The Relevance of Audit Quality, Debt Financing and Earnings Management

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Abstract: - The relevance of audit quality, DF, and EM is a topic of common concern at home and abroad. The research first analyzes the DF mode, EM motivation, and financial audit mechanism. Then the modified Jones model is applied to EM. Two regression models are constructed by introducing control variables and adjustment variables. According to the empirical results of 11835 observed sample values, there are differences in the degree of earnings management among A-share companies. The average accrued profit is 0.063, the maximum value is 3.960, the minimum value is 0, and the standard deviation is 0.091. The situation of different listed companies getting debt financing increments varies greatly, with an average value of 0.095 and a standard deviation of 0.214. The average asset-liability ratio is 0.429, and the average enterprise size is 22.215. Correlation analysis shows that there is a positive correlation between bank loan increment, total debt increment, commercial credit increment, and earnings management behavior, while there is a negative correlation between audit quality and earnings management. The regression analysis results show that there is a positive relationship between the total increase in corporate debt, the increase in commercial credit, the increase in bank loans, and the degree of earnings management, while there is a negative correlation between audit quality and the degree of earnings management.

Key-Words: - Debt financing; Earnings management; Financial audit; Modified Jones model; Regression model

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1 Introduction

The audit work is mainly to review the financial report of the enterprise and give relevant suggestions. The audit quality (AQ) is closely related to the accountants' workability, professional quality, the size of the accounting firm, and the risk of undertaking audit work, [1]. Because the earnings management (EM) behavior of enterprise management has always existed, it is a "legal" tax reduction behavior. If the accountant cannot reveal the financial problems in the audit work, the high-quality audit work cannot be guaranteed, [2]. There is rich research on EM at home and abroad, mainly focusing on two aspects. EM mainly represents the management of businesses. The financial report and EM behavior of the enterprise are the active management behavior of businesses. Businesses often use two management techniques for EM: accrual items and real operating earnings, [3]. At this stage, most scholars focus on the impact of DF on EM, but there is no clear classification of debt increment and increment methods, [4]. To investigate the effects of DF on EM, this study introduces financial audits. Based on the analysis of the correlation among the three, the regression analysis model of debt financing, EM, and financial audit is established to improve the EM of enterprises.

2 Related Works and Research Hypothesis

2.1 Related Work

EM is usually used to operate the profit balance point by enterprise management, which has a two-way promoting and inhibiting effect. In, [5], the authors collected listed companies in Vietnam from 2007 to

2016 as data samples to discuss the impact of CEO rights on EM. The results of regression analysis showed that CEO rights had a positive impact on EM. In enterprises with high foreign shareholding, this effect was more significant. In other words, the potential dual role of foreign investors should be considered by policymakers with oversight responsibilities. Taking the directors of Indonesian manufacturing companies as a sample, [6], discussed the impact of bonus motivation, political motivation, debt contract motivation, and tax motivation on EM. The results of multiple regression analysis showed that these four motivations had an impact on EM practice. The highest motivation of directors for EM was political cost motivation. The second was bonus incentive, tax incentive, and debt contract incentive, which provided evidence for the potential motivation of directors to encourage EM practice. In, [7], the authors studied the relationship between EM and the culture of time-honored enterprises. The results showed that the accrued EM and actual EM of time-honored enterprises were much lower than those of other enterprises. The transition between corporate EM and culture came from cultural infiltration with senior management. The association between trusted brands and EM was significantly moderated by property rights and incentive compatibility. In, [8], the authors analyzed the impact of accrual earnings management (AEM), the adoption of international financial reporting standards (IFRS), and the stock market integration of Latin American Integrated Market (MILA) companies. A multi-level mixed model was used for robustness analysis. The findings demonstrated that businesses adopted AEM as a premeditated tactic to erode corporate governance. Agency costs were reduced through the introduction of MILA and the adoption of IFRS. In, [9], the authors used EM to measure the mentality of enterprise managers. The discretionary accruals represented the EM of enterprises. The results showed that EM had a negative correlation with the probability and frequency of stock repurchase. The scale of EM could be used as a reliable indicator of company valuation. In, [10], the authors used the panel data set of 250 companies in the Baltic Sea from 2012 to 2016 to analyze the relationship between EM and reporting complexity. The findings revealed that EM was completed about 6-11% of the company year. EM and reporting complexity were positively correlated, although this association was only seen in enterprises with higher liquidity.

It is noteworthy that AQ is also closely related to EM. Generally, AQ can effectively promote the real EM of enterprises. In, [11], the authors studied whether audit companies would hire former Public Company Accounting Oversight Board (PCAOB) employees based on negative PCAOB inspection reports and whether such employment would reduce future inspection defects and improve audit quality. The findings revealed a strong correlation between the amounts of deficiencies listed in prior inspection reports and the number of PCAOB staff working for large audit firms. However, there was a bad correlation between the number of former PCAOB personnel employed and the number of problems in the company's subsequent inspection reports. It indicated that the former PCAOB personnel had higher audit professional quality, which improved the AQ. In, [12], the authors used reputation theory to predict the potential personal costs of auditors when performing their professional obligations. The experiment found that auditors with negative reputations faced more stringent choices when predicting budget overruns. The auditor's perceived reputation directly affected AQ. In, [13], the authors discussed the impact of external auditors' regular interaction with some parties in their work, such as accounting firms, audit team members, and customers on audit quality. The AQ was translated into improved financial reports, which depended on the stakeholders of audited financial statements to make wise business decisions. The results verified the essential function of auditors' view on the fair treatment of partners in AQ. In, [14], the authors studied the impact of geographic distance between audit partners and customers on audit quality. The research uses modeling distance to match partners

and customers. The result showed that the geographical distance between partners and potential customers was an important matching criterion. If other qualities of a partner are more significant, they will also be weighed again. In addition, when the partner is farther away from the customer, the AQ will be reduced.

To sum up, there are a large number of research data on debt financing (DF) and earning management at home and abroad, mainly including EM motivation, DF scale, and DF sources. However, the analysis of DF and EM on the quality of financial audits is relatively small. The study takes the quality of financial audit as an adjusting variable to explore the impact of DF and EM, aiming to provide effective ideas for EM of enterprises.

