

The Impact of Executive Heterogeneity on Firm Performance - Mediating Role Based on Digital Transformation of Firms

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Abstract. According to the "14th Five-Year Plan for Digital Economy Development" issued by the State Council, major enterprises should insist on digital development as the guide to promote the digital transformation of enterprises. The degree of digital transformation of enterprises is affected by the cognitive ability of managers, so the strategic decisions made by executives are crucial to enterprises, which will not only affect the development direction of enterprises, but also further influence the performance. Therefore, this paper selects A-share listed companies in China from 2010-2019 as the research object, and empirically tests the interrelationship between executive heterogeneity, corporate digital transformation, and corporate performance from three dimensions: executive age, financial background, and overseas background, supported by higher-order theory, and the findings show that (1) executive team age heterogeneity, financial background heterogeneity, and overseas background heterogeneity are all significantly and positively related to corporate performance significantly and positively; (2) executive team age heterogeneity is significantly and negatively related to corporate digital transformation, while executive team financial background heterogeneity and overseas background heterogeneity are significantly and positively related to corporate digital transformation; (3) corporate digital transformation is significantly and positively related to corporate performance; and (4) corporate digital transformation shows a partial mediating effect in executive heterogeneity and corporate performance.

Keywords: Executive heterogeneity, Corporate digital transformation, Strategic decision, corporate performance, Higher-order theory.

1. Introduction

As the direct managers of a company, executives have the authority to run the company and the decisions they make affect the development of the company. With the increasing competition in major markets and the explosive growth of the digital economy, digital transformation is becoming a key factor for companies to improve their competitive advantage (Donghui Liu et al, 2022) and economic efficiency. In the process of digital transformation, it is crucial for executives to change their mindset (Jian Chen et al, 2020). In the face of the complex corporate market environment, Hambrick and Mason (1984) proposed the "higher echelon theory", which states that the background of the executive team affects corporate performance by influencing the final decisions made by the executives, and Desheng Sun (2009) also argued that the basic information of executives affects executives' value orientation, which ultimately affects the performance of the firm. Therefore, the inclusion of corporate digital transformation in the examination of the relationship between executive team heterogeneity and corporate performance is an important issue in current academic research, and the introduction of corporate digital transformation for mechanism testing can help further clarify the actual role of executive team heterogeneity on corporate performance and provide effective empirical evidence for firms to enhance their performance.

2. Literature review and theoretical basis

The executive team, as the helmsman leading the company forward, has a great influence on the future direction of the company by their background and mindset. In daily operations, although the executive team announces decisions as a whole, they remain independent of each other when making decisions (Kexin Li, 2022). Therefore, executive team heterogeneity is a key factor that cannot be

ignored. Executive team heterogeneity refers to the differentiation of demographic characteristics, psychological perceptions, and values among team members (Blau and Turner, 1978), which covers a wide range of dimensions, including easy-to-measure variables such as age, tenure, educational background, and financial background, as well as more difficult to collect background characteristics such as ethnicity, personality, and values (Van Knippenberg and Schippers, 2007). Considering the completeness and reliability of the data, this paper subdivides executive team heterogeneity into three directions: executive team age heterogeneity, executive team financial background heterogeneity, and executive team overseas background heterogeneity, and examines the impact on corporate performance separately.

2.1. Relationship between executive heterogeneity and firm performance

2.1.1. Age heterogeneity

Age can confirm the social experience and risk preference of senior executives, and further affect the decision-making behavior of enterprises (Zhaoguo Zhang, 2014). The greater the age heterogeneity of a team, the more favorable it is for senior executives to exert their relationship network and play a leading role to improve the decision-making efficiency and corporate performance of the whole team (Jingchang Xu and Shenghai Wang, 2010). Bantel and Jackson (1989) also found in their earlier study that the higher the age heterogeneity of the senior management team, the better the enterprise performance. Because age heterogeneity can broaden the thinking span of the entire senior management team, the entry of young thoughts will help the entire enterprise to better conform to the trend of social development, and the existence of older thoughts will also make team decision-making more stable. Therefore, this paper proposes the following hypothesis:

H1a: The higher the age heterogeneity of the executive team, the higher the firm's performance

