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## KM Theory Applied in Accounting and Statistics Education: Case on the Cost of Debt

Bin Li

School of Economics and Management, Beijing University of Chemical Technology  
No.15 Bei-san-huan Dong-lu, Chaoyang District, Beijing 100029, P.R. China

Fangfang Han

School of Economics and Management, Beijing University of Chemical Technology  
No.15 Bei-san-huan Dong-lu, Chaoyang District, Beijing 100029, P.R. China

Jiahe Liu

School of Economics and Management, Beijing University of Chemical Technology  
No.15 Bei-san-huan Dong-lu, Chaoyang District, Beijing 100029, P.R. China

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### ABSTRACT

This study examines the impact of audit opinions on the cost of debt based on accounting education and knowledge management theory. The empirical results of whole sample regression show that audit opinions are negatively correlated with the cost of debt and financial marketization weakens the effect of audit opinions on debt pricing. The subsample regression results of audit opinions indicate that financial marketization is negatively correlated with the cost of debt only in companies with modified audit opinions. This implies that audit opinions play a more important role in debt pricing compared to the financial marketization of companies' localities.

**Keywords:** financial marketization, audit opinion, cost of debt, debt pricing

### INTRODUCTION

Knowledge management, as an effective tool for companies to promote performance (Darroch, 2005; Mills and Smith, 2011; Andreeva and Kianto, 2012), has been well-known in recently years. Advance Collegiate Schools of Business International (AACSB) have also emphasized the importance of integrating Big Data and technology into the accounting curriculum (Sledgianowski, Gomaa, and Tan, 2017). This study examines the relation between companies' audit opinions from auditors and the cost of debt based on knowledge management theory, which expands the application of knowledge management in debt financing field.

The debt financing has an important implication on the companies, since the companies with debt borrowed from banks grow faster than other sectors (Ayyagari, Demirgüç-Kunt, and Maksimovic, 2010). Auditing plays an important role in credit decision-making process by providing auditing reports on companies' financial statements. Nevertheless, the extent of financial information that users achieve from these reports is still under discussion (Church, Davis, and Mccracken, 2008; DeFond and Zhang, 2014).

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**Correspondence:** Bin Li, *School of Economics and Management, Beijing University of Chemical Technology, P.R. China.*

✉ [libin@mail.buct.edu.cn](mailto:libin@mail.buct.edu.cn)

#### **State of the literature**

- Knowledge management is taken as the continuous process of providing the right knowledge at the right time to members who need it to help them take the right action and consequently improve the organizational performance.
- Audited financial statements are the most important information source of lenders' knowledge management in the course of credit decision-making.
- This study examines the relation between companies' audit opinions from auditors and the cost of debt based on knowledge management theory, which expands the application of knowledge management in debt financing field.

#### **Contribution of this paper to the literature**

- This study indicates a negative significant relation between companies' audit opinions from auditors and the cost of debt based on knowledge management theory.
- This study provides empirical evidence that the financial marketization of companies' localities weakens the effect of audit opinions on debt pricing.
- This study also notices that the cost of debt of companies issued clean opinions has nothing to do with financial marketization of its locality.

Some empirical studies report that selecting auditors with brand name decreases the borrowing cost in public companies (Pittman and Fortin, 2004; Mansi et al., 2004). For privately-held companies, selecting specific auditors reduces the cost of debt and improves credit ratings by releasing the problem of information asymmetry (Berger and Udell, 2006; Karjalainen, 2008, 2011). However, Fortin and Pittman (2007), adopting private company sample, find that selecting auditors has no significant negative effect on the cost of debt. Dhaliwal et al. (2008) find that audit fees charged by auditors with brand name are negatively correlated with the cost of debt.

Chen et al. (2016) issue that companies with two kinds of Modified Audit Opinions (MAOs) have fewer debt contracts and loans, or get them with about 17 basis points higher interest spreads than companies with standard opinions or even there are strict requirements asked by lenders on collaterals. Besides, Jiang (2008) suggests that beating zero earnings benchmarks generally reduce the cost of debt. Rahaman and Zaman (2013) find that the improvement of companies' management quality has a mitigating effect on the cost of bank loans.

