

The Impact of Blockchain-Based Shareholder Voting System on Corporate Governance

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ABSTRACT

The development of blockchain technology in modern business and finance is of great importance. The study delves into the blockchain-based shareholder voting system and the role of blockchain on corporate governance. On this basis, relevant research hypotheses are formulated. After completing the definition of research variables, the research model is constructed to empirically investigate the impact of blockchain-based shareholder voting system on corporate governance. The research hypotheses are tested through regression analysis and the robustness test is utilized to ensure the reliability of the research findings. The minimum value of blockchain-based shareholder voting and corporate governance level are both 0, the maximum value is 4.954, 0.624, and the average value is 0.821, 0.089, respectively. There is variability in shareholder voting and corporate governance level across companies. Before and after the control variables, the coefficients of blockchain-based shareholder voting system are 0.225 and 0.247 respectively, and both are significantly positive at 1% level. Blockchain-based shareholder voting system can improve corporate governance.

Keywords: blockchain technology, shareholder voting system, corporate governance, regression analysis

1. Introduction

Voting right is one of the core rights of shareholders, which is of great significance for safeguarding shareholders' own interests, participating in corporate governance, and realizing the sustainable development of the company's democracy and openness [1]. However, facts and studies over the years have found that there is a big difference between the majority and minority shareholders of a company in terms of their motivation to exercise their voting rights and participate in the company's affairs, and the percentage of minority shareholders attending shareholders' meetings in China is also relatively low [2-4]. On the one hand, this is related to the cost of shareholder participation, and the benefits of minority shareholders attending shareholders' meetings do not match their costs [5-6]. On the other

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hand, small shareholders, because of their small shareholdings, naturally believe that their opinions do not play a role in the formation of shareholders' meeting resolutions, and it is difficult to compete with large shareholders [7-8]. Moreover, even if the shareholders who do not attend the shareholders' meeting on site choose to vote by proxy, it is difficult to find suitable proxies, making proxy voting less efficient [9-10]. A variety of reasons have created the realistic dilemma of difficulties for minority shareholders to attend shareholders' meetings, a situation that is obviously not conducive to the company's checks and balances mechanism, especially in the case of Chinese listed companies where the shareholding is often dominated by a single party, the company is prone to become a one-track mind of the majority shareholders, which makes the interests of the small and medium-sized shareholders harmed [11-13].

Whether in academia or practice, the issue of protecting the rights and interests of small and medium shareholders has always been the focus of attention. In the practice of corporate governance in various countries, due to the relatively decentralized distribution of small and medium-sized shareholders, coupled with the individual economic capacity is also relatively limited, frequently occurring large shareholders and senior management to infringe on the rights and interests of small and medium-sized shareholders [14-15]. Partial transfer of corporate decision-making power to small and medium-sized shareholders can better solve this problem, and the network voting system plays an extremely important role in this process [16-18]. Today's shareholder network voting has become one of the important ways for shareholders to participate in corporate governance, which is convenient, cost-saving, and improves the enthusiasm of small and medium-sized investors to participate in the shareholders' meeting, which is a successful application of information technology in corporate governance [19-21].

Some scholars have studied the importance of shareholder online voting. Literature [22] verified the impact of minority shareholder network voting on corporate social responsibility performance through the established difference-to-difference model, and the shareholder network voting system enhances the transparency of enterprises, and its impact is more significant for private enterprises and enterprises with lower profitability and less external monitoring. Literature [23] shows that the form of electronic shareholders' meeting gives the dispersed minority shareholders the opportunity to participate in the company's decision-making, on the one hand, it improves the quality of corporate auditing and the level of internal control, on the other hand, it reduces the company's financial leverage with the help of shareholders' supervision. Literature [24] qualitatively investigated the perception and feelings of corporate executives towards the shareholder online voting mechanism, and found that the mechanism reversed the corporate governance relationship between shareholders and executives to a certain extent, forcing executives to adopt relevant legitimacy strategies to cope with it. Literature [25] discusses the influencing factors of corporate shareholders' participation, in which the network voting mechanism significantly improves shareholders' participation, allowing minority shareholders to actively participate in the corporate governance process and obtain more informed rights. Literature [26] examined the link between the online voting mechanism of small and medium shareholders on the risk of corporate share price collapse, where online voting involving minority shareholders can increase enhance the information disclosure of the company and effectively improve corporate transparency, thus reducing the risk of corporate share price collapse due to negative news. Literature [27] studied the impact of small and medium-sized shareholders' online voting mechanism on corporate innovation, the degree of participation in voting will weaken the management's right to speak, which in turn significantly inhibits corporate innovation ability, and the performance of the enterprise's major shareholders hold more shares of the enterprise's innovation ability is weaker. However, the transparency and authenticity of voting are the key issues that plague the improvement of online voting system, which needs a strict relief mechanism and regulatory mechanism to avoid the new risks brought by new technologies. As a matter of fact, the unique distributed bookkeeping and consensus mechanism of blockchain technology is highly suitable for the voting system, which can

