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A Study on the Enhancement of Financial Reporting Transparency and Audit Effectiveness by Blockchain-Based Secure Accounting Information System

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SUMMARY: *As of now, most companies are using secure accounting information systems to conduct their financial management. This research work gives a detailed analysis of the importance of incorporating blockchain into these systems in order to enhance the level of transparency in financial reporting and the efficiency of auditing. Four hypotheses are formulated and tested and the regression and mediation models are developed to examine how the blockchain-enabled secure accounting information systems influence the reporting transparency and audit performance. Regression findings indicate that the two independent variables have coefficients of 0.796 and 0.385 respectively, and they are statistically significant(p<0.001), indicating that blockchain adoption can play a vital role towards enhancing the transparency of corporate financial reporting and audit effectiveness. As such, H1 and H2 are confirmed. The mediation analysis also affirms the suggested connections: the F-statistics are 15.34 and 11.96, both significant at 0.000, which means that information sharing is a mediator in the relationship between blockchain technology, reporting transparency, and audit efficiency. Hence, H3 and H4 are also validated. On the whole, the current paper proves that blockchain technology has a significant place in enhancing financial reporting transparency and the quality of auditing and provides valuable assistance to the theoretical research and practice implementation.*

KEYWORDS: *secure accounting information system; blockchain; regression model; mediation model; financial reporting transparency; auditing effectiveness*

1 Introduction

As part of the current process of enterprise development, inadequate financial reporting transparency and poor audit performance have been identified as acute problems which hinder development. In the era of the internet, it is possible to apply all the potentials of blockchain to create safe accounting information systems and thus eliminate such issues [1]. Blockchain is basically a distributed registry technology, the main principle of which is the use of cryptography to distribute data between the network nodes, and every transaction needs to be confirmed by several nodes before it is completed [2, 3]. This mechanism cannot only prevent the data being manipulated or erased, but also enhance the traceability and visibility of the information [4].

Based on the concept of transparency improvement, traditional accounting information systems are frequently subject to information asymmetry, and there is no way to ensure full

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accuracy and authenticity of information. On the other hand, blockchain-based safe accounting information system achieves synchronized bookkeeping and information sharing within the network via a transparent and open ledger enabling participants to access and even check transaction records directly, thus enhancing transparency in financial reporting [5-8]. The increased transparency also enhances monitoring and auditing as well as curbing financial fraud and counterfeiting [9]. Literature [10] suggests a conceptual framework of financial transparency based on blockchain and claims that the decentralized and secure nature of blockchain would make it particularly useful in overcoming the vulnerabilities of the traditional financial reporting due to the reinforcement of accountability, accuracy, and compliance. Literature [11] underlines the significant part of the blockchain in the transformation of the accounting practice, especially regarding transparency and integrity, and also points out the necessity of further exploring how this technology can be applied to the accounting process. Literature [12] explains what blockchain technology is, lists a range of implementation possibilities in the field of accounting, and demonstrates how blockchain technology can contribute to accounting information systems as well as their overall applications. Literature [13] explores the possibility of blockchain in promoting environmental, social, and corporate governance (ESG) objectives, and the results suggest that blockchain has the potential to make a significant contribution to enhance transparency, accountability, and sustainability, and it could be very transformative in promoting ESG agenda in the finance industry.

Regarding the effectiveness of audits, traditional accounting information systems typically involve a series of intermediaries, including banks and clearing institutions, which tends to result in slow and expensive transactions processing [14, 15]. Conversely, blockchain-enabled secure accounting information systems allow decentralized peer-to-peer transactions and settlement, significantly decreasing the duration and cost of the transactions. Blockchain may also use smart contracts to automate the process of executing contracts and payments, hence enhancing the effectiveness of audits[16-19]. The literature [20] creates an automatic auditing system using blockchain and claims that it will be highly effective in terms of improving the safety and reliability of accounting information and at the same time address the constraints of the traditional auditing techniques through enhancing the rate of accuracy and efficiency. The literature [21] discusses the relationship between blockchain technology and financial auditing, builds the conceptual framework of blockchain-based audit application and mentions that blockchain enables real-time auditing with the help of pre-, mid-, and post-event transparency, bringing a new dimension to the performance of auditing and financial transparency. Literature [22] explores the effect of blockchain on accounting and auditing and concludes that it can be used to improve the efficiency and transparency of the audit, and thus can serve as a valuable critical methodology. Literature [23] addresses the application of blockchain-based accounting information systems and indicates that because blockchain is decentralized and transparent, the systems have great potential to increase the efficiency of auditing and quality of accounting.