Auditing is one of the important factors that affect companies' debt financing (Chen et al., 2016), and a few studies explore the application of knowledge management in financial field (Oluikpe, 2012; Shah, Rahneva, and Ahmed, 2014), however, there is few literature focuses on the relation between audit opinions and the cost of debt from the perspective of knowledge management. Therefore, adopting the sample of 5763 firm-year observations from 1500 A-listed firms during the period of 2005 to 2009 in China, this study examines the impact of audit opinions on the cost of debt based on knowledge management theory.

## **LITERATURE REVIEW AND HYPOTHESES**

### **Knowledge Management**

Everyone faces all kinds of data all the time, but data are not equivalent to knowledge. Nonaka and Takeuchi (1995) divide data into four different dimensions: data, information, knowledge and wisdom. Data is the basic element of knowledge and data alone have no any meaning; information comes from analyzed data to meet the certain purposes of somebody; and knowledge comes from the value-added process of organizing, analyzing and integrating information (Nonaka, 1994; Wu et al., 2016). Knowledge is an intangible resource and often classified as either implicit or explicit (Massingham, 2014a). Knowledge management, as one of the most promising ways for organizations to succeed in the information age, has captured the attention of companies (Malone, 2002; Wang, 2013). Massingham evaluates a range of best practice knowledge management ideas used to manage knowledge resources (Massingham, 2014a), flows and enablers (Massingham, 2014b). Some empirical studies find

positive relation between knowledge management and companies' performance. Darroch (2005) finds that companies with knowledge management capability will use resources more efficiently and perform better. The research results of Mills and Smith (2011) show that some knowledge resources are directly related to organizational performance. Andreeva and Kianto (2012) also find that knowledge management practices have significant influence on both financial performance and competitiveness of companies.

Gold, Malhortra, and Segars (2001) examine the issue of effective knowledge management from the perspective of organizational capabilities and present that acquisition, conversion, application, and protection are essential organizational capabilities for effective knowledge management. Cui, Griffith, and Cavusgil (2005) also emphasize the importance of knowledge acquisition, conversion, and application for knowledge management capabilities, and find both competitive intensity and market dynamism influence knowledge management capabilities. The research results of Liao and Wu (2010) indicate that organizational learning is the mediating variable between knowledge management and organizational innovation. In the field of finance, Oluikpe (2012) explores the development of a knowledge management strategy at the Central Bank of Nigeria (CBN) and finds focusing knowledge management on the Bank's payments system process help create value and drive business results. Shah, Rahneva, and Ahmed (2014) report on knowledge management practices in the customer service and lending departments of one of Bulgaria's top retail banks and investigate how knowledge management processes can be further improved. The findings of Shah, Rahneva, and Ahmed (2014) will potentially help in improving knowledge sharing practice as well as provide a valuable insight into knowledge management related issues.

### **The Relation between Audit Opinions and the Cost of Debt**

Lenders' credit decision-making is also of a process of knowledge management. Lenders acquire all the necessary information about borrowers through different channels and convert it into the knowledge about borrowers' credit position and debt paying ability. After matching the knowledge with the requirements of issuing loan, lenders finish the credit decision-making process through applying the knowledge and form the final terms of debt covenants. Generally speaking, audited financial statements are the most important information source of lenders' knowledge management in the course of credit decision-making.

When the data sets are now larger than ever before and better data analytic software is available, the primary goal of accounting has always been creating and providing information to internal and external decision makers (Janvrin and Watson, 2017). Some studies indicate that audited financial statements ease the information asymmetry by providing results of evaluation of borrowers' worthiness and debt risk (Ohlson, 1980). Tirole (2007) emphasizes that lenders estimate the default risk of borrowers by evaluating the market value and liquidation of assets and investigating the character and ability of managements. Minnis (2011) finds that informative audited financial statements have been paid extra attention by lenders when they are setting the interest; besides, accruals disclosed through audited financial reports provide creditors future cash flows of companies. Chen et al. (2016) suggest that auditors play an important role during this process through the audit report, and the audit report has become a valuable instrument since auditors gather all the significant evidence and have an estimation or test with the financial statement provided by a firm in advance and communicate with users by explanatory language before issuing this audit report with a cogent opinion. Previous studies show that shareholders have a negative reaction when they concern about a modified auditing opinion provided by the auditor (Menon and Williams, 2010).