solve the various problems in the traditional network voting, and it becomes possible to improve the shareholder network voting system through blockchain technology in China.

This paper is studying the impact of blockchain on shareholder voting system and corporate governance, based on which the research hypothesis about the impact of blockchain-based shareholder voting system on corporate governance is proposed. After selecting the initial research sample and processing it, the explanatory, interpreted and control variables of the study are defined and the research model is constructed. After descriptive statistics of the sample variables, the sample grouping test is used to determine whether there are significant differences in the data of each variable. Regression analysis was performed after using correlation test to determine that there is no multicollinearity between the research variables. Finally, robustness tests were conducted by replacing the explanatory variables, the explained variables and changing the fixed effects.

2. Blockchain and shareholder voting, corporate governance

2.1. The Significance of Blockchain for Shareholder Voting

Voting is one of the important ways for shareholders to participate in corporate governance [28], shareholders can express their views through voting, the lack of effective means of voting will seriously weaken the checks and balances of the company, resulting in the emergence of large shareholders “one word” of the unfavorable situation, the traditional paper voting and Internet voting, although each has its own unique advantages, but there are still shortcomings in the authenticity of the results, such as the openness of the voting process. Although traditional paper voting and Internet voting have their own unique advantages, there are still deficiencies in the authenticity of the results and the openness of the voting process, and a new technology is needed to make up for the deficiencies of the above methods.

Blockchain voting technology can meet the demand of shareholders for multi-subject participation in corporate governance [29], which has the advantages of decentralization, high security and non-tampering, realizing the transformation of the company from central governance to distributed governance, giving shareholders “empowerment” while “empowerment”, reducing the capacity cost and conflict cost of shareholders' participation in corporate governance. “It empowers shareholders and reduces the ability cost and conflict cost of shareholders' participation in corporate governance. Currently, countries around the world have begun to lay out blockchain voting technology, and large international exchanges such as the NASDAQ Exchange in the United States and the Toronto Stock Exchange in Canada have developed blockchain voting systems to facilitate the voting of small and medium-sized shareholders, especially overseas shareholders.

2.1.1. Blockchain technology can ensure the authenticity of voting results. The reason why blockchain technology is able to guarantee the authenticity of voting results is due to several core elements that it possesses. The first is distributed bookkeeping. The distributed bookkeeping of blockchain technology is a completely transparent information record and management system, and this distributed bookkeeping ensures the transparency of information and also well solves the problem of information tampering [30].

The second core element of blockchain technology is the consensus mechanism. A typical application of this technology is the shareholder voting of a company, in which any fake data submitted by malicious nodes will be traced back, and such tracing will not affect the anonymity of the vote. At the same time, this validation mechanism will also ensure that the data will not be tampered with, and in the event of tampering with the data on the chain, it can be easily detected. Combined with the above attributes, the consensus mechanism also gives a unique cryptographic security to the voting system.

2.1.2. Blockchain technology enables verifiable voting results. Blockchain voting is more transparent than traditional voting. Ballots are stored in a public ledger, and using the blockchain's

audit trail technology, all shareholders are able to count their own ballots and verify that they have been altered, deleted, or illegally cast during the voting process.

