

Research on the Mechanism of Blockchain Technology Investment's Impact on Audit Fees

-- Based on the Analysis of China's A-share Listed Companies

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Abstract

This paper selects the financial data of China's A-share listed companies from 2016 to 2020, and analyzes the impact of blockchain technology investment on company audit expenses. The results show that there is a significant positive correlation between the blockchain technology investment and the company's audit expenses, that is, the more the company invests in blockchain technology, the higher the audit expenses will be. This is because the application of blockchain technology in listed companies will make auditors face higher risk of significant misstatement and audit risks, and then increase the related audit procedures, thus increasing the audit expenses. Conclusion The above results are still valid after robustness test and endogenous treatment. In this paper, the research on blockchain technology investment from the perspective of audit fees will help the theoretical circle to fully understand the potential effects of blockchain technology investment on social and economic development.

Keywords

Blockchain; Audit Expenses; Digital Economy.

1. Introduction

When presiding over the 18th collective study meeting of the Political Bureau of the CPC Central Committee, General Secretary Xi Jinping emphasized that the integrated application of blockchain technology plays an important role in new technological innovation and industrial transformation. First of all, as one of the representative technologies of financial technology, the importance of blockchain enabling the development of listed companies is becoming increasingly prominent, especially in the field of corporate financing. Development investment based on blockchain technology has positive significance for improving information reliability and security. Secondly, as a kind of market activity, the independent audit's charging standard is bound to be affected by the audit market environment, but it is not excluded to be controlled by other mechanisms, such as government, internal audit quality, company earnings management and many other factors. This paper makes an empirical study on the relationship between blockchain technology investment and audit fees of listed companies in China, and further discovers the potential influencing factors of audit fees.

This paper selects the financial data of China's A-share listed companies from 2016 to 2020, and analyzes the impact of blockchain technology investment on company audit expenses. It is concluded that there is a significant positive correlation between blockchain technology investment and company audit cost, that is, the more blockchain technology investment, the

higher audit cost. This is because the application of blockchain technology in listed companies will make auditors face higher risk of significant misstatement and audit risk, and then increase related audit procedures, thus increasing audit cost.

The contributions of this paper are as follows:

First, the data of China's A-share listed companies are used to test the relationship between blockchain technology investment and audit fees for the first time, which provides empirical evidence for internal audit risk to increase audit time and expands the influencing factors of audit pricing in China.

Secondly, the board of directors of the company can use the conclusion of this paper to adjust the investment in blockchain technology development, strengthen the coordination between internal auditors and certified public accountants, and adjust the audit fees, which is of great practical significance to improve the company's net cash flow and promote development.

2. Review of the Literature

First of all, according to the existing literature, it is found that with the continuous development of digital economy and society, blockchain technology is widely used for technical support of enterprises to improve production processes and reduce costs, while blockchain technology keeps its competitive advantage and produces improved performance [1]. It is a list of more and more records, which are linked together by encryption technology; At the same time, it is a distributed technology, which can improve the visibility and transparency of the storage system and allow transactions to be executed automatically, which ensures that a single version of the truth that helps to build trust is in the stored information. The blockchain has greatly improved the accuracy, efficiency and transparency of corporate governance [2].

Secondly, looking at the literature at home and abroad, it can be found that the research on audit fees starts from the general influencing factors of audit fees and gradually deepens to some specific influencing factors. Wang Zhenlin [3] found that the scale of listed companies, the complexity of economic business and other characteristics constitute the main factors that affect audit fees, but the risk factors of customers do not have an important impact. Han Housheng and Zhou Shengchun [4] found that audit fees were significantly related to the company's total assets, the number of subsidiaries, asset-liability ratio, audit opinion types and other factors. In view of the influencing factors such as accounting firms and audit tenure, the research results of Qi Jiangna [5] show that the audit fees of "Big Four" are significantly higher than those of local firms, which indicates that China needs high-brand firms, and listed companies, especially large ones, are willing to pay high fees for high-brand firms. Li Shuang [6] found that the audit pricing level was uneven at different stages of the audit term; With the extension of the audit term, the audit fees are gradually increasing.