Chen et al. (2016) find that audit opinions play an important role in debt contracting through the communication of private information between auditors and lenders about borrowers' financial condition and debt, and this private information is not available in corporate reports. Non-standard audit opinions reveal the auditors' judgments of debtors' potential default risk and losses, and convey suspect or alert signals to lenders. And a company which is provided with the MAO may suffer from a higher probability of bankruptcy (Mutchler, Hopwood, and Mckeown, 1997).

Overall, the first hypothesis is described as follows:

**H<sub>1</sub>: Compared to modified audit opinions, clean opinions lower the cost of debt.**

## The Moderating Effect of Financial Marketization

Lenders' credit decision-making process usually happens in the open market environment. Peev (2015) finds that economic liberalization has an indirect effect on external financing. Luo and Park (2001) indicate that environmental factors are an important consideration for a company when determining strategy. Cui, Griffith, and Cavusgil (2005) find both competitive intensity and market dynamism influence knowledge management capabilities. The regions with higher financial marketization level have larger numbers of competitive financial institutions. Therefore, the financial marketization level may also affect lenders' credit decision-making process.

By investigating 17 Chinese owners and managers of companies from Zhejiang and Jiangsu province, two of the most developed regions in China, Allen, Qian, and Qian (2005) state that throughout the start-up and subsequent period of the company, it is able to achieve the external capital from alternative channels like state-owned commercial banks, private credit agencies, multiple financial institutions and their relatives or friends. Otherwise, the survey evidence shows that because of the disclosure of important information to outsiders and competitors and a large amount of cost, companies in areas with developed financial markets incline to choose local numerous financial institutions for the need of financing (Allen, Qian, and Qian, 2005).

After acquiring above market environment information and converting it into useful knowledge, lenders will take the market environment factor into their credit decision-making process and relax the examination of borrowers' qualifications like financial statements and audit reports to build the share of credit market and improve the performance. Audit opinions are not the only issue lenders concern about in credit decision-making process but collaterals are required for recovering the potential loss caused by the default risk (Karjalainen, 2008).

Therefore, as the results of knowledge management, lenders recognize that borrowers have limited channels to obtain external debts and lenders take the predominant place in underdeveloped financial markets, thus lenders may require borrowers to provide financial reports with clear audit opinions. However, in the developed financial markets, lenders know that borrowers have more channels to obtain external debts, and lenders may relax the restriction of contractual terms including audit opinion to make better market performance.

Accordingly, the second hypothesis is proposed:

**H<sub>2</sub>: Financial marketization weakens the effect of audit opinions on debt pricing.**

## METHODOLOGY

### Data Source and Sampling Procedure

This study obtains data from the China Stock Market and Accounting Research (CSMAR) database, which provides public financial data or stock price and is widely used in research in China like the COMPUSTAT/CRSP of US (Lennox, Wu, and Zhang, 2016). In addition, this study uses the subindex from the *NERI INDEX of Marketization of China's Provinces 2011 Report* written by Fan, Wang, and Zhu (2011), an authoritative book which has been highly evaluated and widely applied.

There are 5763 firm-years observations of 1500 A-listed companies in China from 2005 to 2009 eventually after dropping some observations. We first drop 156 firm-years within the finance and insurance industry from initial 8235 firm-years. Then we delete 872 firm-years which are neither SOEs nor private firms during the five-year period. Next, we exclude 1410 firm-years with missing data on audit. Finally, by dropping 34 firm-years with missing data on other control variables and making a winsorization for the dependent variable on a quantile of 1% and 99%, we get an unbalanced panel data with 1500 firms from 2005 to 2009.