The high transparency of blockchain voting result verification does not mean that shareholders have no privacy or information leakage. Although the transaction information stored on the blockchain is public, the account identity information is highly encrypted and can only be accessed with the authorization of the data owner, thus guaranteeing the security of the data and the privacy of individuals.

2.1.3. Blockchain technology enables accurate authentication of identity. Blockchain technology can improve the traditional network voting into “chain voting”, thus improving the defects of traditional network voting at the technical level and further improving the system of shareholder voting. A major feature of blockchain voting is that the voting right of shareholders is automatically matched with their equity, and the equity is registered on the blockchain. This, on the one hand, well solves the pitfalls of shareholder identification faced by traditional network voting, and also simplifies the tedious steps that shareholders used to need to confirm their identities at intermediaries, reduces the cost of shareholder participation in voting, and is more conducive to improving the situation in which small and medium-sized shareholders are reluctant to participate in the resolution of the shareholders' meeting. On the other hand, the design of this matching of voting rights and shareholdings directly combines the participation of shareholders with their earnings, creating a positive incentive.

2.2. *Blockchain in Corporate Governance*

Blockchain is a continuous database of information created and formed through the protection of cryptographic authentication, which provides a new method capable of replacing traditional financial ledgers. Blockchain technology allows for the creation, exchange and tracking of transactions and changes in ownership of financial assets on a peer-to-peer basis. Blockchain also has the ability to accommodate bonds and financial derivatives. To date, many prominent stock exchanges have begun exploring the use of blockchain to register, enroll and trade shares issued by companies. In addition, blockchain may be used in other databases such as government land ownership and demographics. Although public attention to blockchain is still largely focused on speculative trading of virtual currencies such as Bitcoin, it is highly likely that the innovative applications arising from blockchain as an advanced technology will affect the behavior of corporate managers and owners to the extent of profoundly influencing and reconfiguring the entire corporate governance system.

Blockchain technology has been proposed as a voting platform for all types of elections. It appears to be a viable alternative to the corporate proxy voting system that has been in use for hundreds of years, and in February 2016, Nasdaq announced that it could pilot voting at shareholder meetings of public companies using blockchain technology.

The archaic proxy voting system is actually one of the major sources of problems with corporate governance. The original voting election system, which often fails to accurately count voting shareholders, is controversial in its integrity and authenticity. Especially in the Chinese stock market, it is very common for large shareholders to infringe on small shareholders, and for large shareholders to conspire with management to hollow out listed companies, largely due to the fact that small shareholders and ordinary shareholders are unable to participate in the company's voting election directly, and are unable to participate in corporate governance in a better way. The blockchain voting system will improve the efficiency and fairness of voting, greatly increase the enthusiasm of all shareholders to participate in corporate governance, and largely solve the corporate governance problems caused by the proxy voting system.

3. Research design

3.1. Sample Selection and Processing

This paper takes A-share listed companies in the Shenzhen market from 2012 to 2022 as the initial research sample and excludes the following categories of listed companies: (1) Financial listed companies, because the nature of their business and accounting system are quite different from that of general listed companies. (2) ST and *ST listed companies, which are in the state of abnormal operation and have abnormal financial indicators. (3) Samples with missing relevant data. Finally, 5,215 observations are obtained for 1,586 listed companies. Except for the online voting rate of listed companies' shareholders' meeting and information disclosure appraisal, which are manually collected from the official websites of Juchao Information and Shenzhen Stock Exchange, respectively, all other data come from the database of Cathay Pacific (CSMAR). In order to avoid the influence of extreme values on the estimation results, this paper shrinks the tails of all continuous variables at the 1% and 99% levels. For data processing and testing, the software used is Excel 2013 and Stata 14.0.

3.2. Formulation of research hypotheses

The relevant regulations and systems for improving the voting mechanism at general meetings of shareholders of listed companies have always been emphasized by the Government and society. Voting is the right of shareholders to make decisions, and this right can only be exercised by attending shareholders' meetings. In the past, since the participation of some shareholders in on-site shareholders' meetings was not in line with the cost-benefit analysis, they usually chose to sell their shares or attach themselves to managers and major shareholders, and their participation was not highly motivated. However, with the growing market, shareholders' awareness of protecting their own rights and interests has gradually increased, and more shareholders have begun to pay attention to corporate development and actively participate in corporate governance through a variety of ways, while the emergence and popularization of online voting and blockchain have substantially reduced the cost of participation of shareholders, and the general meeting of shareholders has gradually become a key channel for shareholders to put forward their demands and participate in governance.