3. Theoretical Analysis and Research Hypothesis

The implementation of blockchain will bring a series of risks related to strategic transformation to enterprises, including strategic risks, operational risks and financial risks. The implementation of enterprise blockchain technology will affect strategic risks from many angles. At the same time, the implementation of blockchain will affect the effectiveness of internal control of listed companies. From a positive perspective, the implementation of blockchain will improve the operational efficiency of four of the five elements of internal control, namely, risk assessment, control activities, information and communication and internal supervision. From another perspective, the characteristics of some aspects of blockchain will also reduce the inherent risks and control risks. Implementing blockchain can effectively reduce the degree of information asymmetry among information users, and then greatly

improve the stability and reliability of enterprise-related data, which should reduce the inherent risks of enterprises.

However, the use of blockchain technology by listed companies can not only improve the inherent risks of auditing, but also control risks. From another perspective, the reverse may also exist. Faced with higher inherent risk and control risk, or higher risk of material misstatement, auditors should invest more audit resources and carry out more substantive testing procedures to find problems and avoid risks, which will inevitably increase audit costs. Accordingly, this paper puts forward the following main assumptions:

Hypothesis H0: When the investment in blockchain technology of listed companies is higher, its audit cost is higher.

4. Research Design

4.1. Data Sources

This paper aims to study the impact of blockchain technology investment of China's A-share listed companies on audit fees, taking all A-share listed companies from 2016 to 2020 as the initial samples. In order to ensure the validity of the samples, the following procedures are followed: (1) Excluding financial industry companies; (2) Eliminate ST, PT and *ST companies; (3) eliminating the samples with missing data; After the above-mentioned screening and sorting process, this study finally got 1,028 valid sample observations. The relevant financial, auditing and blockchain investment data of listed companies in this paper were all taken from CSMAR database, and after manual calculation and sorting, in order to ensure the reliability of the samples, this paper checked the sample data with the annual reports of A-share listed companies. In addition, in order to reduce the influence of outliers on the research results, in the empirical analysis, this paper processed all continuous variables with 1% Winsorize.

4.2. Model Design

In order to test the impact of blockchain technology investment of listed companies on audit fees, this paper sets up the following model for empirical test.

$$FEE = \beta_0 + \beta_1 \text{Blockchain}_{i,t} + \beta_2 \text{ROA}_{i,t} + \beta_3 \text{LEV}_{i,t} + \beta_4 \text{SOE}_{i,t} + \beta_5 \text{PPE}_{i,t} + \beta_6 \text{INTAN}_{i,t} + \beta_7 \text{SIZE}_{i,t} + \beta_8 \text{GROWTH}_{i,t} + \beta_9 \text{AGE}_{i,t} + \beta_{10} \text{OCF}_{i,t} + \beta_{11} \text{BIG4}_{i,t} + \sum \text{Indcd} + \sum \text{Year} + \varepsilon \quad (1)$$

FEE is the audit fee of the listed company; Block chain is a measure of blockchain technology investment of listed companies.

4.3. Variable Setting

1. Explained variable (FEE): audit fee. In this paper, the annual total records of listed companies' audit fees in Guotai 'an database are selected as the original data, and on this basis, the logarithm is taken as the explained variable of the study.

2. Explanatory variables (Block chain): blockchain technology investment indicators. In this paper, referring to the existing literature on China's blockchain technology, the degree of blockchain technology involvement of listed companies and related news announcements in CNRDS database are selected as the measurement indicators, and the blockchain degree indicators are set to have a distribution of 1, 2, 3 and 4.

3. Control variables: In this paper, the following control variables are set in the model with reference to the existing literature: ROA (profit Profitability), LEV (financial leverage), SOE (property right nature), PPE (fixed asset ratio), INTAN (intangible asset ratio), SIZE (company size), GROWTH (growth), AGE (listed years), OCF (cash flow), BIG4 (audit supervision). The

specific calculation method is shown in Table 1. In addition, this paper also controls the Year fixed effect and Industry Code fixed effect.