The advantage of this study is that it takes the quality of financial audit as a moderating variable to explore the impact between debt Financing and earnings management. In the existing literature, there is relatively little research on the relationship between debt Financing and earnings management in terms of financial audit quality. This study fills this research gap and provides a new perspective for further revealing the relationship between debt Financing and earnings management. At the same time, the use of the modified Jones model to measure the degree of earnings management provides more realistic and accurate results, providing a more reliable data source for research. In summary, this study is innovative and practical.

2.2 Research Hypothesis

As for the relationship between DF and EM, through the analysis of principal-agent theory and contract theory, the relationship between the increment and source of debt and EM is obtained. In contract theory, restrictive treaties and debt contracts influence each other. In contract theory, restrictive treaties and debt contracts influence each other. With the increase of corporate debt, in order not to violate the contract, managers must make the enterprise realize well before creditors through EM. When creditors increase their investment, they will also add the treaty in the contract to restrict the operators. Once a breach of contract is discovered by creditors, it may bring great pressure on the operation of the enterprise, [15]. It will also promote the business operators to achieve non-default through the adjustment of earnings information. In the principal-agent theory, from the perspective of financing, the relationship between the two parties is the relationship between the creditor and the debtor. The entrusting party hopes to obtain a stable income after lending their funds. The operator hopes to use the funds in high-risk and high-return projects. There will also be many problems between the two parties, [16]. Therefore, hypothesis 1 is put forward, that is, the EM behavior of enterprises is positively correlated with the increase of DF.

In view of the relationship between DF and EM, domestic enterprises often obtain financing through bank loans. Before the bank loans, they will know the actual financial information, debt repayment ability, and profitability of the enterprise through the audit of the bank's financial experts and regulatory authorities in advance, [17]. The ability of enterprises to obtain bank loans increases with the addition of earnings information. To obtain lower-cost loans, enterprises are more active in EM. Therefore, hypothesis 2 is proposed, that is, the degree of EM of enterprises with more bank loans will also increase. From the perspective of signal transmission theory, enterprise investors often audit through a high-quality third-party institution to strengthen the transparency of the financial information of the enterprise, deliver relatively reliable investment information to the majority of investors, and improve the trust between investors and enterprises. The supplier determines whether to continue to cooperate with the enterprise and provide the source of goods through the financial information and operating ability of the enterprise. Therefore, enterprises pay great attention to the credit of enterprises in the operation. This also urges operators to establish good financial information through EM to ensure cooperation between upstream and downstream enterprises. Therefore, hypothesis 3 is put forward,

that is, business credit loans of enterprises increase with the deepening of EM, [18]. Although China's bond market is still at the initial stage, there are still a small number of enterprises with strong operating ability and good performance that use bond financing.

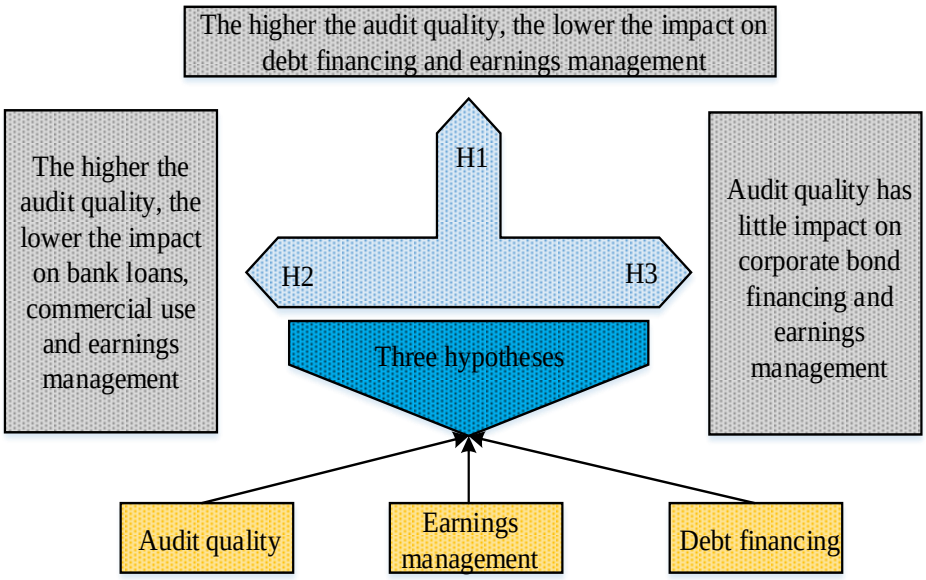

Fig. 1: Three hypotheses

After financing through the bond market, these enterprises will disclose their financing information to make it more transparent. Investors and financial analysts can better supervise, and also connect with the interests of enterprises. To establish a good corporate image and win the trust of investors in the capital market, such enterprises do not need the operation of EM. Therefore, hypothesis 4 is put forward, that is, the increase in corporate bond financing has little impact on EM.

In view of the relationship among debt financing, EM, and audit quality, listed bond financing enterprises are subject to strict supervision by relevant departments, and the company's financial management is more rigorous. Enterprises have good operating ability, and EM operations are also few. Therefore, bond financing enterprises have little impact on EM, [19]. Therefore, three hypotheses are proposed. Firstly, the higher the AQ is, the lower the impact on DF and EM. Secondly, the stronger the AQ is, the lower the impact on bank loans, commercial use, and EM. Thirdly, the AQ has no effect on corporate bond financing and EM. In Figure 1, hypotheses are displayed.

3 Multiple Regression Model of Debt Financing, EM, and Audit Quality

3.1 Definition and Calculation of Variables

At present, the models commonly used in quantitative EM are the time series model and the Jones model. Due to the systematic limitation of the time series model on time and EM, the development status of China's capital market cannot be analyzed using this model. Jones model and modified Jones model, which are developing faster at home and abroad, are more in line with domestic EM. These two models are relatively more realistic and accurate in representing the EM of enterprises and are more suitable for verifying empirical assumptions. Both of these models represent the degree of EM of the enterprise with controllable accrued profits. Firstly, the non-controllable accruals model is obtained by model fitting. Then the controllable accruals are

obtained through the difference between the total accruals and the non-controllable accruals. In view of the fact that the Jones model sets revenue as non-controllable accrued profit, this study selects the improved Jones model to replace the degree of EM to prevent the calculation error of EM, [20]. Combined with the research purpose, $absEM$ refers to the absolute value of the controllable accrued profits. The calculation formula of the model is shown in Formula (1).