2.1.2. Financial background heterogeneity

Financial background refers to the extent to which each executive has engaged in the financial industry, because each enterprise's executives are elite talents in their field, and the degree of mastery of financial knowledge can reflect the extent to which the executive understands the capital market, which is conducive to the use of various information accumulated in the course of financial work to improve the company's financial investment system. In the long run, financial background heterogeneity can effectively promote corporate capital circulation, alleviate the deposit and loan relationship and financing constraints between companies and banks, and help companies obtain lower loan interest rates and higher credit lines, which is beneficial to the overall performance of the company (Jigao Zhu et al, 2015). Since the executive team can rationalize the allocation of corporate funds and select higher quality investments by virtue of their financial background heterogeneity, they can bring higher economic rewards to the firm. Therefore, this paper proposes the hypothesis that:

H1b: The higher the heterogeneity of the financial background of the executive team, the higher the corporate performance

2.1.3. Overseas background heterogeneity

Overseas background can reflect an executive's education level as well as his international and open thinking. Overseas background can provide executives with a multi-angle and multi-cultural way of thinking, making their thinking more comprehensive and active. At the same time, executives can practically feel the difference of technology between two countries, which can easily stimulate their sense of independent innovation, enhance corporate competitiveness and obtain better corporate performance (Yuan and Wen, 2018). The greater the heterogeneity of overseas backgrounds, the more it indicates the integration of a variety of different values in the senior management team, which can enrich the thinking perspectives of the whole team, promote mutual learning and communication progress between each other, and thus enhance the final quality of decision-making and improve corporate performance (Smith et al., 1994). Combining the above discussion, this paper proposes the following hypothesis:

H1c: The higher the heterogeneity of the executive team's overseas background, the higher the firm's performance

2.2. Impact of enterprise digital transformation on enterprise performance

Faced with the speed increasing development of the society, innovation has become the main driving force. In essence, digital transformation is to innovate the production mode and process with the help of digital technology (Fansheng Meng et al, 2019). Therefore, the executive team should be proactively aware of the necessity and importance of digital transformation to achieve optimistic gains through digital transformation. Zehao Min (2021) empirically tested the impact of digitalization on operational efficiency in retail enterprises and concluded that, on the whole, digital transformation in retail enterprises is beneficial for business performance improvement. At the same time, digital transformation can motivate firms to innovate and thus significantly improve their performance (Peng and Tao, 2022). Therefore, this paper proposes the hypothesis that.

H2: The higher the degree of digital transformation of a firm, the higher the firm performance

2.3. The impact of executive heterogeneity on the digital transformation of enterprises

2.3.1. Age heterogeneity

The concept of digital transformation of enterprises has started to become familiar to major companies in recent years. According to Hossain (2017), the use of digital technology is at the heart of digital business model innovation. Decisions made by older members of the executive team generally tend to be conservative and risk-averse (OLSEN and COX, 2001). Younger executives, however, tend to make high-risk, high-reward decisions to prove their competence in a short period of time. Thus, the innovative thinking of digital transformation requires a significant investment in a short period of time, coupled with the fact that innovation is a high-risk, long-term activity (Holmstrom, 1989). If the age heterogeneity of the executive team is high, the more intense the conflict of ideas among the executive members, the more time it takes to make unified decisions to support the digital transformation of the company (Xuan Tang et al, 2022). Thus, we propose hypothesis H3a:

H3a: The higher the age heterogeneity of the executive team, the lower the degree of digital transformation of the enterprise

2.3.2. Financial background heterogeneity

A firm's funding is key to the success of a firm's digital transformation. Also, Bernstein (2015) shows that corporate innovation is largely influenced by financing constraints. Talent in the field of finance can expand more corporate financing options, thus effectively alleviating financing constraints. In addition, the level of risk tolerance reflects the extent to which firms are willing to pay when making investment decisions (Boubakri et al, 2013), and executives with a financial background are more risk tolerant and thus more exposed to emerging things (Qian Chen et al, 2020). Therefore, the higher the heterogeneity of the financial background of the executive team, the more it can help companies to obtain information about digital transformation, promote cooperation among themselves and form a monitoring mechanism (Minghao Shen et al, 2023), thus improving the risk appetite of companies, which has helped companies to achieve digital transformation. Therefore, hypothesis H3b is proposed:

H3b: The higher the heterogeneity of the financial background of the executive team, the higher the degree of digital transformation of the company