Corporate governance decisions may be affected by shareholder voting. Strict supervision of management may be a key way to improve the level of corporate governance. From the above analysis, it can be seen that the blockchain-based shareholder voting system can play a full role. By participating in the general meeting of shareholders, shareholders pay more attention to the behavior of management and can communicate with management through social media thus corporate governance. Meanwhile, the application of blockchain promotes more transparent information about corporate equity, finance and decision-making, which greatly helps shareholders and all parties to play a role in corporate governance. Based on the above analysis, this paper proposes the following hypotheses:

H1: Blockchain-based shareholder voting system can improve corporate governance.

3.3. Definition of variables

The definition of the research variables in this paper is shown in Table 1, which includes three parts: the explanatory variables, the explanatory variables and the control variables.

Table 1. Variable definition

Variable type	Variable name	Variable symbol
Explained variable	Corporate management	Manage
Interpretation variable	Shareholder voting system	Vote
Control variable	Asset liability ratio	Lev

	Corporate value	TobinQ
	Independent director ratio	Idr
	Management shareholding ratio	Share
	Fixed asset ratio	Fixed
	Corporate size	Size
	Corporate cashflow	Cash
	Duality	Dual
	Corporate growth	Growth
	Nature of property right	SOE

Based on the theoretical analysis in the previous section, the explanatory and interpreted variables are not repeated in this paper. The control variables in the above table are described.

1) Gearing ratio (Lev): defined as the ratio of the company's total liabilities to total assets on the balance sheet date in the quarter prior to the date of the shareholders' meeting.

2) Firm value (TobinQ): defined as the ratio of the market value of the company's assets to the book value in the year in which the AGM is held. Company value is defined as:

$$TobinQ = \frac{Total\ equity \times Closing\ price + Book\ value\ of\ liabilities}{Book\ value} \quad (1)$$

3) Ratio of independent directors (Idr): defined as the ratio of the number of independent directors to the number of board of directors in the year prior to the year in which the shareholders' meeting is held.

4) Management's shareholding ratio (Share): indicates the management's shareholding in the year when the company's general meeting is held; if the management holds the company's shares in the year when the company's general meeting is held, the value is taken as 1; otherwise, it is taken as 0.

5) Fixed assets ratio (Fixed): defined as the ratio of net fixed assets to total assets.

6) Company Size (Size): defined as the natural logarithm of the total assets of the company on the balance sheet date of the quarter before the date of the shareholders' meeting.

7) Corporate Cash Flow Level (Cash): defined as the ratio of a company's money funds to its total assets.

8) Dual (Dual): indicates that the shareholders' meeting is held the year before the company's chairman and general manager of the two positions, if the company's chairman and general manager of the two positions for a person to serve as the value of 1, otherwise take 0.

9) Company growth (Growth): defined as the growth rate of the company's operating income, said the company's operating income for the year the amount of growth and the previous year's operating income ratio. Company growth is defined as:

$$Growth_t = \frac{Revenue_t - Revenue_{t-1}}{Revenue_{t-1}} \quad (2)$$

Where t denotes the year and $t-1$ denotes the previous year. $Revenue_t$ said the company held a general meeting of the year's operating income, $Revenue_{t-1}$ said the company held a general meeting of the previous year's operating income.

10) Nature of ownership (SOE): the balance sheet of the year before the date of the shareholders' meeting that the nature of the company's de facto controller, if the company is a state-owned enterprise nature of the value of 1, otherwise take 0.