$$\begin{cases} TAC_{i,t} = NE_{i,t} - OCF_{i,t} \\ \dfrac{TAC_{i,t}}{A_{i,t-1}} = \alpha_1 * \dfrac{1}{A_{i,t-1}} + \alpha_2 * \dfrac{\Delta REV_{i.t}}{A_{i,t-1}} + \alpha_3 * \dfrac{PPE_{i.t}}{A_{i,t-1}} + \xi_{i.t} \\ \dfrac{NAC_{i,t}}{A_{i,t-1}} = \alpha_1 * \dfrac{1}{A_{i,t-1}} + \alpha_2 * \dfrac{\Delta REV_{i.t} - \Delta REC_{i.t}}{A_{i,t-1}} + \alpha_3 * \dfrac{PPE_{i.t}}{A_{i,t-1}} \\ DAC_{i,t} = \dfrac{TAC_{i,t-1}}{A_{i,t-1}} - \dfrac{NAC_{i,t}}{A_{i,t-1}} \end{cases} \tag{1}$$

Formula (1), $NE_{i,t}$ and $TAC_{i,t}$ refer to the net profit and accrued profit of the enterprise i at the end of the accounting year t. $NAC_{i,t}$, $DAC_{i,t}$ and $OCF_{i,t}$ represent the non-controllable accrued profit, controllable accrued profit, and net cash flow of operating activities of the enterprise t at the end of the accounting year t. The total assets of the enterprise i in time $t-1$ are expressed in $A_{i,t-1}$. $\Delta REV_{i.t}$ refers to the growth of the current operating income, which is the difference between the current period and the previous period in the main operating income. $PPE_{i.t}$ refers to the original value of fixed assets in the current period. The increase in accounts receivable in the current period compared with the previous period is indicated by $\Delta REC_{i.t}$. $DAC_{i,t}$ is the controllable accrued profits in the t period of the enterprise i after the total assets correction. $absEM$ can also refer to the degree of EM. The enterprise's EM level increases with the addition of the absolute value of controllable accruals.

The multiple regression model is a widely used statistical analysis method in fields such as finance and economics. Its basic idea is to use multiple independent variables (or predictive factors) to predict the dependent variable (or outcome variable). In the research, a multiple regression model is used to study the impact of debt Financing, EM, and audit quality on corporate earnings. In the study, we construct a multiple regression model with earnings as a dependent variable and debt Financing, EM, and audit quality as independent variables. By fitting the sample data, the impact coefficients of each variable on corporate earnings can be obtained, and it is also possible to observe whether there is a significant correlation between them. By analyzing the results of the regression equation, conclusions and experiences can be drawn, which can provide decision-making suggestions for enterprise decision-makers.

It should be noted that multiple regression models can only predict the correlation between the dependent variable and the independent variable, and cannot explain causal relationships. Therefore, in practical applications, it is necessary to carefully analyze the regression results and pay attention to controlling for other possible influencing factors. For the "multiple regression model of debt Financing, EM and audit quality", the definition and calculation of variables are also very critical. In this model, debt Financing, EM, and audit quality are all regarded as independent variables, while corporate earnings are regarded as dependent variables. Among them, debt Financing refers to enterprises obtaining funds by issuing bonds to creditors or loans to banks and other financial institutions. The debt financing ratio refers to the proportion of total liabilities of an enterprise in total assets. The calculation method is debt Financing ratio=total liabilities/total assets; The size of an enterprise's business scale is generally measured by total assets. There is a certain relationship between EM and corporate earnings, and generally speaking, larger enterprises have relatively higher levels of earnings. The calculation method for EM is total

assets; Audit quality refers to the quality of an auditor's audit of a company's financial statements. Generally, factors such as the size of the auditing firm, audit fees, auditor qualifications, and experience are used to reflect audit quality. Among them, audit fees are considered an important indicator reflecting audit quality. The calculation methods of audit quality variables can be selected and compared based on actual situations; Corporate surplus refers to the sum of a company's net profit and accrued profit. In a multiple regression model, corporate earnings are used as the dependent variable, and the relationship between other independent variables and corporate earnings needs to be obtained through regression analysis. After determining the definitions and calculation methods of each variable, multiple regression models can be used to study their interactions. Through multiple regression analysis, the degree to which each independent variable affects corporate earnings can be determined.

The explanatory variables of the study are DF methods, including corporate bond increment, commercial credit increment, and bank loan increment of listed companies. Enterprise DF accounts are shown in Table 1.

Table 1. Corporate DF subjects

Non-current liabilities		Belong to DF account	Does not belong to debt financing
Long-term loan		1	\
Bonds payable		1	\
Including:	preferred stock	1	\
\	Perpetual bond	1	\
Long-term payables		1	\
Long-term payroll payable		\	1
Estimated liabilities		\	1
Deferred income		\	1
Deferred Tax Liability		\	1
Other non-current liabilities		\	1
Current liabilities		Belong to DF account	Does not belong to DF account
Short-term borrowings		1	\
Trading financial assets		\	1
Financial liabilities measured at fair value with changes included in current profit and loss		\	1
Derivative financial liabilities		\	1
Notes payable		1	\
Advance receipts		\	1
Employee compensation payable		\	1
Taxes payable		\	1
Other payables		\	1
Including:	Interest payable	\	1
\	Dividends payable	\	1
Liabilities held for sale		\	1
Non-current liabilities due within one year		\	1
Other current liabilities		\	1

DF is mainly concentrated on long-term loans, bonds payable, long-term accounts payable, and short-term loans and notes payable. According to previous studies, the calculation method of total debt increment DI is the ratio of the difference between the total debt at the end of the period and the beginning of the period and the total assets at the end of the period. The calculation formula of corporate debt increment CBI is the ratio of the difference between the ending value and the beginning value of bonds payable and the total value of assets at the end of the period. When calculating the commercial credit increment CI, the first step is to get the difference between the sum and difference of the closing value of the advance receipts, notes payable, and accounts payable, and then calculate the ratio of the difference to the total value of the closing assets, which is the commercial increment. When calculating the increment BLI of bank loans, the first step is to calculate the difference between the sum of the ending value of short-term and short-term loans and the sum of the initial value of long-term and short-term loans, and then divide the difference by the total amount of assets at the end of the period to obtain the increment of bank loans (Table 2).