### Empirical Model and Variables Definitions

To examine the relation between companies' audit opinions from auditors and the cost of debt and test two mentioned hypotheses, this study construct the following empirical model.

**Table 1.** Variable Definitions

Variables	Description
<i>Cost</i>	The percentage of the sum of the interest expense plus fees and other financial expenses divided by total liabilities.
<i>Opinion</i>	An indicator variable, which equals 1 if the firm receives a clean opinion from the auditor, and zero otherwise.
<i>Marketization</i>	A proxy of the financial marketization level in China, which is calculated according to the method of Fan, Wang, and Zhu (2011).
<i>Big_Four</i>	An indicator variable, which equals 1 if the firm hires the auditor from big four audit firms, and zero otherwise.
<i>Fee</i>	The natural log of total fees that the firm pays to the audit firm.
<i>Private</i>	An indicator, which equals 1 if the firm is a private-owned, and zero otherwise.
<i>Asset</i>	The natural log of total assets, estimated at the end of a year.
<i>Lev</i>	Total liabilities divided by total assets, estimated at the end of a year.
<i>Roa</i>	The sum of total profits plus financial expenses divided by total assets.
<i>Ppe</i>	The sum of total inventories plus fixed assets divided by total assets.
<i>Current</i>	Current assets divided by current liabilities.
<i>Liquid</i>	The natural logarithm of the quotient of fixed assets divided by total assets.
<i>Maturity</i>	Long-term loans divided by total assets.
<i>Year</i>	A variable that is used to control the effect of year.
<i>Industry</i>	A variable that is used to control the effect of industry.

$$\begin{aligned}
 Cost_{it} = & a + b_1Opinion_{it-1} + b_2Marketization_{it} + b_3Marketization_{it} * Opinion_{it-1} + b_4Big\_Four_{it-1} + b_5Fee_{it-1} \\
 & + b_6Private_{it} + b_7Asset_{it} + b_8Lev_{it} + b_9Roa_{it} + b_{10}Ppe_{it} + b_{11}Current_{it} + b_{12}Liquid_{it} \\
 & + b_{13}Maturity_{it} + Year_{it} + Industry_{it} + e_{it}
 \end{aligned}$$

*Cost* is the dependent variable, which indicates the cost of debt. According to Pittman and Fortin (2004) and Minnis (2011), we get the value of *Cost* by calculating the percentage of net financial fees divided by total liabilities. *Marketization* is a proxy of the financial marketization level in China, which indicates the degree of provincial financial markets competition and debt funds distribution in China (Fan, Wang, and Zhu, 2011). *Opinion* is a proxy of audit opinion, which equals 1 if the firm receives a clean opinion from the auditor, and zero otherwise. To test the two hypotheses, we observe the influence coefficients of *Opinion* and its interaction variable *Marketization\*Opinion*.

According to Karjalainen (2011), we put *Big\_Four* and *Fee* into model to measure the audit quality of Chinese companies. We also control the different impact between private-owned firms and non-private-owned ones by introducing *Private*, which indicate the ownership of firms. As for firm size, Pittman and Fortin (2004) use the natural logarithm of normalized total assets to measure firm size since larger firms are perceived to suffer from less risk and cause a larger number of loan interests. Blackwell, Norland, and Winters (1998) prove that taking the logarithm brings an expected result of decreasing marginal effect of firm size. To control the value of collaterals, we use *Ppe* as a proxy (Pittman and Fortin, 2004). In addition, *Lev* and *Maturity* are controlled for potential effects (Karjalainen, 2011). Lennox, Wu, and Zhang (2016) compare the profitability before and after audit by *Roa*. What is more, we introduce *Current*, *Liquid* for additional control variables.