In this paper, with blockchain technology application as the independent variable, financial reporting transparency and auditing effectiveness as the dependent variable, company size, leverage level, profitability and company growth as the control variables, and information sharing as the mediator variable, two regression models and two mediator models were constructed to verify the effect of blockchain-based secure accounting information system on the enhancement of financial reporting transparency and auditing effectiveness, respectively. Finally, the four models are tested for robustness to verify the accuracy of the research results.

2 Method

2.1 Research hypothesis

Blockchain is essentially a distributed ledger system, which is based on a hash algorithm that connects the stored “blocks” of verified transaction records sequentially with the previous block to form a time-series data chain, and once the data has been written on the chain, it cannot be altered or deleted unless it has gained the consensus of all the nodes in the network.

After the security accounting information system integrates blockchain technology, the ledger is no longer kept by a single server to save the records, but is managed and viewed as a complete copy of the records through multiple data nodes distributed everywhere at the same time. Under such an architecture, even if a node fails or is attacked by human beings, etc., and cannot work normally, the normal operation of the whole system will not be affected, and other management data nodes can take over and continue to manage the work at any time. Based on this decentralized ledger can be reconstructed into an enterprise's financial bookkeeping process, in such a business situation, it is difficult for insiders to tamper with the ledger, whether it is the transfer of assets or the modification of financial statements, etc., all the changes can be traced back openly and transparently through this distributed ledger. At the application level, it mainly includes the following application scenarios: first, the uploading of accounting certificates. Blockchain can write the original documents, reimbursement documents, contract records and other information required by the enterprise in the chain through hash encryption, realizing the “full trace” from document generation, audit to archiving within the enterprise, and preventing counterfeiting and duplication of documents from occurring in the accounts. Second, financial audit automation. With the help of smart contracts, reconciliation and generation of working papers can be completed automatically, and even anomaly alerts can be issued directly to the tax authorities when the agreed conditions are met.

The blockchain-based secure accounting information system ensures real-time updating and non-tampering of data through distributed ledger and encryption technology, greatly improving the real-time and accuracy of financial data. For auditing, the introduction of blockchain not only simplifies the auditing process and improves efficiency, but also reduces compliance costs through automated smart contracts. In addition, blockchain technology can generate and disclose financial reports in real time, which improves the timeliness and transparency of reports and provides investors with more reliable and timely financial information. As a result, this paper presents the following hypotheses:

H1: A reliable accounting information system based on the blockchain technology may enhance the transparency of financial reporting.

H2: A blockchain-based safe accounting information system can enhance the quality of audits.

As blockchain has the property of enhancing the efficiency and accuracy of information transmission, it is the basis for realizing information sharing among enterprises, and improving the problems of supply chain information loss and information transmission lag through the sharing of information data. Supply chain trust requires enterprises to maintain a healthy cooperative order with each other, and there is no opportunistic behavior that harms the interests of other enterprises. Under the mode of mutual trust, supply chain enterprises can trust each other, share risks, improve the timeliness and response rate of communication and cooperation between enterprises through the support of external information technology, strive for time advantage to adapt to market uncertainty, and then improve the overall flexibility of the supply chain. Utilizing the technological advantages of blockchain (information transparency, data reliability, contract intelligence, and transaction flexibility) can solve the trust problem existing in the security accounting information system. Therefore, hypotheses 3 and 4 are proposed:

H3: Information sharing is an intervening variable in the connection of blockchain technology and financial reporting transparency.

H4: Information sharing is a mediator variable in the relationship between blockchain technology and audit effectiveness.