Table 2. Definition and calculation method of variables

Variable classification	Variable	Symbolic representation	Corresponding calculation formula
Control variable	Industry virtualization	*I*nd	Industry dummy variable
	Annual virtual	*Y*ear	Annual dummy variable
	Situation of the Board of Supervisors	*Spvboard*	Number of members of the Board of Supervisors
	Independence of the Board of Directors	*I*nd	Percentage of independent directors on the Board of Directors
	Tobin Q value	*T*obQ	Ratio of stock market value to total assets at the end of the period
	Proportion of fixed assets	*AS*	Ratio of fixed assets to total assets at the end of the period
	Net cash flow from operating activities	*OCF*	Ratio of net cash flow from operating activities to total assets at the end of the period
	Return on total assets	*ROA*	Proportion of net profit to total assets at the end of the period
	Company size	*Size*	Natural logarithm of total assets at the end of the period
	Asset-liability ratio	*L*ev	Ratio of total liabilities to total assets at the end of the period
Adjusting variables	Audit quality	*AQ*	The value of audit passed by the top ten accounting firms is 1, and the value of failed audit is 0

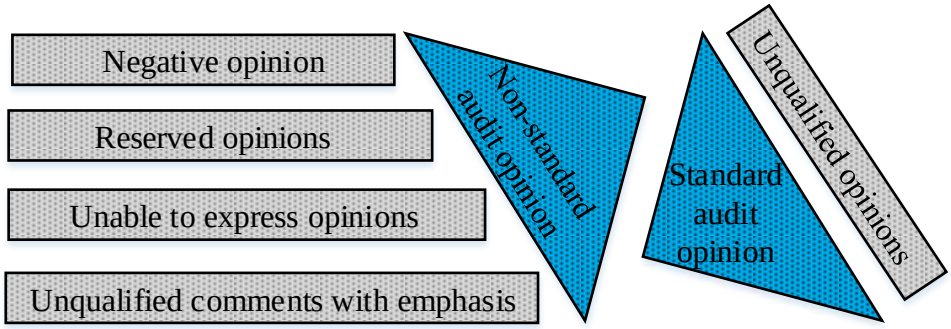

Fig. 2: Audit opinion type

The definitions and related explanations of the control variables and adjustment variables selected in the study are shown in Table 1. The asset-liability ratio is used to evaluate the state of the financial leverage of an enterprise, which can reflect the financial risk to a certain extent. In the stage of debt financing, if the creditors have a significant increase in liabilities or a gradual decline in operating conditions, the company will encounter financial risk problems, which will lead to EM motivation. The AQ is determined based on the audit opinions. For the adjustment variable, the value audited by the top ten accounting firms is 1, otherwise, it is set to 0. The types of audit opinions are shown in Figure 2.

From Figure 2, the main classification nodes of AQ are different types of audit reports. The two basic categories are non-standard audit opinions and standard audit opinions. The standard audit opinion refers to the unqualified audit opinion. Non-standard audit opinions include unqualified audit opinions with emphasis on matters, qualified opinions, negative opinions, and opinions that cannot be expressed. In addition, in terms of company size, the company size can influence the EM through both income and cost. When the scale of the company is small, the degree of EM is relatively high, because the regulations and management of the enterprise need to be further improved. On the contrary, the EM is relatively low. The return on total assets can not only reflect the profitability of the enterprise but also display the relevant performance of the enterprise management. The net cash flow from operating activities reflects whether the enterprise has financing needs. When the enterprise has more cash flow, the financing demand will be reduced, and the probability of normal operation of the company is high. On the contrary, enterprises will have a strong demand for financing, which will urge managers to conduct EM. In the case of imperfect new accounting standards and related systems, the proportion of fixed assets may urge the enterprise managers to conduct EM. When the Tobin Q value is greater than 1, the enterprise will not make additional investments. On the contrary, enterprises will increase corresponding investments. In this state, it may urge the enterprise managers to conduct EM. The higher the independence of the board of directors is, the stronger the corresponding role of supervision and governance. It can reduce the EM behavior of enterprises. The board of supervisors has the responsibility of restriction and supervision within the enterprise, which can ensure the maximization of shareholders' rights and interests and standardize the operation of the company. The larger the size of the board of supervisors is, the stronger the corresponding supervision ability of the enterprise, thus reducing the degree of EM of the enterprise. For the annual dummy variable, the years from 2014 to 2018 are set as 1, and the remaining years are 0. According to the industry classification standard of the China Securities Regulatory Commission in 2013, the manufacturing industry and non-manufacturing industry are set as Level 2 and Level 1 respectively. The meaning of the explanatory variable and explained variable is displayed in Table 3.

Table 3. Definition and calculation method of variables

Variable type	Variable name	Variable code	Variable calculation method
Interpreted variable	Accrued profit (operable part)	absEM	Calculation according to Jones model
Explanatory variable	Increase in debt	DI	Quotient value between the amount of debt increase and the total amount of assets at the end of the accounting year
	Increase in corporate bonds	CBI	Quotient value between the increased amount of corporate bonds and the total amount of assets at the end of the accounting year
	Increase in business credit	CI	Quotient value between the increased amount of commercial credit and the total amount of assets at the end of the accounting year
	Increase in bank loans	BLI	The quotient between the increased amount of bank loans and the total amount of assets at the end of the accounting year

From Table 3, the research mainly uses four variables, namely, the increase in debt, the increase in corporate bonds, the increase in commercial credit, and the increase in bank loans, to explain the accrued profits (the operational part).

3.2 Sample Selection and Regression Model

The research selects an A-share company as the research object. The selected time period is from 2014 to 2018. The sample of companies with a lack of data and an asset-liability ratio greater than 1 are eliminated. At the same time, the sample is processed by Winsorize. Finally, 2839 listed companies with 11834 observation samples in five years are selected. The annual distribution of sample data is shown in Figure 1. From Figure 1, in five years, some enterprise data fail to meet the requirements and are excluded from the sample. The most excluded data is in 2015, up to 653. The least excluded year is 2018, with 128. On the whole, the annual distribution of samples is reasonable and uniform. The financial data is from the Guotai'an database (Figure 3).