Table 1. List of definitions and calculations of variables

Variable type	Variable name	Variable symbol	Variable definition
Explained variable	Audit expenses	FEE	Natural logarithm of audit fee
Explanatory variable	Blockchain investment	Block chain	Records related to blockchain investment of listed companies in RDS database
Control variable	profitability	ROA	Net profit/average total assets
	trading on equity	LEV	Total liabilities/average total assets
	Nature of the property right	SOE	If it is a state-owned enterprise, it is 1; otherwise, it is 0.
	Fixed assets ratio	PPE	Net fixed assets/average total assets
	Intangible asset ratio	INTAN	Net intangible assets/average total assets
	Company size	SIZE	Natural logarithm of average total assets
	Growth	GROWTH	Operating income growth rate
	flows	OCF	Net operating cash flow/average total assets
	Listing period	AGE	Take the natural logarithm after adding 1 to the listing period.
	Audit supervision	BIG4	If the annual report audit is undertaken by the "big four" accounting firms, the value is 1, otherwise it is 0.

Source: This article is compiled.

5. Empirical Results and Analysis

5.1. Descriptive Statistical Analysis

Table 2. Descriptive statistical analysis of table variables

variable	N	mean	sd	max	p25	p50	p75
FEE	1208	14.199	0.900	19.262	13.592	14.039	14.521
Block chain	1208	2.145	1.054	4.000	1.000	2.000	3.000
SIZE	1208	22.782	1.994	30.823	21.522	22.302	23.374
LEV	1208	0.488	0.270	4.067	0.289	0.468	0.648
ROA	1208	0.004	0.151	0.587	0.008	0.027	0.059
PPE	1208	0.121	0.137	0.854	0.025	0.078	0.163
INTAN	1208	0.034	0.042	0.601	0.009	0.023	0.044
OCF	1208	0.039	0.073	0.516	0.003	0.036	0.077
SOE	1208	0.246	0.431	1.000	0.000	0.000	0.000
GROWTH	1208	0.143	0.828	22.099	-0.065	0.072	0.213
BIG4	1208	0.111	0.314	1.000	0.000	0.000	0.000
AGE	1208	10.478	7.295	30.000	4.000	9.000	15.000

Source: This article is compiled.

Table 2 reports the descriptive statistical results of variables. It can be seen that (1) the audit fees of China's A-share listed companies show a high trend in the industry. (2) The average and median of blockchain technology investment indicators are 2.145 and 2.000 respectively, indicating that the blockchain technology investment of listed companies is at a medium level. (3) Among the statistical results of other variables, the average ROA is 0.004, and its relatively low value indicates that the profitability of Chinese listed companies needs to be improved at present; Compared with the value of PPE INTAN, it is confirmed that Chinese listed companies have a tendency to pay more attention to fixed assets investment than intangible assets investment. The average value of GROWTH is 0.143, which is at a relatively high level, but there are also about 1/2 companies whose growth rate is less than 1%.

5.2. Correlation Analysis

This paper analyzes the correlation of main variables, and the results show that there is a significant positive correlation between blockchain technology investment and audit cost at the level of 1%. To some extent, it supports the main hypothesis of this paper, and provides basic information for the following empirical test.

5.3. Analysis of Regression Results

5.3.1. Basic Analysis

Panel A of Table 3 shows the basic regression results of blockchain technology investment and audit fees. Among them, column (1) only controls the fixed effect of industry and year, and column (2) adds related control variables as the regression result of model (1), which is also the main regression. The results show that there is a significant positive correlation between blockchain technology investment and audit fees under the control of company characteristics and external factors, which is consistent with the results of correlation analysis, and the main hypothesis of this paper is verified.