2.2 Research methodology

Multiple regression is a classical method of statistical analysis that describes the linear relationship between variables through a mathematical model, thus predicting or explaining changes in the dependent variable, and is now widely used in social sciences, economics and other fields. In economics, multiple regression analysis is widely used in the identification of influencing factors and elimination of possible confounds. Compared with other mathematical methods, multiple regression has a wider scope of application and is widely used in natural experimental studies to produce stable results. In this study, multiple regression will be used to analyze the impact of blockchain-based secure accounting information system on financial reporting transparency and auditing effectiveness, with a view to improving the reliability of the study and data interpretation. The basic idea of multiple regression is to assume that there is a statistically linear correlation between the system variables and their respective variables and it can be expressed as equation (1):

$$y = a_0 + a_1 x_1 + a_2 x_2 + \cdots + a_k x_k \tag{1}$$

The analysis of correlation coefficients in multiple regression describes the effect of each influencing factor (independent variable) on the research objective (dependent variable). There are two ways of describing this relationship, one is the univariate correlation coefficient and the other is the partial correlation coefficient.

2.2.1 Correlation coefficients

Noting that the regression sum of squares is S_{Return}, the residual sum of squares is $S_{\text{Remaining}}$, and the total sum of squares is $S_{\text{Total}} = S_{\text{Return}} + S_{\text{Remaining}}$, then equations (2) through (4) are obtained:

$$\frac{S_{\text{Return}}}{\sigma^2} = \sum_{i=1}^{n} (\hat{y}_i - \overline{y})^2 / \sigma^2 \sim \chi^2(k) \tag{2}$$

$$\frac{S_{\text{Return}}}{\sigma^2} = \sum_{i=1}^{n} (y_i - \hat{y}_i)^2 / \sigma^2 \sim \chi^2\left(n-k-1\right) \tag{3}$$

$$\frac{S_{\text{Total}}}{\sigma^2} = \frac{S_{\text{Return}} + S_{\text{Remaining}}}{\sigma^2} = \sum_{i=1}^{n} (y_i - \overline{y})^2 / \sigma^2 \sim \chi^2(n-1) \tag{4}$$

Single correlation coefficient (one-dimensional correlation coefficient): the single correlation coefficient of y on the independent variable x_j does not take into account the effect of the rest of the independent variables, and is the correlation coefficient of the one-dimensional regression of y on x_j. The calculation is shown in equation (5):

$$r=\sqrt{\frac{S_{\text{Return}}}{S_{\text{Remaining}}}}=\sqrt{1-\frac{S_{\text{Remaining}}}{S_{\text{Total}}}}=\sqrt{\frac{\sum_{i=1}^{n}(\hat{y}_i-\bar{y})^2}{\sum_{i=1}^{n}(y_i-\bar{y})^2}} \tag{5}$$

The partial correlation coefficient $R_{y,j}$ denotes the overall linear correlation of y with all the independent variables $x_1,\cdots,x_k$, i.e., the extent to which each of the independent variables influences the dependent variable. When calculating the partial correlation coefficient of an independent variable on the dependent variable, the other independent variables are treated as constants. The calculation is shown in equation (6):

$$R_{y,j}=\sqrt{1-\frac{S_{\text{Remaining}}}{S'_{\text{Remaining}}}} \tag{6}$$

2.2.2 Statistical tests of regression models

Statistical tests of regression models include significance tests of equations and significance tests of regression coefficients.

The significance test of the regression equation (F test) is to test whether the hypothesis $a_i=0\left(i=1,\cdots,k\right)$ is valid at a certain level of significance.

Because $\frac{S_{\text{Return}}}{\sigma^2}\sim\chi^2(k)$, $\frac{S_{\text{Remaining}}}{\sigma^2}\sim\chi^2\left(n-k-1\right)$, construct the statistic F, see equation (7):

$$F=\frac{S_{\text{Return}}/k}{S_{\text{Remaining}}/\left(n-k-1\right)}\sim F\left(k,n-k-1\right) \tag{7}$$

Then the hypothesis is rejected when $F>F_\alpha\left(k,n-k-1\right)$ and the regression model is considered to be meaningful at the significance level α.

Significance test of regression coefficients (t-test) means that the correlation between each independent variable x_i and y is tested for significance separately.