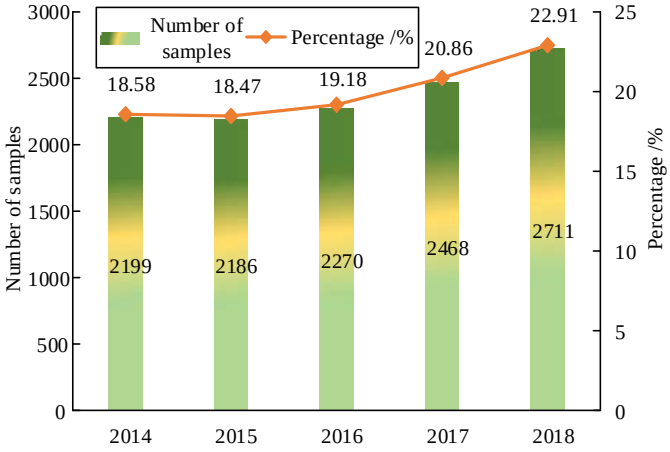

Fig. 3: Distribution of selected samples

To verify the impact of DF methods and DF on EM, regression model 1 is created to test. The calculation method is Formula (2).

$$absEM_{i,t-1} = \alpha_0 + \alpha_1 Debt_{i,t} + \alpha_2 Size_{i,t} + \alpha_3 ROA_{i,t} + \alpha_4 OCF_{i,t} + \alpha_5 Lev_{i.t} + \alpha_6 AS_{i,t} + \alpha_7 TobQ_{i,t} + \alpha_8 Ind_{i,t} + \alpha_9 SpvBoard_{i,t} + \sum IND_{i,t} + \sum Year_{i,t} + \xi_{i,t} \quad (2)$$

Formula (2), $\xi_{i,t}$ refers to the random error term. α_0 is a constant term. $a_1 - a_9$ refers to the parameters of corresponding variables. $a_1 - a_9$ refers to four explanatory variables. A regression model 2 is established to verify the impact of AQ on the correlation between DF and EM. The calculation formula is shown in Formula (3).

$$absEM_{i,t-1}' = \alpha_0 + \alpha_1 Debt_{i,t} + \alpha_2 Size_{i,t} + \alpha_3 ROA_{i,t} + \alpha_4 OCF_{i,t} + \alpha_5 Lev_{i,t} + \alpha_6 AS_{i,t} + \alpha_7 TobQ_{i,t} + \alpha_8 Ind_{i,t} + \alpha_9 SpvBoard_{i,t} + \alpha_{10} Debt_{i,t} * AQ_{i,t} + \alpha_{11} AQ_{i,t} + \sum IND_{i,t} + \sum Year_{i,t} + \xi_{i,t} \quad (3)$$

4 Analysis of Empirical Results

4.1 Descriptive Statistics

Figure 2 displays descriptive statistical analysis results, with a total of 11835 observed sample values. The average value of controllable accrued profit is 0.063. The maximum value is 3.960, and the minimum value is 0, which indicates that there is a large gap in the EM of a few enterprises. The standard deviation of this indicator is relatively small, with a value of 0.091, which indicates that the gap of EM degree of most A-share enterprises is relatively small. In terms of explanatory variables, the minimum, maximum, average, and standard deviation of total debt increment is -0.28, 1.317, 0.095, and 0.214 respectively. It means that there are certain differences between different listed companies in obtaining DF increments, and a few companies have debt increments. This data reflects the correlation between EM and debt increment to some extent. For the three ways of debt financing, the difference between the minimum and maximum value of commercial credit increment and bank loan increment is the most obvious, and the average is smaller of the three. The minimum gap and average corporate debt increment are small, which indicates that corporate bond financing is rare and the amount of financing is small. In terms of control variables, the average, median, maximum, and minimum asset-liability ratios are 0.429, 0.419, 0.898, and 0.053 respectively. This shows that the asset-liability ratio of most enterprises is at a relatively low level, and the enterprises have very serious insolvency, or the funds are not fully utilized. The average, median, maximum, and minimum company sizes are 22.215, 0.419, 0.898, and 0.053 respectively, which shows that there is a large gap between the size of different listed companies, and the size of listed companies is relatively large. The average, median, maximum, and minimum return on total assets is 0.042, 0.037, 0.205, and -0.144 respectively. The average, median, maximum, and minimum of net cash flow from operating activities are 0.041, 0.041, 0.234, and -0.169 respectively, which indicates that the overall cash level of listed companies is poor and has urgent financing needs. For the adjustment variable, the average value of AQ is 0.631, which shows that 63.1% of the sample listed companies have been audited by the top ten domestic accounting firms (Figure 4).

4.2 Correlation Analysis

The correlation between numerous variables is investigated in this study. Table 4 (Appendix) displays the particular outcomes.

From Table 4 (Appendix), the correlation coefficient between control variables and explanatory factors is less than 0.40, which indicates that there is only a weak correlation between them.

Therefore, the analysis of model regression does not have a multicollinearity issue. The relationship between the three variables of bank loan increment, enterprise total debt increment, and business credit increment and EM behavior is a positive correlation. The correlation coefficient between AQ and EM is below 0, which demonstrates that the relationship between them is negative.