2.3.3. Overseas background heterogeneity

As digital technology continues to improve, the products and services that customers receive are constantly changing, and it's difficult to meet the needs of today's customers with technological innovation or product innovation alone (Chesbrough, 2010), the incorporation of new thinking becomes the key for companies to stand out from the crowd of competitors. The diversity of educational backgrounds of the executive team members facilitates is conducive to the team making

more rational decisions (Cameloh et al, 2015), and also allows the executive team to be more sensitive to emerging things, making their mindset more active and thus coming up with more innovative ideas (Jianbo Song and Wen Wen, 2016). As the journey of digital transformation takes longer, the whole executive team needs to constantly update their thinking and face the future difficulties of the company with a more open and tolerant mindset, and the higher the heterogeneity of overseas backgrounds, the more it helps the executive team eventually form more diverse, specialized, and comprehensive decisions (Smith et al, 1991), facilitating the digital transformation of the company. Based on the above discussion, hypothesis H3c is derived:

H3c: The higher the heterogeneity of the executive team's overseas background, the higher the degree of digital transformation of the enterprise

3. Study design

3.1. Sample selection and data sources

This paper selects A-share listed companies from 2010-2019 as the initial sample, background data of the senior management team was obtained by sorting out the company's annual report, prospectuses, and corporate announcements, and enterprise digital transformation index data was collected and sorted out by Python crawler. Other data came from CSMAR database. Sample screening rules are as follows: First, enterprises with delisting risk (listed ST) and delisting period are excluded; Second, the financial industry samples are excluded. Thirdly, the samples whose key variable data were seriously missing were eliminated. After the above screening, the final number of observed samples is 21,789.

3.2. Variable settings

3.2.1. Explained variables

Enterprise value (Tobin's Q). At present, business management status is usually measured by business performance, and the evaluation criteria for business performance are broad and can be divided into financial and non-financial indicators. According to the record of Statistical Evaluation Bureau of the State-owned Assets Supervision and Administration Commission of the State Council (2005), in order to objectively reflect the business performance of enterprises in a certain period of time, financial indicators are divided into four aspects: development capacity, asset operation, financial efficiency and debt servicing capacity. Meanwhile, in order to portray the short- and long-term business conditions of enterprises, financial indicators can be subsequently divided into two major categories. Chinese and foreign scholars tend to use return on assets (ROA) and operating profit to portray short-term historical performance, while Tobin's Q, for example, is used to portray long-term future performance of the firm (Jinqing Zhang and Jiaqi Xiao, 2018). Non-financial indicators generally use values such as customer satisfaction and employee turnover rate. Combined with the data collected from the listed companies in this paper, Tobin's Q value is used to measure corporate performance considering that it takes time for corporate executives to make decisions, execute them, and subsequently present the financial effects. In this paper, Tobin's Q is expressed by Tobin'sQ, which is calculated as follows:

$$Tobin'sQ = \frac{\text{Market Value}}{\text{Total assets at end of period} - \text{Net intangible assets} - \text{Net goodwill}} \quad (1)$$

3.2.2. Core explanatory variables

Executive team heterogeneity (HTMT). In this paper, we measure TMT heterogeneity using three characteristics of executive team age heterogeneity, executive team financial background heterogeneity, and executive team overseas background heterogeneity, which are denoted by Hage, Hfin, and Hove in the paper for convenience. The age heterogeneity of the executive team represents

the degree of difference in age among the executive team members, and is measured using the standard deviation coefficient; the financial background heterogeneity (H_{fin}) reflects the degree of diversity in the knowledge of the financial industry among the executive team members, and the overseas background heterogeneity (H_{ove}) reflects the differentiation in exposure to different cultures, both of which are measured using the Herfindal-Hirschma coefficient method, which determines the degree of dispersion of different categories of members by calculating the square of the percentage of individuals in the whole for that category; when selecting data on overseas background, dummy variables are used, with 1 = with overseas background and 0 = without overseas background. The specific formula is:

$$H = 1 - \sum_{i=1}^N P_i^2 \quad (2)$$

Where i represents the category, P_i is the percentage of members of the i category in the team, and N is the total number of categories. H Values range from 0 to 1. The closer the value of H is to 1, the more dispersed and heterogeneous the categorical variable is.