Assuming that $H_0:a_j=0,\ j\in\left\{0,1,\cdots,k\right\}$, there is equation (8):

$$t=\frac{\hat{a}_j/\sqrt{c_{jj}}}{\sqrt{S_{\text{Remaining}}/\left(n-k-1\right)}}=\frac{\hat{a}_j}{\hat{\sigma}\sqrt{c_{jj}}} \tag{8}$$

Then when $j=1,\cdots,k,t_j=\frac{\hat{a}_j}{\hat{\sigma}\sqrt{c_{jj}}}>t_\alpha\left(n-k-1\right)\left(R=X^TX,C=R^{-1}\right)$ when it is considered that α_j is significantly different from 0 at the significance level α, i.e., x_j has a significant effect on y. The t test was used in conducting the test in this study.

2.3 Study design

2.3.1 Sample selection and data sources

This paper selects A-share listed companies in Shanghai and Shenzhen as the research sample, and the research interval is 2016~2024. 2016~2024 is the growth stage of blockchain technology, and the secure accounting information system based on blockchain begins to step into the accounting services and applications.

The present research has conducted these processing steps on the raw data gathered:

(1) eliminate companies in the financial industry.

(2) Exclude listed companies with missing key variables between the years 2016-2024.

(3) winsorize every continuous variable in the final data set to the 1% and 99% levels.

Following these procedures, the sample has 3,502 firms, which is equal to 26,365 firm-year observations. The initial data was collected through the Juchao Information website, the official websites of the Shanghai Stock Exchange and the Shenzhen Stock Exchange, and the CSMAR database. Data cleaning and analysis were done with the help of Excel and Stata 16.0.

2.3.2 Variable design

(1) Dependent Variables

Financial reporting transparency (FT) and audit effectiveness (AE). Financial reporting transparency is measured by the principal component scores of disclosure quality and analyst forecast accuracy. Audit Effectiveness (AE) indicates the amount of units audited annually.

(2) Dependent Variables

Blockchain Technology Application (CLBL1). In this study, Python was used to calculate the total frequency of blockchain-related terms appearing in the annual reports of listed companies from 2016 to 2024, and the original word-frequency data extracted from those reports were further processed. On this basis, a dummy variable was constructed: when blockchain-related terms appeared in a firm’s annual report, the value was coded as 1; otherwise, it was coded as 0. In this way, the overall indicator CLBL1, which reflects the application of blockchain technology in enterprises, was obtained. In addition, this paper employs the logarithm of the statistical word frequency plus one, denoted as CLBL2, as an alternative measure to test the robustness of the main regression results.

(3) Control variables

To improve the reliability of the empirical results, this paper includes firm size (Size), leverage (Lev), profitability (Roe), and growth (TobinQ) as control variables.

1) Firm size is commonly measured by the natural logarithm of a listed company’s total assets at year-end.

2) Leverage is generally represented by the asset-liability ratio, which more directly reflects a company’s capital structure, and is calculated as total liabilities at the end of the period divided by total assets at the end of the period.

3) Return on net assets can generally reflect the profitability of a company, that is, the ratio of net profit to net assets.

4) Growth of a company is the ratio of its market value to its total assets; the larger the TobinQ value, the higher the growth of the company.

(4) Mediating variables

Information Sharing (IS). Information sharing is mainly considered in two parts: content and quality of information sharing, where the content of information sharing is measured in terms of production, materials used, demand and orders, and the quality of information sharing is measured in terms of the accuracy, completeness and accessibility of the shared information.

2.3.3 Model construction

(1) The regression model A constructed to test the research hypothesis H1 is as follows:

$$FT_{i,t} = \beta_0 + \beta_1 CLBL1_{i,t} + \beta_2 Controls_{i,t} + \beta_3 Year + \beta_4 Ind + \varepsilon_{i,t} \tag{9}$$

where the subscript i represents the company, t represents the year, FT represents financial reporting transparency, $CLBL1$ is the core independent variable, Controls is the control variable, and ε is the model random errorability. In order to ensure the reliability of the regression results of this model, the following basic treatments are carried out in this paper: first, the Cluster clustering robust standard error-adjusted t-statistic is used by default in all regression equations. Second, the paper controls for both year and industry dummy variables to absorb fixed effects as much as possible. In the model, β_1 is the main coefficient of interest in this paper, and if $\beta_1 > 0$, the transparency of corporate financial reporting is high. On the contrary, if $\beta_1 < 0$, the transparency of corporate financial reporting is lower.