3.4. Model construction

In order to explore the impact of blockchain-based shareholder voting system on the level of corporate governance, the following benchmark regression model is used in this study:

$$Manage_{it-1} = \beta_0 + \beta_1 Vote_{it-1} + \sum Control_{it-1} + \delta_i + \mu_{t-1} + \varepsilon_{it-1} \quad (3)$$

where i , $t-1$ represent listed firms and time, respectively, and $Manage_{it-1}$ is the explanatory variable for the level of corporate governance of i listed firms in the $t-1$ th. β_0 is the constant term, β_1 is the parameter to be estimated, and $Vote_{it-1}$ is the explanatory variable. $Control_{it-1}$ is the other control variables affecting the level of corporate governance for i listed firms in year $t-1$, which include gearing ratio (Lev), firm value (TobinQ), proportion of independent directors (Idr), management shareholding (Share), fixed asset ratio (Fixed), firm size (Size), level of corporate cash flow (Cash), Dual (Dual), Firm Growth (Growth), and Nature of Ownership (SOE). ε_{it-1} is a random disturbance term, δ_i is an industry fixed effect, and μ_{t-1} is a year fixed effect. Where i is for 1586 listed firms and $t-1$ is for the interval 2012-2022.

4. Empirical analysis of the impact of shareholder voting system on corporate governance

4.1. Descriptive statistics

The results of descriptive statistics of each variable are shown in Table 2. As shown in Table 2, the minimum value of corporate governance level (Manage) is 0, the maximum value is 4.954, and the standard deviation is 1.026, indicating that there is a large difference in the level of governance among listed companies. The mean value of Corporate Governance is 0.821. The minimum value of Shareholder Vote (Vote) is 0, the maximum value is 0.624, and the mean value is 0.089, which indicates that there is variability in the performance of shareholders' vote in different companies.

For measuring the control variables, the average company's gearing ratio (Lev) is 45.6%, the average company value (TobinQ) is 2.354, and the average proportion of sole directors is 41.2%, with a relatively large number of seats occupied by independent directors. The average management ownership is 18.6%, the mean fixed asset ratio is 24.6%, the average firm size is 24.06, the average firm cash flow level is 0.197, and the mean value of two jobs is 0.342. The average firm growth is 38.4%. The average value of the nature of ownership is 0.318, indicating that the market is mainly composed of non-state-owned enterprises, with state-owned enterprises accounting for 31.8%. These provide a better research basis for the empirical test of this paper.

Table 2. Descriptive statistics

Variable	N	Min	Max	Mean	Median	St.Dev
Manage	5215	0	4.954	0.821	0.712	1.026
Vote	5215	0	0.624	0.089	0.036	0.141
Lev	5215	0.069	0.901	0.456	0.415	0.213
TobinQ	5215	0.895	8.458	2.354	1.825	1.406
Idr	5215	0.365	0.634	0.412	0.465	0.074
Share	5215	0	0.702	0.186	0.044	0.263
Fixed	5215	0.008	0.685	0.246	0.196	0.178
Size	5215	21.63	27.85	24.06	23.45	1.294
Cash	5215	0.032	0.634	0.197	0.174	0.137
Dual	5215	0	1	0.342	0	0.507
Growth	5215	-0.685	4.826	0.384	0.165	0.764
SOE	5215	0	1	0.318	0	0.537

4.2. Sample grouping test

Using the mean value of corporate governance level (Manage) as the boundary, the data is divided into two groups, above the mean value is the high level of governance group with 1450 observations. Below the mean is the low level of governance group with 3765 observations. Through the independent

samples t-test for the difference between the means of the explanatory variables and control variables in the two groups of data, and the Wilcoxon rank sum test for the difference between the medians of the explanatory variables and control variables, to determine whether there is a significant difference between the data of the variables in the high level of corporate governance group and the low level of governance group, the results are shown in Table 3.

As shown in Table 3, the mean and median of each variable in the high level of governance group is higher than that in the low level of governance group, and the difference is significant at the 1% confidence level, indicating that the next year's shareholder turnout rate of the company with a high level of governance is better than that of the company with a low level of governance.

