-squared | 0.310 | 0.311 | 0.315 | 0.315 |

Notice: The values in parentheses are z test statistic, \*\*\* represents significant at 1% level, \*\* represents significant at 5% level, \* represents significant at 10% level.

1. **Conclusion**

This paper uses the Chinese credit bond rating data to study the reputation mechanism and rating behavior of rating agencies, and demonstrates the impact of rating agency competition on rating behavior and the effectiveness of rating agency reputation constraints theoretically and empirically. In the case of the homogenization operation of rating agencies with income as the main target, the competition will make the rating behavior more radical. The event of default is the key to the function of the reputation mechanism. In the absence of default, the reputation mechanism of Chinese credit rating market is invalid.

The empirical results show that market competition is one of the main reasons for the high rating in China. The competition of rating agencies and the pursuit of market share will prompt rating agencies to give more high ratings. In addition, this paper constructs a new reputation index to verify the role of reputation mechanism. It is found that the reputation mechanism will not be able to constrain the rating behavior of rating agencies when the default has not occurred, and even make rating agencies use the bad reputation behavior to pursue higher market share. However, after the event of default occurs, rating agencies will choose to lower the rating to protect their reputation due to the worries about their reputation. And the more defaults occur, the lower the market's rating they give.

In conclusion, this paper explores the rating agencies' rating behaviors from the perspective of the real business environment and reputation mechanism of Chinese rating agencies. The conclusions are similar to some foreign literatures, that is, market competition will prompt rating agencies to conduct high-rated behaviors, and default events are the key of reputation mechanism. This paper builds a research foundation for exploring the behavior and effectiveness of Chinese credit rating agencies. It also provides support for accurate measuring the effectiveness of credit ratings.

**References**

[1] Bolton P, Freixas X, Shapiro J,，The credit ratings game, The Journal of Finance, 67(1), (2012), 85-111.

[2] Bongaerts D, Cremers K J M, Goetzmann W N，Tiebreaker: Certification and multiple credit ratings, The Journal of Finance, 67(1), (2012), 113-152.

[3] Xia H,, Can investor-paid credit rating agencies improve the information quality of issuer-paid rating agencies?, Journal of Financial Economics, 111(2), (2012), 450-468.

[4] Goel A M, Thakor A V., Information reliability and welfare: A theory of coarse credit ratings, Journal of Financial Economics, 115(3), (2015), 541-557.

[5] Bar-Isaac H, Shapiro J., Ratings quality over the business cycle, Journal of Financial Economics, 108(1), (2013), 62-78.

[6] Manso G., Feedback effects of credit ratings, Journal of Financial Economics, 109(2), (2013), 535-548.

[7] Camanho N, Deb P, Liu Z., Credit rating and competition, SSRN Working paper, (2012).

[8] Hirth S., Credit rating dynamics and competition, Journal of Banking & Finance, 49, (2014), 100-112.

[9] Becker B, Milbourn T, How did increased competition affect credit ratings?, Journal of Financial Economics, 101(3), (2011), 493-514.

[10] Opp C C, Opp M M, Harris M., Rating agencies in the face of regulation, Journal of Financial Economics, 108(1), (2013), 46-61.

[11] Rablen M D,, Divergence in credit ratings, Finance Research Letters, 10(1), (2013), 12-16.

[12] Mathis J, McAndrews J, Rochet J C, Rating the raters: are reputation concerns powerful enough to discipline rating agencies?, Journal of monetary economics, 56(5), (2009), 657-674.

[13] Li Qi, Luo Wei，Gu Shiping, Enterprise Credit Rating and Earnings Management, Journal of Economic Research, 46(S2), (2011), 88-99.

[14] Liu Shida, Wang Hao, Zhang Ming, Credit Rating Effectiveness and Regulatory Dependence: Evidence from Interbank Deposits, Chinese Journal of Economics, 5(01), (2018), 17-37.

[15] He Ping, Jin Meng, The influence of credit rating on the Chinese bond market, Journal of Financial Research, (04), (2010), 15-28.

[16] Wang Xiongyuan, Zhang Chunqiang, Reputation Mechanism, Credit Rating and Medium Term Bill Financing Costs, Journal of Financial Research, (08), (2013), 150-164.

[17] Kou Zonglai, Pan Yuzhang, Liu Xueyue, Does China's credit rating really affect the cost of issuing bonds? Journal of Financial Research, (10), (2015), 81-98.

[18] Huang Xiaolin, Zhu Song, Chen Guanting, The Impact of Bond Default on the Credit Rating Organizations in China——Based on the Analysis of China's Credit Bond Market Defaults, Journal of Financial Research, (03), (2017), 130-144.

[19] Xing Tiancai, Zhan Mingjun, Wang Wengang, Rating agency competition, reputation and bond credit rating quality, Research on financial and economic issues, (06), (2016), 66-71.

[20] Shumway T., Forecasting bankruptcy more accurately: A simple hazard model, The journal of business, 74(1), (2001), 101-124.

[21] Yao Hongyu, Shi Zhan, Individual Characteristics, Local Economic Variables and Credit Debt Default Prediction——Based on Discrete-Time Risk Model, Investment Research, 37(06), (2018), 114-132.

1. To be specific, the selection principle of bond samples is that if the issuer obtains the China Bond Credit rating within two months before or after obtaining the external rating, it will be regarded as an effective sample. [↑](#footnote-ref-3)