3.2.3. Intermediate variables

The degree of digital transformation of enterprises (DCG). By referring to the structured feature word map of Chenyu Zhao (2021) and Fei Wu (2021) on the construction of enterprise digital transformation index, this paper collects and organizes annual reports of A-share listed companies through Python crawler technology. The word frequency of keywords involving "artificial intelligence technology", "big data technology", "cloud computing technology", "blockchain technology", "digital technology application" are summarized and sorted out. Due to the typical "right bias" of such data, all the obtained word frequency data are processed logarithmically in this paper.

3.2.4. Control variables

In addition, to improve the reliability and accuracy of this study, the following five control variables have been selected: Cash asset ratio (Cash), equity concentration (Foc), proportion of non-operating income (Income), firm growth (Grow), fixed assets growth (FI), and control for industry (Ind) and year (Year) effects.

The types and names of all variables, variable abbreviations and definitions are shown in Table 1.

Table 1. Definition and description of main variables

Variable type and name		Variable abbreviations	Variable Definition
Explained variables	Corporate Performance	Tobin's Q	Equation 1
Explanatory variables	Age heterogeneity	Hage	Age heterogeneity = standard deviation of age of executive team age / mean value of age
	Financial background heterogeneity	Hfin	Equation 2
	Overseas background heterogeneity	Hove	Equation 3
Intermediate variables	Enterprise Digital Transformation	DCG	In (Keyword frequency for digital transformation+1)
Control variables	Shareholding Concentration	Foc	Shareholding ratio of the first largest shareholder of the enterprise
	Cash Asset Ratio	Cash	Cash asset ratio = (monetary fund's + marketable securities)/current liabilities*100%
	Proportion of non-operating income	Income	Proportion of non-operating income = Amount of proportion of non-operating income / Total income
	Business Growth	Grow	Operating income growth rate
	Growth rate of fixed assets	FI	Growth rate of fixed assets = Net increase in original value of fixed assets for the period / Original value of fixed assets at the beginning of the period *100%
	Industry	Ind	Industry dummy variables, after excluding the financial industry, are divided into five categories: utilities, real estate, general, industrial, and commercial, and five dummy variables are set
	Year	Year	Year dummy variables, with 9 dummy variables set for 2010-2019

3.3. Research model

Based on the hypotheses and key variables presented in the previous paper, this paper adopts a two-way fixed effects model controlling for industry and time effects. Meanwhile, according to the core ideas of this paper, "Explore the relationship between heterogeneity of senior executives and enterprise performance" and "explore the mediating role of enterprise digital transformation", in order to explore the relationship between heterogeneity of senior executives and enterprise performance, the main regression models (3) and (4) are set as follows:

$$Tobin's Q_{i,j} = \alpha_0 + \alpha_1 HTMT_{i,j} + \sum Year + \sum Ind + \varepsilon_{i,j} \quad (3)$$

$$Tobin's Q_{i,j} = \beta_0 + \beta_1 HTMT_{i,j} + \beta_2 CVs_{i,j} + \sum Year + \sum Ind + \varepsilon_{i,j} \quad (4)$$

At the same time, this paper uses a stepwise regression method with three steps in order to explore the mediating effects of digital transformation of enterprises:

In the first step, determine whether executive team heterogeneity is significant for firm performance in conjunction with model (4);

In the second step, construct a model (5) to determine whether executive team heterogeneity is significant for the digital transformation of the firm;

$$DCG_{i,j} = \gamma_0 + \gamma_1 HTMT_{i,j} + \gamma_2 CVs_{i,j} + \sum Year + \sum Ind + \varepsilon_{i,j} \quad (5)$$

Among them, HTMT is the explanatory variable of the heterogeneity of top management team, and its main contents are: age heterogeneity (Hage), financial background heterogeneity (Hfin), overseas background heterogeneity (Hove), DCG is the degree of enterprise digital transformation, CVs is the control variable group, ε is the random error term, i is time, j represents the individual.

The third step is to build a model (6) to determine whether the heterogeneity of senior management team and enterprise digital transformation, as independent variables, have significant effects on enterprise performance. If corporate digital transformation is significant and executive team heterogeneity is not significant, then the effect of executive team heterogeneity on corporate performance all comes from corporate digital transformation, indicating that corporate digital transformation is fully mediated. If both enterprise digital transformation and executive team heterogeneity are significant, it indicates that enterprise digital transformation is partially mediated.

$$Tobin'sQ_{i,j} = \varphi_0 + \varphi_1 HTMT_{i,j} + \varphi_2 DCG_{i,j} + \varphi_3 CVs_{i,j} + \sum Year + \sum Ind + \varepsilon_{i,j} \quad (6)$$

Where Tobin'sQ is the explanatory variable in this paper.