(2) In order to verify the research hypothesis H2, the regression model B is constructed as follows:

$$Logit\left(AE_{i,t}\right) = \beta_0 + \beta_1 CLBL1_{i,t} + \beta_2 Controls_{i,t} + \beta_3 Year + \beta_4 Ind + \varepsilon_{i,t} \tag{10}$$

where AE represents audit effectiveness and the rest of the variables are defined as in equation (9). In order to ensure the reliability of the regression results of this model, this paper controls the dummy variables of year and industry at the same time to absorb the fixed effects as much as possible. In the model, β_1 is the main coefficient of interest in this paper, if $\beta_1 > 0$, corporate audit effectiveness is high. On the contrary, if $\beta_1 < 0$, corporate audit effectiveness is low.

(3) In order to verify the research hypothesis H3, the mediation model C is constructed as follows:

$$\begin{aligned} FT_{i,t} &= \beta_0 + \beta_1 CLBL1_{i,t} + \beta_2 CLBL1 * IS + \beta_3 IS + \beta_4 Controls_{i,t} \\ &+ \beta_5 Year + \beta_6 Ind + \varepsilon_{i,t} \end{aligned} \tag{11}$$

where IS stands for information sharing, and the rest of the variables are defined as in equation (9). In this model, β_2 is the main coefficient of interest in this paper, if β_2 > 0, it indicates that there is a positive moderating effect of information sharing in the impact of blockchain technology application on financial reporting transparency, i.e., it strengthens the impact of blockchain technology application on financial reporting transparency. Conversely, if β_2 < 0, it is said that there is a negative moderating effect of information sharing in the impact of blockchain technology application on financial reporting transparency, i.e., it inhibits the impact of blockchain technology application on financial reporting transparency.

(4) The mediation model D constructed to verify the research hypothesis H4 is as follows:

$$\begin{aligned} AE_{i,t} &= \beta_0 + \beta_1 CLBL1_{i,t} + \beta_2 CLBL1 * IS + \beta_3 IS + \beta_4 Controls_{i,t} \\ &+ \beta_5 Year + \beta_6 Ind + \varepsilon_{i,t} \end{aligned} \tag{12}$$

In this model, if β_2 > 0, it is said that there is a positive moderating effect of information sharing in the impact of blockchain technology application on auditing effectiveness, i.e., it strengthens the impact of blockchain technology application on auditing effectiveness. Conversely, if $\beta_2 < 0$, it is said that there is a negative moderating effect of information sharing in the impact of blockchain technology application on audit effectiveness, i.e., it inhibits the impact of blockchain technology application on audit effectiveness.

3 Results and Discussion

3.1 Descriptive statistics

3.1.1 Full sample descriptive statistical analysis

Table 1 shows the descriptive statistics of the key variables. It is evident that the dependent variables, which are Financial Reporting Transparency (FT) and Audit Effectiveness (AE), average near zero as they are basically regression residuals. The rest of the control variables seem statistically normal on the whole and are largely in agreement with what was found in previous research.

Table 1: Descriptive statistics of major variables

Variable	Obs	Mean	Std.Dev.	Min	Med	Max
FT	26365	0.021	0.632	12.334	13.254	16.324
AE	26365	0.063	0.177	0	1	1
CLBL1	26365	0.325	0.471	0	0	1
CLBL2	26365	0.563	0.952	0	0	3.452
Size	26365	22.315	1.325	18.632	22.241	26.352
Lev	26365	0.413	0.211	0.051	0.419	0.855
Roe	26365	0.061	0.132	-0.614	0.071	0.354
TobinQ	26365	2.113	1.425	0.763	1.664	9.142
IS	26365	1.235	1.052	0.253	1.201	2.632

3.1.2 Split-sample variability test

To conduct an initial evaluation, to determine if essential differences can be observed between companies secure accounting information systems prior to implementation and post-implementation of blockchain technology, this paper performs mean and median tests of the respective indicators. By measuring the use of blockchain technology application (CLBL1, with 0 and 1 serving as the basis of classification), the full sample is split into two groups. This one includes companies that report blockchain-related terms in their annual reports and will thus be considered the blockchain adoption group; the second one includes companies without these terms in their annual reports and will thus be labeled the non-adoption group. The test results of sub-sample differences are given in Table 2. The results indicate that there is a significant difference in the level of financial reporting transparency and audit effectiveness among companies that implemented blockchain technology and those that did not. In addition, the average differences are statistically significant at the 1 percent level which means that in enterprises that use blockchain-based secure accounting information systems, the financial reporting transparency and audit effectiveness have increased significantly. These findings offer preliminary evidence to support H1 and H2.