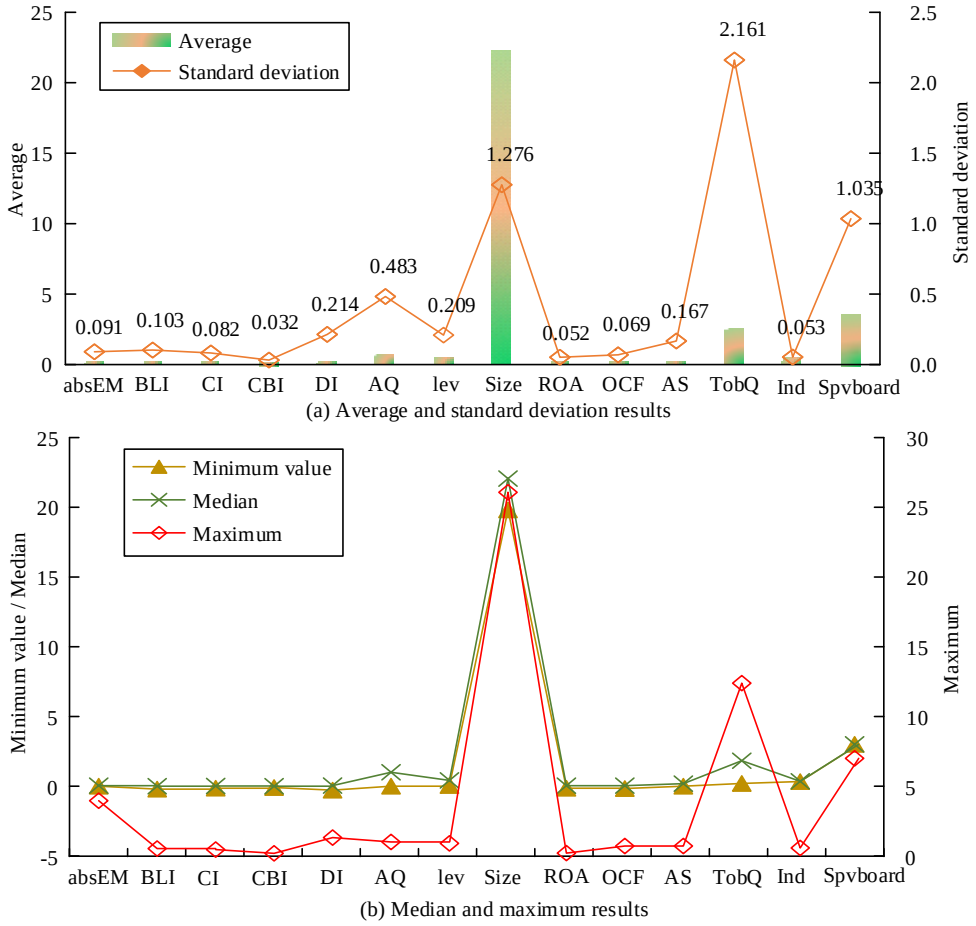

Fig. 4: Descriptive statistical analysis results

4.3 Regression Analysis

The model variables have a positive relationship with the total increment of corporate debt, EM behavior, commercial credit increment, and bank loan increment. The EM has a negative correlation with AQ. The absolute value between the control variable and the explanatory variable of the regression model is less than 0.4, so the model does not have a very obvious linear problem. The required variables are reasonable. *, **, and *** represent significant levels at 1%, 5%, and 10% respectively, and the data in "()" represent t values. The relationship between DF, DF methods, and EM is shown in Table 5. From model 1, the EM and the increase in corporate debt have a significant positive relationship, with a regression coefficient of 0.073. The degree and motivation of EM increase with the growth of debt financing. The 1% significance level confirms the validity of initial hypothesis 1. The degree of EM has a positive relationship with bank loans, which is consistent with hypothesis 2. The EM and the regression coefficient of corporate debt increment are not significant, which verifies hypothesis 4. The regression coefficient between EM and corporate business credit is 0.146, which verifies hypothesis 3. The degree of EM increases with the improvement of business credit. Enterprises with better business credit have more customer control advantages. If the repayment ability of the enterprise is weakened, the normal operation of the enterprise will be seriously affected, because there is no necessary raw material supply. There is a significant positive correlation between the asset-liability ratio and EM at 1%. An increase in the debt ratio of enterprises will add to the financial risk of enterprises. The regression coefficients of the enterprise size and the return on total assets are negative and positive respectively, and show obvious correlation at the level of 1%.

Therefore, enterprises can provide corporate profits by processing financial information related to the return on total assets, thus increasing the degree of EM.

Table 5. The relationship between DF, DF methods, and EM in model

-	abs*EM*（1）	abs*EM*（2）	abs*EM*（3）	abs*EM*（4）
BLI	0.106*** (12.66)	-	-	-
CI	-	0.146*** (14.25)	-	-
CBI	-	-	0.019 (0.65)	-
DI	-	-	-	0.073*** (18.26)
*L*ev	0.058*** (11.36)	0.056*** (10.88)	0.069*** (13.45)	0.048*** (9.28)
Size	-0.004*** (-4.04)	-0.003*** (-3.63)	-0.003*** (-3.70)	-0.004*** (-4.32)
ROA	0.139*** (7.20)	0.146*** (7.6)	0.174*** (9.06)	0.115*** (5.97)
OCF	-0.195*** (-13.83)	-0.248*** (-18.16)	-0.239*** (-17.38)	-0.205*** (-14.96)
AS	-0.024*** (-4.50)	-0.013*** (-2.37)	-0.023*** (-4.25)	-0.015*** (-2.79)
*T*obQ	0.005*** (10.95)	0.005*** (11.32)	0.005*** (11.08)	0.005*** (10.73)
*I*nd	0.015 (1.00)	0.020 (1.32)	0.016 (1.03)	0.018 (1.21)
*S*pvbo*ard*	-0.001 (-1.09)	-0.001 (-1.10)	-0.002** (-1.97)	-0.000 (-0.40)
-cons	0.107*** (5.46)	0.095*** (4.87)	0.101*** (5.13)	0.109*** (5.60)
N	11834	11834	11834	11834
*I*ndustryFE	YES	YES	YES	YES
*Y*ear*FE*	YES	YES	YES	YES
F	110.28	115.38	91.65	130.84
R^2	0.0767	0.0800	0.0645	0.0899

The relationship between EM, AQ, and DF method increment and DF increment in model 2 are shown in Table 6. Under the influence of audit quality, the impact of DF increment on EM changes. The regression coefficient between the interaction of AQ and total DF increment and the degree of EM is -0.051, which shows a significant negative correlation at the level of 1%, that is, the higher the audit quality, the less the impact on DF and EM.

Table 6. The relationship between EM, AQ, and DF method increment and DF increment in model 2

-	abs*EM*（1）	abs*EM*（2）	abs*EM*（3）	abs*EM*（4）
BLI	0.166*** (12.82)	-	-	-
CI	-	0.205*** (12.98)	-	-
CBI	-	-	0.010 (1.04)	-
DI	-	-	-	0.104*** (16.93)
AQ	-0.006*** (-3.54)	-0.005*** (-3.01)	-0.008*** (-4.79)	-0.004*** (-2.06)
*BLI * AQ*	-0.098*** (-6.05)	-	-	-
*CI * AQ*	-	-0.099*** (-6.90)	-	-
*CBI * AQ*	-	-	-0.091 (-0.70)	-
*DI * AQ*	-	-	-	-0.051*** (-6.60)
*L*ev	0.059*** (11.41)	0.056*** (10.96)	0.068*** (13.38)	0.049*** (9.41)
Size	-0.003*** (-3.52)	-0.003*** (-3.21)	-0.003*** (-3.19)	-0.003*** (-3.87)
ROA	0.140*** (7.26)	0.149*** (7.80)	0.175*** (9.14)	0.117*** (6.11)
OCF	-0.193*** (-13.69)	-0.247*** (-18.14)	-0.237*** (-17.27)	-0.203*** (-14.89)
AS	-0.024*** (-4.45)	-0.012*** (-2.30)	-0.023*** (-4.19)	-0.014*** (-2.71)
*T*obQ	0.005*** (11.18)	0.006*** (11.52)	0.005*** (11.23)	0.005*** (11.02)
*I*nd	0.014 (0.92)	0.020 (1.31)	0.016 (1.04)	0.017 (1.13)
*S*pvbo*ard*	-0.001 (-1.15)	-0.001 (-1.15)	-0.002** (-2.04)	-0.000 (-0.42)
-cons	0.100*** (5.15)	0.090*** (4.61)	0.096*** (4.89)	0.102*** (5.27)
N	11834	11834	11834	11834
*I*ndustryFE	YES	YES	YES	YES
*Y*ear*FE*	YES	YES	YES	YES
F	96.53	99.33	77.71	113.99
R^2	0.0816	0.0838	0.0666	0.0950