4. Empirical analysis and hypothesis testing

4.1. Descriptive statistics

The dependent variable corporate performance (Tobin'sQ), the independent variable executive team heterogeneity (Hage, Hfin, Hove), the mediating variable corporate digital transformation (DCG) and the five control variables cash to assets ratio (Cash), equity concentration (Foc), proportion of non-operating income (Income), corporate growth (Grow), and Fixed Assets Growth Rate (FI), the descriptive statistical results of 10 main variables and 3119 listed companies from 2010 to 2019 are shown in Table 2.

Table 2. Descriptive statistical analysis of the main variables

Variable Name	Observations	Average value	Minimum value	Maximum value	Standard deviation
Hage	21789	0.127	0.000	0.471	0.051
Hfin	21786	0.075	0.000	0.500	0.140
Hove	21789	0.076	0.000	0.500	0.143
DCG	21789	1.251	0.000	6.306	1.386
Tobin'sQ	21789	2.180	0.719	32.220	1.496
Cash	21789	0.181	-0.023	0.936	0.146
Foc	21789	0.371	0.000	1.552	0.158
Income	21789	0.154	-277.000	206.300	3.229
Grow	21789	0.334	-1.309	1878.000	12.950
FI	21789	0.323	-1.000	382.000	3.209

From the results of descriptive statistics, it can be seen that the mean value of Hage is 0.127, which indicates that the age difference of executive team members is small and the age distribution is more concentrated; the mean value of Hfin is 0.075, which tends to be close to 0, indicating that fewer members of the executive team of listed companies have financial knowledge and financial work background, and its standard deviation is 0.140, which also indicates that the situation is similar

among different companies; the overseas The level of background heterogeneity (Hove) is also low, with a mean value of 0.076, a minimum value of 0 and a maximum value of 0.5, indicating that fewer executive members have overseas backgrounds. Corporate Digital Transformation (DCG) has a mean value of 1.251, a minimum value of 0, and a maximum value of 6.306, with a large standard deviation of 1.386, indicating that there are still companies that have not started their digital transformation in China's A-share listed companies, while those that have started their digital transformation have a large gap in their degree of transformation. In terms of corporate performance, the average Tobin'sQ of the sample companies is 2.180, but the difference between different companies is particularly obvious, with a minimum of 0.719 and a maximum of 32.220.

4.2. Correlation analysis

In this paper, Pearson correlation analysis and variance inflation factor VIF test were performed on the main variables in the model to initially detect the relationship between the independent and dependent variables, and also to determine whether there is a problem of multicollinearity, and the test results are shown in Table 3.

Table 3. Pearson correlation analysis table

Variables	Tobin'sQ	Hage	Hfin	Hove	DCG	Cash	Foc	Income	Grow	FI
Tobin'sQ	1.000									
Hage	0.038***	1.000								
Hfin	0.020***	0.062***	1.000							
Hove	0.072***	0.086***	0.078***	1.000						
DCG	0.133***	-0.035***	0.057***	0.125***	1.000					
Cash	0.101***	0.050***	-0.008	0.027***	0.087***	1.000				
Foc	-0.070***	-0.007	-0.042***	-0.038***	-0.118***	0.058***	1.000			
Income	0.001	-0.005	-0.018***	-0.013**	-0.014**	-0.008	-0.015**	1.000		
Grow	-0.004	0.002	0.004	-0.003	0.008	-0.005	-0.016**	-0.001	1.000	
FI	0.063***	0.008	0.019***	0.010	0.013*	0.054***	-0.003	0.000	0.009	1.000

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The results show that age heterogeneity of executive team (Hage), financial background heterogeneity of executive team (Hfin), and overseas background heterogeneity of executive team (Hove) are significantly and positively correlated with corporate performance (Tobin'sQ) at the 1% level, and the regression coefficients are 0.038, 0.020, and 0.072, respectively, which tentatively validate H1a, H1b, and H1c, indicating that this question has research significance. The mediating variable corporate digital transformation (DCG) is significantly and positively correlated with corporate performance (Tobin'sQ) at the 1% level, and the regression coefficient is 0.133, which is the same as hypothesis H2, that is, the higher the degree of corporate digital transformation, the more beneficial to corporate performance.