Table 2: Variability by sample test

	CLBL1=1			CLBL1=0			Difference test	t
Variable	Obs	Mean	Med	Obs	Mean	Med		
FT	9022	13.956	13.365	17343	13.744	1.241	0.012	3.251***
AE	9022	0.971	0	17343	0.936	0.023	0.014	2.141***
CLBL1	9022	0.296	0.123	17343	0.214	0.231	0.123	2.535***
CLBL2	9022	0.514	0.141	17343	0.412	0.141	0.023	1.254***
Size	9022	22.236	21.251	17343	18.632	16.521	0.031	3.251***
Lev	9022	0.341	0.304	17343	0.251	0.211	0.023	2.156***
Roe	9022	0.057	0.034	17343	0.614	0.142	0.025	2.145***
TobinQ	9022	2.106	1.235	17343	0.763	0.423	0.024	1.521***
IS	9022	1.022	1.032	17343	0.214	0.223	0.024	1.523***

3.2 Correlation analysis

Even before performing the multiple regression analysis, it is important to consider the interrelations between variables by analyzing their correlation coefficients because it will help to determine the level of relationship between them and offer a preliminary framework of further causal relationships research. In turn, this paper employs Pearson correlation coefficient to assess the relations between the variables and build a correlation coefficient matrix, with the specifics of the findings depicted in Figure 1. The significance values of the P-values between the indicators are less than 0.01, indicating the statistical significance of the coefficients of these indicators and the presence of meaningful correlations between the variables.

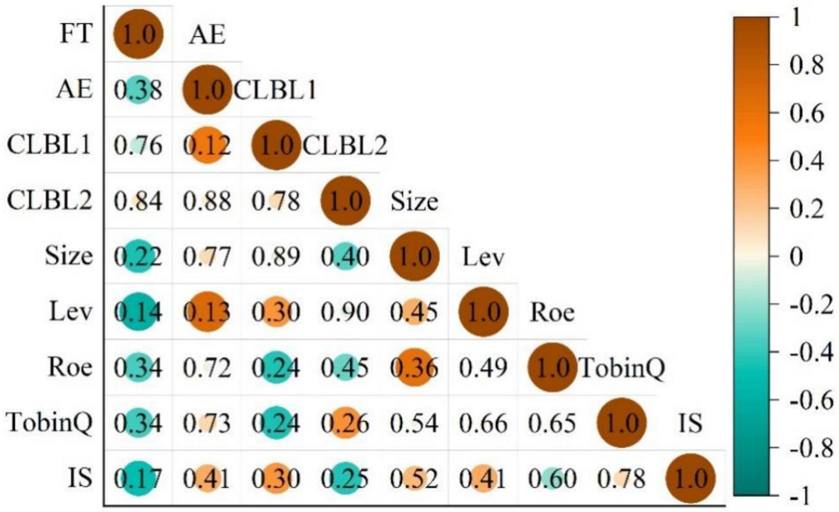

Figure 1: Correlation analysis

3.3 Regression analysis

3.3.1 Regression analysis of transparency in financial reporting

The regression analysis of blockchain technology application on financial reporting transparency is shown in Table 3. Model 1 is the case of adding only control variables, and Model 2 is the result of adding the independent variable of blockchain technology application on the basis of control variables. In Model 2, the F-statistic value is 10.596, and its significance probability is 0.000, indicating that the regression of blockchain technology application on financial reporting transparency is significant and positive.R^2 is 0.233, which is a better regression effect. Compared with model 1, the amount of change in R^2 is 0.204, indicating that the independent variable blockchain technology application that enters the regression equation can explain 20.4% of the variation in corporate transparency, indicating that the regression equation sample data fit is better. In the regression equation of blockchain technology application on financial reporting transparency, the regression coefficient of the independent variable is significant (Beta=0.796, p<0.001), which indicates that blockchain technology application can effectively improve the transparency of corporate financial reporting. Therefore, hypothesis H1 is established.