The regression coefficient between AQ and bank loan increment and EM is -0.098. The regression coefficient between the interaction of AQ and business credit and EM degree is -0.099, and both of them show a significant negative correlation at the level of 1%. The higher the audit quality, the lower the impact on bank loans, commercial increment, and EM. The regression coefficient of AQ and corporate bonds to EM is -0.091, but it is not significant. In regard to corporate bond financing and EM, AQ has no impact, which is consistent with the three presumptions mentioned above. Therefore, AQ can greatly reduce the positive effect of bank loans and commercial credit increment on EM, but it cannot affect the regulatory effect of corporate debt increment on EM.

This study uses a large number of data and analytical methods to explore the relationship between earnings management behavior and debt Financing. The empirical results indicate that there is a certain correlation between these two factors. At the same time, the empirical results also indicate the impact of the interaction between control variables on this relationship. From the results of descriptive statistical analysis, it can be seen that the degree of earnings management of most enterprises is relatively stable, and different listed enterprises have certain differences in the amount of debt financing increment. On this basis, through correlation analysis and regression analysis, the following results are obtained: First, the degree of earnings management is positively related to debt Financing and the increment of debt financing, while the degree of earnings management is negatively related to audit quality. This can be understood as that when facing financing needs, enterprises will affect the increase of debt Financing by adjusting earnings management behavior in order to maintain profitability; Secondly, from the results of regression analysis, it can be seen that when interaction terms appear in the control variables, audit quality has a moderating effect on the relationship between bank loans, commercial credit increment, and earnings management. This indicates that in reality, more consideration needs to be given to the impact of the interactions between different variables on the results. In practical applications, these results may have significant implications for businesses and policymakers. For example, in the case of high audit quality, to reduce the impact of debt financing, enterprises can actively adjust earnings management behavior to reduce financing costs. At the government level, relevant policies can be formulated to guide enterprises to achieve more stable financial operations. In conclusion, this study provides a method to explore the relationship between earnings management and debt financing behavior and suggests further exploring other possible factors in future research to better understand the interaction of these two factors.

Through empirical research on the data of A-share listed companies, this study systematically analyzes the relationship between debt financing increment and earnings management and considers the impact of multiple regulatory factors on the relationship, including audit quality, debt Financing methods, etc. The research results have high credibility and explanatory power and have important reference value for an in-depth understanding of corporate financial management and its influencing factors. In addition, in terms of research methods, the study adopted a multiple regression analysis method to consider multiple factors, effectively avoiding the impact of a single factor, and more comprehensively and objectively presenting the relationship between debt Financing and earnings management. Therefore, the advantage of this study is that it comprehensively considers the impact of multiple factors on the relationship between debt financing increment and earnings management, and the results are highly reliable and explanatory, which has enlightenment and reference value for the practice and theoretical research of enterprise financial management.

4.4 Robustness Test

In the robustness test, two kinds of test methods are used to test the robustness of model parameters and the regression function. Table 7 displays the results of the model parameters' robustness test.

Table 7. Robustness test

Sample size	Change of parameters	Variation range of variable parameters										Confidence interval
		0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	
50	Standard deviation	0.055	0.056	0.055	0.044	0.049	0.055	0.054	0.053	0.052	0.051	[0.047,0.055]
80		0.048	0.055	0.053	0.054	0.051	0.045	0.051	0.056	0.055	0.052	
110		0.049	0.055	0.051	0.051	0.053	0.055	0.047	0.052	0.055	0.056	

Table 8. Results of the robustness test of EM, DF, and DF methods

-	abs*EM*（1）	abs*EM*（2）	abs*EM*（3）	abs*EM*（4）
BLI	0.122*** (14.48)	-	-	-
CI	-	0.194*** (18.81)	-	-
CBI	-	-	0.002 (1.02)	-
DI	-	-	-	0.092*** (22.82)
Lev	0.051*** (9.90)	0.046*** (8.96)	0.063*** (12.26)	0.037*** (7.17)
Size	-0.003*** (-3.28)	-0.003*** (-2.82)	-0.003*** (-2.88)	-0.003*** (-3.67)
ROA	0.132*** (6.81)	0.135*** (7.02)	0.173*** (8.92)	0.098*** (5.11)
OCF	-0.199*** (-14.00)	-0.261*** (-19.08)	-0.250*** (-17.98)	-0.207*** (-15.08)
AS	-0.030*** (-5.65)	-0.016*** (-2.87)	-0.029*** (-5.35)	-0.019*** (-3.54)
*T*obQ	0.006*** (12.00)	0.006*** (12.50)	0.006*** (12.13)	0.006*** (11.76)
*I*nd	0.005 (0.31)	0.011 (0.72)	0.005 (0.34)	0.008 (0.55)
*S*pvbo*ard*	-0.001 (-0.81)	-0.001 (-0.66)	-0.002** (-1.81)	-0.000 (-0.15)
-cons	0.099*** (5.02)	0.084*** (4.32)	0.92*** (4.65)	0.102*** (5.25)
N	11834	11834	11834	11834
*I*ndustryFE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
F	122.70	139.89	98.15	159.83
*A*dj.R-Square	0.0847	0.0955	0.0688	0.1078

The sample size changes along the scale of 50, 80, and 110 in the test. The parameters vary from 0.0 to 0.9. With the change of parameters and sample size, the confidence interval of the model is always within the range of 0.047 to 0.055. The model itself has the advantages of parameter operation robustness and

performance. It can be inferred that even when encountering small range parameter changes or sample size changes in practical applications, the model is likely to still maintain reliable performance. Therefore, when using this model, it is more reassuring to adjust parameters or change the scale of data collection without worrying about the potential impact on the performance of the model. This also provides greater flexibility and security guarantees for the practical application of the model. At the same time, the application value of this model has also been effectively validated in areas involving high reliability or stability.