Table 3. Sample grouping test results

Variable	Mean			Median		
	High group	Low group	Mean difference	High group	Low group	Mean difference
Vote	0.945	0.665	-0.280***	0.799	0.625	0.174***
Lev	0.091	0.077	-0.014***	0.045	0.027	0.018***
TobinQ	0.605	0.300	-0.305***	0.459	0.371	0.088***
Idr	2.508	2.198	-0.310***	2.362	1.288	1.074***
Share	0.536	0.256	-0.280***	0.497	0.433	0.064***
Fixed	0.323	0.030	-0.293***	0.077	0.011	0.066***
Size	0.394	0.090	-0.304***	0.208	0.184	0.024***
Cash	24.234	23.904	-0.330***	24.188	22.712	1.476***
Dual	0.347	0.041	-0.306***	0.201	0.147	0.054***
Growth	0.496	0.186	-0.310***	0.018	-0.018	0.036***
SOE	0.536	0.228	-0.308	0.309	0.021	0.288***

4.3. Correlation test

Correlation analysis is a prerequisite for regression analysis, on the one hand, the results of correlation analysis can initially obtain the relationship between the variables, on the other hand, correlation test can identify the existence of covariance between the variables. As a result, this part of the data processing with Stata 15.0, Pearson correlation coefficient matrix is shown in Table 4.

From the results of Pearson correlation test for the main variables of the full sample, it can be seen: 1) From the results of Spearman correlation coefficient test, it can be seen that blockchain-based shareholder voting is positively correlated with the level of corporate governance, and the significance level is under 0.1%. It indicates that the blockchain-based shareholder voting system has a positive effect on corporate governance in enterprises.

2) From the correlation coefficient, the maximum correlation coefficient between variables is -0.4968, and it can be preliminarily judged that there is no multicollinearity between variables.

Table 4. Pearson correlation coefficient

	Manage	Vote	Lev	TobinQ	Idr	Share
Manage	1.000	0.0635***	0.1647***	0.1342***	0.0127	0.0245***
Vote	0.0635***	1.000	0.0342***	-0.1845*	-0.0069	0.0035
Lev	0.1647***	0.0342***	1.000	0.0897***	0.0016	0.0759***
TobinQ	0.1342***	-0.1845*	0.0897***	1.000	0.0264***	0.0216***
Idr	0.0127	-0.0069	0.0016	0.0264***	1.000	-0.4968***
Share	0.0245***	0.0035	0.0759***	0.0216***	-0.4968***	1.000
Fixed	0.1523***	-0.0156*	0.0892***	0.2671***	0.0245***	0.0635***

Size	0.1895***	0.0356***	0.4782***	0.3264***	0.0496***	0.3264***
Cash	0.1274***	-0.0124*	0.0936***	0.0306***	0.2314***	0.0592***
Dual	0.0052	0.0138	-0.0987***	-0.1125***	0.1385***	-0.1205***
Growth	0.1308***	-0.0178	0.0865***	0.0374***	0.0426***	0.0524***
SOE	0.0968***	0.0036	-0.1384***	-0.1362***	0.0395***	-0.1472***
	Fixed	Size	Cash	Dual	Growth	SOE
Manage	0.1523***	0.1895***	0.1274***	0.0052	0.1308***	0.0968***
Vote	-0.0156*	0.0356***	-0.0124*	0.0138	-0.0178	0.0036
Lev	0.0892***	0.4782***	0.0936***	-0.0987***	0.0865***	-0.1384***
TobinQ	0.2671***	0.3264***	0.0306***	-0.1125***	0.0374***	-0.1362***
Idr	0.0245***	0.0496***	0.2314***	0.1385***	0.0426***	0.0395***
Share	0.0635***	0.3264***	0.0592***	-0.1205***	0.0524***	-0.1472***
Fixed	1.000	0.3326***	0.2865***	0.1534***	0.2749***	-0.1524***
Size	0.3326***	1.000	0.3211***	0.1807***	0.2634***	-0.2216***
Cash	0.2865***	0.3211***	1.000	-0.1125***	0.0625***	-0.1386***
Dual	0.1534***	0.1807***	-0.1125***	1.000	0.1063***	0.0637***
Growth	0.2749***	0.2634***	0.0625***	0.1063***	1.000	0.0568***
SOE	-0.1524***	-0.2216***	-0.1386***	0.0637***	0.0568***	1.000

The sample variables were further tested for multicollinearity and the results of the test are shown in Table 5. The results show that the VIF values of each variable are between 1.21-2.18, which is much less than 10, so it is considered that there is no multicollinearity between the selected variables in this paper.