Table 3: Regression analysis of the transparency of financial reports

Dependent variable			FT	
			Model 1	Model 2
Control variable	Size	Beta	0.154**	0.154*
		Sig	0.002	0.024
	Lev	Beta	0.251	0.235
		Sig	0.031	0.125
	Roe	Beta	0.063	0.163
		Sig	0.014	0.022
	TobinQ	Beta	0.063	0.177
		Sig	0.051	0.034
Independent variable	CLBL1	Beta	-	0.796
		Sig	-	0.000
R^2			0.029	0.233
ΔR^2			0.061	0.236
F			3.526*	10.596***
ΔF			3.41	35.264

Note: *** denotes P<0.001, ** denotes P<0.01, and * denotes P<0.05 (below).

3.3.2 Regression analysis of audit effectiveness

The regression analysis of blockchain technology application on audit effectiveness is shown in Table 4. Hypothesis H2 is a regression test with blockchain technology application as the independent variable and audit efficacy as the dependent variable; Model 1 is the case of adding only control variables, and Model 2 is the result of adding blockchain application as the independent variable on top of the control variables. As shown in Model 2, the F-statistic value is 8.536, and its probability of significance is 0.000, which indicates that the regression of blockchain technology application on auditing effectiveness is significant and positive.R^2 is 0.256, and the regression effect is good. Compared with model 1, the amount of change in R^2 is 0.188, which indicates that the independent variable blockchain technology application that enters the regression equation can explain 18.8% of the variation in the level of trust, indicating that the sample data of the regression equation has a good fit. In the regression equation of blockchain technology application on audit effectiveness, the regression coefficient of the independent variable is significant (Beta=0.385, p<0.001), indicating that the application of blockchain technology can effectively improve audit effectiveness. Therefore, hypothesis H2 is established.

Table 4: Regression analysis of audit effectiveness

<table>
<tr><td colspan="3" rowspan="2">Dependent variable</td><td colspan="2">AE</td></tr>
<tr><td>Model 1</td><td>Model 2</td></tr>
<tr><td rowspan="8">Control variable</td><td rowspan="2">Size</td><td>Beta</td><td>0.063</td><td>0.563</td></tr>
<tr><td>Sig</td><td>0.521</td><td>0.041</td></tr>
<tr><td rowspan="2">Lev</td><td>Beta</td><td>0.063</td><td>0.417</td></tr>
<tr><td>Sig</td><td>0.412</td><td>0.034</td></tr>
<tr><td rowspan="2">Roe</td><td>Beta</td><td>0.056</td><td>0.156</td></tr>
<tr><td>Sig</td><td>0.417</td><td>0.355</td></tr>
<tr><td rowspan="2">TobinQ</td><td>Beta</td><td>0.453</td><td>0.245</td></tr>
<tr><td>Sig</td><td>0.224</td><td>0.068</td></tr>
<tr><td rowspan="2">Independent variable</td><td rowspan="2">CLBL1</td><td>Beta</td><td>-</td><td>0.385</td></tr>
<tr><td>Sig</td><td>-</td><td>0.000</td></tr>
<tr><td colspan="3">R^2</td><td>0.068</td><td>0.256</td></tr>
<tr><td colspan="3">ΔR^2</td><td>0.632</td><td>0.245</td></tr>
<tr><td colspan="3">F</td><td>5.321*</td><td>8.536***</td></tr>
<tr><td colspan="3">ΔF</td><td>3.145</td><td>32.121</td></tr>
</table>