To ensure the stability of the proposed model, the extended Jones model is used to verify the practicability of the modified Jones model. The robustness test results of EM, DF, and DF methods are shown in Table 8. The commercial credit increment, bank loan, total asset financing, and EM still show a significant positive correlation, below 1%. There is no obvious correlation between the increase in corporate debt and the degree of EM. The robustness tests of EM, audit quality, DF, and DF methods show that AQ is a good regulatory variable, and significantly weakens the positive effect of the increment of industrial credit, bank loan, and total DF on EM. The AQ cannot well adjust the relationship between the increase of corporate debt and the degree of EM. This is consistent with the hypothesis proposed in the study and the regression results mentioned above. Therefore, the proposed model is stable.

It can be considered that the modified Jones model is reliable, and has certain practicability in studying the relationship between earnings management, debt financing, and debt financing. In addition, audit quality also plays a certain role in regulating this relationship. When enterprises conduct earnings management, business credit increment, bank loan increment, or total debt financing increment, audit quality can play a role in limiting and controlling, thus improving the robustness and sustainability of enterprises. Therefore, when conducting earnings management and debt Financing, enterprises should improve audit quality as much as possible, adopt reasonable and stable financing methods, and avoid negative impacts on the financial stability of enterprises. In conclusion, the modified Jones model is reliable and practical in studying the relationship between earnings management, debt Financing, and debt Financing. Audit quality can be used as a regulating variable to control the earnings management behavior and debt financing of enterprises. When conducting earnings management and debt financing, enterprises should pay attention to avoiding excessive borrowing and earnings management, and adopt reasonable and stable financing methods to ensure financial stability and sustainable development.

5 Conclusion and Inspiration

Through theoretical analysis of the relationship between AQ, DF, and EM, this paper puts forward the interaction between different DF methods and EM of enterprises, and the role of AQ in their impact. The empirical analysis results show that more DF enterprises, whether through bank loans or commercial credit financing enterprises use the most, trigger corporate managers to manage corporate earnings, increase their advantages, and then make corporate DF higher. Bond financing has little impact on EM. AQ can reduce the impact of bank loans and commercial credit DF on EM, but it has little impact on bond financing. For the company, when faced with operational and financial difficulties, the company's operators should properly adopt EM measures to avoid financial risks and default. At the same time, they can also obtain more financing to improve the production efficiency of enterprises. However, earnings information should be used reasonably. The long-term operation of the enterprise should pay more attention. To support the enterprise's successful development, the management capability of the business is enhanced, making investors more confident. For creditors, before and after investment, creditors should reduce their dependence on the evaluation of enterprise earnings information, objectively and comprehensively understand the

enterprise's operating ability and loan repayment ability, and carefully examine the specific financial information and profitability of the enterprise. In the operation, it is also necessary to supervise, and improve the debt contract, reduce the operation of enterprises through surplus information, maintain the operation of enterprises, understand the direction of financing funds, ensure the safety of funds, and reduce risks. For the market supervision department, many listed companies in China have EM. It is mainly caused by the information asymmetry between the debtor and the debtor. Most financing entities, including bank loans, only pay attention to the financial information of the enterprise and rarely know the specific scale and operating capacity of the enterprise, which also increases the risk of financing. Relevant departments should effectively monitor the financial information of enterprises and the capital trend of debt financing, and disclose major events of the company.

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APPENDIX

Table 4. Variable Correlation Analysis

\	absEM	BLI	CI	CBI	DI	AQ	Lev	Size	ROA	OCF	AS	TobQ	Ind	Spvboard
absEM	1.000	0.074***	0.096***	0.008	0.134***	-0.042***	0.078***	-0.042**	0.032***	-0.127***	-0.156***	0.0547***	0.024**	-0.044***
BLI	0.173***	1.000	0.196***	-0.017*	0.623***	0.012	0.182***	0.101***	-0.005***	-0.256***	-0.097***	-0.087***	0.008	-0.028***
CI	0.151***	0.323***	1.000	0.024***	0.638***	0.021***	0.138***	0.097***	0.126**	0.027***	-0.168***	-0.032***	-0.009	-0.057***
CBI	0.015	0.006	0.042***	1.000	0.138***	0.006	0.142***	0.168***	-0.021***	-0.025***	-0.035***	-0.134***	-0.006	0.036***
DI	0.217***	0.716***	0.719***	0.176***	1.000	0.018***	0.244***	0.147***	0.098***	-0.169**	-0.203***	-0.078***	0.008	-0.067***
AQ	-0.056***	0.011*	0.007***	-0.012	0.007	1.000	0.021**	-0.083***	0.035***	0.052***	0.013	-0.034***	0.001	0.015
Lev	0.065***	0.487***	0.156*****	0.083***	0.217***	0.023**	1.000	0.534***	-0.415**	-0.168***	0.024**	-0.627***	-0.015*	0.232***
Size	-0.054***	0.101***	0.094***	0.087***	0.134***	0.108***	0.524***	1.000	-0.068***	0.043***	0.009	-0.706***	-0.025***	0.297***
ROA	0.013	-0.005	0.086	0.025***	0.067***	0.042***	-0.384**	-0.032**	1.000	0.387***	-0.134***	0.364***	-0.027***	-0.125***
OCF	-0.175***	-0.248***	0.013***	-0.056***	-0.151**	0.048***	-0.175**	0.045***	1.001	1.000	0.0268	0.098***	-0.025***	0.024***
AS	-0.126***	-0.088***	-0.154***	-0.076***	-0.161**	0.017**	0.076*	0.086***	0.386***	0.263***	1.000	-0.128***	-0.058***	0.157***
TobQ	0.103***	-0.064***	-0.048***	-0.052***	-0.054**	-0.027**	-0.461**	-0.588**	0.256***	0.078***	-0.167**	1.000	0.049***	-0.294***
Ind	0.023**	0.011	-0.014	-0.003	0.001	0.005	-0.017*	0.001	-0.017***	-0.024**	-0.056**	0.072***	1.000	-0.085***
Spvboard	-0.051***	-0.042***	-0.053***	-0.012	-0.062	0.017*	0.226***	0.331***	-0.094***	0.026***	0.195***	-0.214***	-0.097***	1.000

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