**Table 2.** Whole Sample Regression Results

Fixed-effects Regression					Random-effects Regression				
Variables	Expected Sign	Coef.	t	P> t	Variables	Expected Sign	Coef.	z	P> z
<i>Opinion</i>	-	-0.020***	-4.85	0.000	<i>Opinion</i>	-	-0.016***	-4.40	0.000
<i>Marketization</i>	-	-0.001*	-1.73	0.084	<i>Marketization</i>	-	-0.001*	-1.76	0.079
<i>Marketization *Opinion</i>	+	0.002***	4.07	0.000	<i>Marketization *Opinion</i>	+	0.001***	3.01	0.003
<i>Big_Four</i>	-	-0.003*	-1.78	0.075	<i>Big_Four</i>	-	-0.006***	-4.42	0.000
<i>Fee</i>	+	0.003***	3.62	0.000	<i>Fee</i>	+	0.003***	5.04	0.000
<i>Private</i>	+	0.003*	-1.88	0.061	<i>Private</i>	+	0.001	1.27	0.203
<i>Asset</i>	-	-0.003***	-4.82	0.000	<i>Asset</i>	-	-0.003***	-6.31	0.000
<i>Lev</i>	-	-0.003**	-1.99	0.047	<i>Lev</i>	-	-0.001***	-2.98	0.003
<i>Roa</i>	-	-0.001**	-2.14	0.032	<i>Roa</i>	-	0.000***	-3.24	0.001
<i>Ppe</i>	+	0.010***	4.36	0.000	<i>Ppe</i>	+	0.012***	6.14	0.000
<i>Current</i>	-	-0.002***	-13.04	0.000	<i>Current</i>	-	-0.003***	-22.77	0.000
<i>Liquid</i>	+	0.003***	5.89	0.000	<i>Liquid</i>	+	0.003***	8.06	0.000
<i>Maturity</i>	+	0.001	0.14	0.888	<i>Maturity</i>	+	0.015***	4.65	0.000
N		5763			N		5763		
Adj R-squared		0.09			Adj R-squared		0.08		

Table 2 presents the empirical results of Equation by using the Fixed-effects and Random-effects regression for whole sample from 2005 to 2009. These superscript asterisks \*\*\*, \*\* and \* reveal coefficients' significant level at 1%, 5% and 10% separately. Coefficients only significant at 10% level or better are reported. To check variables definitions, please review the Table 1.

We use the *Industry Classification Guidance for listed firms 2001* issued by China Securities Regulatory Commitment (CSRC) to divide companies into different groups of industries, and then we control the *Industry*. From the beginning of 2006, a great change has happened that for Chinese audit agencies, the public clients' reports of pre- and post-audit values of pre-tax earnings and total assets are required by the regulator (Lennox, Wu, and Zhang, 2016), hence we control the *Year*.

All the variables in the model are defined in [Table 1](#).

## RESULTS

### Whole Sample Regression Results

We use different regression methods to examine two hypotheses. Regression results of equation are revealed in [Table 2](#). Additionally, the year and industry have been controlled in all these regressions.

Consistent with our expectations, *Opinion* has a significant negative impact on *Cost* in both fixed-effects regression and random-effects regression. This indicates that, compared to modified audit opinions, clean opinions lower the cost of debt of companies. The hypothesis H<sub>1</sub> is confirmed by the sample data.

Likewise, the coefficient of *Marketization \* Opinion* is positive and significant in both fixed-effects regression and random-effects regression, which shows the mitigating effect of financial marketization on audit opinions to the debt pricing. In other words, financial marketization weakens the impact of audit opinions on debt pricing. The hypothesis H<sub>2</sub> is also confirmed by the sample data.

### Subsample Regression Results

In order to further observe the impact of financial marketization on the cost of debt of firms with different audit opinions, we divide the sample by *Opinion* into two subsamples. One subsample includes companies with clean audit opinions (*Opinion* = 1), and the other subsample includes companies with MAOs (*Opinion* = 0). We rerun the regression using two subsamples and report the results in [Table 3](#).