3.4 Analysis of the role of information-sharing intermediaries

In the regression equation, the mediating variable of information sharing is added, and the results of the model regression are shown in Table 5. Among them, models 1 and 3 are the cases of adding only the independent variable blockchain technology, and models 2 and 4 are the cases of adding the mediating variable information sharing on top of the independent variable. The regression analysis is performed with blockchain technology application as the independent variable, the degree of information sharing as the mediator variable, and financial reporting transparency as the dependent variable. As shown in Model 1, the F-statistic value is 15.34, which is significant at 0.000 degree. After adding the mediator variable as shown in Model 2, the F statistic value is 28.63, which is significant at 0.000 probability, indicating that the regression of blockchain technology application on financial reporting transparency is significant and positive when information sharing is used as the mediator variable. The R^2 in Model 2 is 0.563, and the regression effect is good. Compared with Model 1, the amount of change in R^2 is 0.167, which indicates that the mediating variable information sharing that enters the regression equation can explain 16.7% of the variation in supply chain performance, which indicates that the sample data of the regression equation has a good fit. The regression coefficient of the independent variable (Beta=0.833, $p<0.001$) and the regression coefficient of the mediator variable (Beta=0.517, $p<0.001$) are both significant, indicating that the blockchain technology application can effectively improve the transparency of financial reporting when information sharing is used as a mediator, and hypothesis H3 is valid. Regression tests (Models 3 and 4) were conducted with audit effectiveness as the dependent variable. With the participation of the mediating variable information sharing, blockchain technology application regressed significantly on audit effectiveness ($F=11.96$, $p<0.001$), which has a significant positive effect. Therefore, hypothesis H4 is valid.

Table 5: Information sharing intermediary analysis

Dependent variable			FT		AE	
			Model 1	Model 2	Model 3	Model 4
Independent variable	CLBL1	Beta	0.833***	0.452***	0.539***	0.453***
		Sig	0.000	0.000	0.000	0.000
Mediation variable	IS	Beta	-	0.517***	-	0.456***
		Sig	-	0.000	-	0.000
R^2			0.396	0.563	0.363	0.596
ΔR^2			0.632	0.524	0.263	0.455
F			15.34***	28.63***	9.63***	11.96***
ΔR^2			0.236	0.163	0.196	0.116
ΔF			79.63	86.22	36.52	75.99

3.5 Robustness Tests

This paper additionally addresses the issue of potential endogeneity by making adjustments to the volume of data included in the last part of the paper by partly deleting observations and subsequently conducting a robustness test of the outcomes of the regression analysis with a smaller sample. The appropriate empirical findings are presented in Table 6, in which columns (A) - (D) correspond to the four models constructed in Section 2.3.3. The table shows that the significance levels of the variables and the direction of their effects is not changed and thus the empirical findings of this paper meet the robustness requirement.

Table 6: Robustness test results

Variable	(A)	(B)	(C)	(D)
Cons	1.424*** (3.41)	9.651*** (2.41)	1.552*** (4.14)	1.452*** (3.41)
Blockchain	0.635*** (1.52)	0.525*** (1.96)	0.639*** (2.56)	0.635*** (2.51)
Size	0.196*** (3.41)	0.365*** (4.55)	-	-
Pro	-	-	0.045 (0.42)	0.253 (0.41)
Blockchain*Size	0.522*** (2.41)	0.419*** (1.63)	-	-
Blockchain*Pro	-	-	0.523*** (2.52)	0.415*** (2.41)
Control variable	Yes	Yes	Yes	Yes
R^2	0.142	0.225	0.263	0.341
ΔR^2	0.063	0.014	0.253	0.241
F	12.23	8.52	9.63	6.14
Sig.F	0.000	0.000	0.000	0.001

4 Conclusion

The paper uses a multiple regression analysis to explore what blockchain implementation in safe accounting information system does to financial reporting transparency and audit effectiveness. The empirical findings result in the following conclusions.

(1) Blockchain adoption is statistically significant and positive in regard to financial reporting transparency and audit effectiveness with p-values lower than 0.001.

(2) Incorporating the mediating variable of information sharing does not change the results of the regression, which are significant, with p-values less than 0.001, as blockchain adoption remains positively significant in the context of financial reporting transparency and audit effectiveness by involving information sharing.

(3) When the total sample size that was used to conduct the robustness test was reduced, none of the significance of the variables and the direction of the effects changed, which reinforces the fact that the findings presented in this paper are valid.

In light of such findings, the present paper offers a number of suggestions to companies regarding the management of their accounts: more focus needs to be placed on the sharing of information and the management of relationships, trustworthy partnership relations need to be formed, and the investment in information technology needs to be adequately raised.

About the Author

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