Table 3. Main Effect and Robustness Test

variable	Panel A: basic analysis		Panel B: robustness test
	FEE	FEE	Bigdata
	(1)	(2)	
Block chain	0.093*** (0.022)	0.037** (0.014)	0.043*** (0.006)
SIZE	Uncontrollable	0.377*** (0.019)	0.417** (0.649)
LEV	Uncontrollable	0.110 (0.057)	0.050 (1.174)
ROA	Uncontrollable	-0.225* (0.104)	-0.146 (0.186)
PPE	Uncontrollable	0.013 (0.123)	0.005* (0.091)
INTAN	Uncontrollable	0.331 (0.344)	0.245 (0.600)
OCF	Uncontrollable	0.562** (0.205)	0.488** (0.271)
SOE	Uncontrollable	-0.147*** (0.041)	-0.100*** (0.038)
GROWTH	Uncontrollable	0.000 (0.011)	0.004 (0.194)

BIG4	Uncontrollable	0.487*** (0.072)	0.517*** (0.068)
AGE	Uncontrollable	0.009*** (0.002)	0.005** (0.190)
constant term	15.163*** (0.159)	4.701*** (0.456)	7.785** (0.379)
Year fixed effect	control	control	control
Industry fixed effect	control	control	control
N	1208	1208	2647
R ²	0.236	0.703	0.319

Note: The values in brackets are T statistics; ***, ** and * represent significant at the level of 1%, 5% and 10% respectively.

Source: This article is compiled.

5.3.2. Robustness Test

Change the measurement method of dependent variables. In order to ensure the robustness of the above conclusions in variable setting, this paper replaces the variables of the measurement indicators of blockchain technology investment. This paper draws lessons from the practices of Yang Deming and Liu Yongwen [7], and estimates the degree of application of blockchain technology by listed companies by collecting and sorting out the frequency of words related to blockchain in the annual reports and announcements of listed companies, thus further reflecting the blockchain technology investment index of listed companies. Robustness results are shown in Panel B of Table 3. The significant positive correlation between blockchain technology investment and audit fees is still valid, and the results of variable replacement prove the main hypothesis of this paper more robustly.

5.4. Endogenous Test

Table 4. Endogenous test

variable	Block chain	FEE
	(1)	(2)
Block chain		0.038*** (0.025)
Block chain-Lag one perious	0.625*** (0.021)	
Other control variables	control	control
Industry fixed effect	control	control
Year fixed effect	control	control
constant term	4.619*** (0.601)	8.133*** (0.406)
N	892	1069
R ²	0.537	0.256

Note: The values in brackets are T statistics; ***, ** and * represent significant at the level of 1%, 5% and 10% respectively.

Source: This article is compiled.

The above-mentioned benchmark regression results confirm that the blockchain technology investment is positively related to the audit cost, but the research in this paper may have potential endogenous problems due to the existence of reverse causal problems or the omission of important control variables. Therefore, there are some errors in the estimation results.

In order to alleviate the potential endogenous problems, this paper adopts the two-stage least square method (2SLS) and takes the lag index of blockchain technology investment index as the tool variable. The results show that after considering endogenous problems, the positive correlation between blockchain technology investment and audit fees still holds.

6. Research Conclusion

Based on the background that the influencing factors of audit fees have become an important hot spot in current academic circles and China pays great attention to blockchain technology, it will have a strong practical significance to investigate the relationship between blockchain technology investment and audit fees of listed companies. Through empirical research, this paper concludes that there is a significant positive correlation between blockchain technology investment of listed companies and audit fees. The possible reason is that the application of blockchain technology by listed companies will bring a series of risks, such as business risks, financial risks, etc. At the same time, companies with rapid development will often have internal control disorder, which will increase the risk of significant misstatement of audit, and then increase audit fees. The research of this paper not only enriches the relevant research on the influence of blockchain technology investment on corporate behavior, but also digs into the determinants of audit fees. At the same time, it helps the theoretical circle to fully understand the potential effects of increasing blockchain technology investment on the company and economic development.

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