**Table 3.** Subsample Regression Results

<i>Opinion=1</i>					<i>Opinion=0</i>				
Variables	Excepted Sign	Coef.	t	P> t	Variables	Excepted Sign	Coef.	t	P> t
<i>Marketization</i>	-	0.000	-1.26	0.209	<i>Marketization</i>	-	-0.012***	-3.23	0.001
<i>Big_Four</i>	-	-0.007***	-5.23	0.000	<i>Big_Four</i>	-	-0.029	-0.75	0.455
<i>Fee</i>	+	0.003***	5.06	0.000	<i>Fee</i>	+	0.047***	3.55	0.000
<i>Private</i>	+	0.004***	4.98	0.000	<i>Private</i>	+	-0.031**	-2.30	0.022
<i>Asset</i>	-	-0.003***	-8.32	0.000	<i>Asset</i>	-	-0.044***	-6.44	0.000
<i>Lev</i>	-	0.006***	2.97	0.003	<i>Lev</i>	-	-0.003***	-2.64	0.009
<i>Roa</i>	-	-0.005*	-1.85	0.064	<i>Roa</i>	-	-0.001**	-2.36	0.019
<i>Ppe</i>	+	0.011***	5.03	0.000	<i>Ppe</i>	+	-0.046	-1.22	0.222
<i>Current</i>	-	-0.006***	-34.86	0.000	<i>Current</i>	-	0.000	0.02	0.984
<i>Liquid</i>	+	0.003***	6.92	0.000	<i>Liquid</i>	+	-0.004	-0.63	0.531
<i>Maturity</i>	+	0.037***	9.70	0.000	<i>Maturity</i>	+	0.045	0.77	0.443
N		5267			N		496		
F		101.81			F		2.43		
Adj R-squared		0.3415			Adj R-squared		0.0698		

Table 3 presents the empirical results of subsample regression divided by audit opinions. The number of observations with clean opinions in 2005-2009 is 5267, while there are 496 observations with MAOs. These superscript asterisks \*\*\*, \*\* and \* reveal coefficients' significant level at 1%, 5% and 10% separately. Coefficients only significant at 10% level or better are reported. To check variables definitions, please review the Table 1.

We find that for companies with clean opinions, the provincial financial marketization does not reduce the cost of debt. Financial marketization is negatively correlated with the cost of debt only in companies with modified audit opinions.

## DISCUSSION

### Empirical Findings

Chinese setting makes it possible to investigate the relevance between audit opinions and the cost of debt in China in consideration of provincial marketization level based on knowledge management theory. We set two hypotheses and find empirical results by examining the full sample that audit opinions can lower the cost of debt whereas the financial marketization weakens the impact of audit opinions on debt pricing in China. Thereafter by running the regression of the subsample observations with clean opinions and MAOs, we find that financial marketization is negatively correlated with the cost of debt only in companies with modified audit opinions.

### Major Contributions

This study contributes to the literature of debt pricing and provides the evidence from China. Firstly, this study indicates a negative significant relation between companies' audit opinions from auditors and the cost of debt based on knowledge management theory. Secondly, this study provides empirical evidence that the financial marketization of companies' localities weakens the effect of audit opinions on debt pricing. Thirdly, this study also notices that the cost of debt of companies issued clean opinions has nothing to do with financial marketization of its locality.

### Potential Limitations

This study is subject to several potential limitations. Firstly, this study focuses the relation between audit opinions and the cost of debt based on the sample of Chinese A-listed firms during the period of 2005 to 2009, and we cannot claim that it is also robust in other year before 2005 or after 2009. Secondly, our results indicate the characteristics of Chinese financial market, and may not generalize to other countries with different financial market structure and social conventions.

## CONCLUSION

Lenders' credit decision-making process is a process of knowledge management with knowledge acquisition, conversion, and application. Credit decision-making process also happens in open market environment. The lenders recognize the roles of audit opinions and financial marketization level and reflect it in the cost of debt through knowledge management.

Based on knowledge management theory, this study find the empirical evidence that audit opinions have a mitigating effect on debt pricing whereas the financial marketization of firms' localities weakens the effect of audit opinions on debt pricing. These conclusions have important policy implications for both lenders and borrower in Chinese debt financing market.

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