Table 5. Multiple common linear test results

Variable	VIF	1/VIF
Size	2.18	0.45872
Vote	1.71	0.58480
TobinQ	1.69	0.59172
Fixed	1.65	0.60606
Lev	1.58	0.63291
Idr	1.57	0.63694
Share	1.56	0.64103
SOE	1.42	0.70423
Growth	1.26	0.79365
Dual	1.22	0.81967
Cash	1.21	0.82645
Mean VIF	1.55	

4.4. Regression analysis

The regression results of the impact of blockchain-based shareholder voting system on corporate governance are shown in Table 6. The regression results in column (1) show that the coefficient of shareholder vote (Vote) is 0.225, which is significantly positive at the 1% level, without controlling for other factors, which indicates that the blockchain-based shareholder network system has an impact on significantly improving corporate governance, and Hypothesis H1 is verified. The empirical results in column (2) prove that shareholder voting is still significantly positive at 1% level on corporate governance after controlling for firm characteristics such as gearing ratio, firm value, proportion of sole director, and firm size, and hypothesis H1 is proved that blockchain-based shareholder voting

system is able to improve the level of corporate governance. Meanwhile, the coefficients of control variables indicate that the larger the asset size, the higher the level of corporate governance.

Table 6. Shareholder voting system based on blockchain and corporate management

	(1)	(2)
	Manage	Manage
Vote	0.225***	0.247***
	(3.74)	(3.98)
Lev		-0.064
		(-0.88)
TobinQ		0.006
		(1.46)
Idr		0.094
		(0.67)
Share		0.256***
		(4.34)
Fixed		-0.167*
		(-1.89)
Cash		-0.067
		(-0.087)
Dual		-0.014
		(-0.98)
Size		0.163***
		(12.87)
Growth		-0.004
		(-0.408)
SOE		-0.018
		(-0.61)
Year	Yes	Yes
Industry	Yes	Yes
_cons	0.405***	-2.854***
	(4.86)	(-10.65)
N	5215	5215
R2	0.0265	0.0275

4.5. Robustness Tests

In order to ensure the robustness of the above regression results and to exclude other endogeneity interferences, this paper tests the robustness of the above conclusions on the basis of the above regressions by substituting variables, changing fixed effects, and so on.

4.5.1. Substitution of explanatory variables. The relative indicator of shareholders' voting rate (attend_r) is used as the first replacement variable, and the number of shareholders attending the shareholders' meeting (min_per) is used as the second replacement variable. The empirical results of the impact of shareholder voting on corporate governance after replacing the explanatory variables are shown in Table 7. As shown in columns (1) and (2), the coefficients of blockchain-based shareholder voting system are 0.134 and 0.548 respectively, both of which are significantly positive at the 1% level, which indicates that the shareholder voting system has a significant positive impact on corporate governance, and the hypothesis H1 is still valid, and this result is robust.

Table 7. Regression results after replacing interpretation variable

	(1)	(2)
	Manage	Manage
attend_r	0.134*** (3.79)	
min_per		0.548*** (2.78)
Lev	-0.056 (-0.96)	-0.052 (-0.83)
TobinQ	0.006 (1.43)	0.009 (1.37)
Idr	0.096 (0.68)	0.075 (0.56)
Share	0.254*** (4.23)	0.274*** (4.05)
Fixed	-0.159* (-1.88)	-0.152* (-1.97)
Cash	-0.065 (-0.93)	-0.068 (-0.94)
Dual	-0.023 (-0.99)	-0.014 (-0.98)
Size	0.156*** (12.67)	0.147*** (12.04)
Growth	-0.006 (-0.59)	-0.006 (-0.72)
SOE	-0.018 (-0.58)	-0.025 (-0.75)
Year	Yes	Yes
Industry	Yes	Yes
_cons	-2.812*** (-10.75)	-2.694 (-9.89)
N	5215	5215
R2	0.0256	0.0250

4.5.2. Substitution of explanatory variables. The natural logarithm of the number of corporate governance plus one (Manage2) is used as the first replacement indicator, and the product of the ratio of governance inputs to operating income and 100 (Cost) is used as the second replacement indicator for the robustness test. The test results are shown in Table 8.

Table 8 shows that the coefficients of Vote are 0.167 and 0.245, which are significantly positive at the 5% and 1% levels, respectively, proving that the blockchain-based shareholder voting system can promote the improvement of corporate governance, and Hypothesis H1 is verified, and the conclusion is robust.

Table 8. Regression results after replacing explained variable

	(1)	(2)
	Manage2	Cost
Vote	0.167**	0.245***

	(2.23)	(2.98)
Lev	-0.195***	0.023
	(-2.96)	(0.37)
TobinQ	0.000	0.113***
	(0.08)	(13.67)
Idr	-0.162	-0.284
	(-0.86)	(-1.47)
Share	0.485***	0.367***
	(6.57)	(3.96)
Fixed	-0.056	0.163
	(-0.69)	(1.52)
Cash	0.118	-0.189*
	(1.62)	(-1.92)
Dual	-0.021	0.064**
	(-0.97)	(2.68)
Size	0.172***	-0.368***
	(11.05)	(-18.94)
Growth	-0.003	-0.071***
	(-0.63)	(-5.84)
SOE	-0.018	-0.095*
	(-0.61)	(-1.98)
Year	Yes	Yes
Industry	Yes	Yes
_cons	-2.526***	8.859***
	(-6.95)	(22.06)
N	5215	5215
R2	0.0386	0.0914

4.5.3. Changing fixed effects. To avoid the possible omission of a portion of the variables that are associated with shareholder voting and at the same time affect corporate governance. Therefore, this paper double fixes the firms individually and annually and regresses them in model (3). The test results are shown in Table 9.

Column (1) in Table 9 shows that the coefficient of blockchain-based shareholder voting (Vote) is 0.161, which is significant at 5% level, and column (2) shows that after controlling the control variables such as firm size and gearing ratio, the coefficient of shareholder voting (Vote) is 0.162, which is significantly positive at 5% level, which indicates that the blockchain-based shareholder voting system has a significant positive impact, and the research conclusion still holds.

Table 9. Regression results after changing fixed effect

	(1)	(2)
	Manage	Manage
Vote	0.161**	0.162**
	(2.84)	(2.85)
Lev		0.007
		(0.12)
TobinQ		-0.005
		(-0.58)
Idr		-0.008

		(-0.08)
Share		0.142
		(1.71)
Fixed		0.078
		(0.82)
Cash		-0.253***
		(-3.26)
Dual		-0.029
		(-1.42)
Size		0.078***
		(4.09)
Growth		-0.000
		(-0.07)
SOE		-0.036
		(-0.68)
Year	Yes	Yes
Firm	Yes	Yes
_cons	0.758***	-0.752
	(45.12)	(-2.14)
N	5215	5215
R2	0.0264	0.0282

5. Conclusion

The article explores blockchain and shareholder voting system and corporate governance, puts forward research hypotheses and constructs a research model on the basis of theoretical analysis. The impact of blockchain-based shareholder voting system on corporate governance is analyzed in depth.

Among the 5215 observations in this paper, the minimum, maximum, and mean values of corporate governance level are 0, 4.954, and 0.821, respectively. The minimum, maximum, and mean values of shareholder voting are 0, 0.624, and 0.089, respectively. It shows that there is variability in shareholder voting and corporate governance level in different companies. The correlation test shows that there is no multicollinearity between the study variables. Without controlling other variables, the coefficient of blockchain-based shareholder voting system is 0.225, which is significantly positive at 1% level. The coefficient of blockchain-based shareholder voting system on corporate governance is 0.247 and is still significantly positive at the 1% level after controlling the variables of gearing ratio, firm value, proportion of sole directors, and firm size. It can be seen that blockchain-based shareholder voting system can improve corporate governance. The robustness test likewise confirms this hypothesis.

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