Table 4. Table of variance inflation factor test

Variables	VIF	1/VIF
Hage	1.02	0.981
Hfin	1.02	0.983
Hove	1.03	0.973
DCG	1.06	0.946
Cash	1.02	0.976
Foc	1.03	0.974
Income	1.00	0.999
Grow	1.00	0.999
FI	1.00	0.995
Mean	VIF	1.02

In addition, according to variance inflation factor test results in Table 4, VIF values of all variables are less than 5, so the multicollinearity problem can be excluded. To sum up, the variable design in

this paper is reasonable, and the basic regression model constructed in this paper can be regression in one model at the same time.

4.3. Multiple regression analysis

4.3.1. Baseline regression

To verify the correlation between executive heterogeneity and firm performance and test hypothesis H1, this paper uses a progressive regression strategy. First, in columns (1)-(3) of Table 5, controlling only for time fixed effects and industry fixed effects, executive team age heterogeneity (Hage), executive team financial background heterogeneity (Hfin), and executive team overseas background heterogeneity (Hove) are positively correlated at 1% significance level, and the regression coefficients are 0.786, 0.307, and 0.440, respectively, further confirming the hypothesis that higher executive team age, financial background, and overseas background heterogeneity are associated with better corporate performance. This further confirms the hypothesis that the higher the age, financial background, and overseas background heterogeneity of the executive team, the better the firm's performance. Second, adding the set of control variables in columns (4)-(6), the age of executive team, financial background, and overseas background heterogeneity are still positively correlated at the 1% significance level, and the regression coefficients are 0.761, 0.278, and 0.425, respectively, which confirms the hypotheses H1a, H1b, and H1c.

Table 5. Regression results of executive team heterogeneity on firm performance

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Tobin'sQ	Tobin'sQ	Tobin'sQ	Tobin'sQ	Tobin'sQ	Tobin'sQ
Hage	0.786*** (3.98)			0.761*** (3.86)		
Hfin		0.307*** (3.89)			0.278*** (3.56)	
Hove			0.440*** (5.76)			0.425*** (5.57)
Cash				0.303*** (3.56)	0.307*** (3.61)	0.304*** (3.58)
Foc				-0.332*** (-5.72)	-0.320*** (-5.50)	-0.323*** (-5.56)
Income				-0.005* (-1.70)	-0.005 (-1.63)	-0.005* (-1.65)
Grow				-0.001*** (-5.14)	-0.001*** (-4.93)	-0.001*** (-4.96)
FI				0.024* (1.95)	0.023* (1.94)	0.023* (1.93)
constant	2.347*** (29.91)	2.437*** (32.92)	2.423*** (32.90)	2.347*** (26.66)	2.429*** (28.76)	2.417*** (28.70)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
N	21789	21786	21789	21789	21786	21789
R ²	0.235	0.235	0.236	0.239	0.239	0.240
R ² _Adj	0.232	0.232	0.233	0.236	0.236	0.237
F	64.228	64.020	64.040	61.703	61.557	61.580

Note: t-statistics are marked in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The results show that age heterogeneity can make the whole executive team think in a wider span, and different age spans have different thinking dimensions; older executives are generally more stable, while younger executives generally have more active thinking, and thus can form a significant complementary advantages to enhance corporate performance; the higher the heterogeneity of financial background, executives with financial background will rely on their professional financial knowledge to allocate corporate capital rationally and choose better investments, which helps

corporate performance; finally, executives with overseas backgrounds have been exposed to different cultural ideas and innovative ideas from different countries, so they can bring higher economic rewards to the company. The higher the heterogeneity of financial background, the more executives with financial background will, by virtue of their professional financial knowledge, allocate corporate funds rationally, choose better quality investments, bring higher economic rewards to the company, and contribute to corporate performance; finally, executives with overseas background, because they have been exposed to different cultural ideas and innovative ideas from different countries, can provide a more comprehensive thinking for the whole executive team when making decisions, thus improving corporate performance.

4.3.2. Mediation effect test

The stepwise test regression coefficient method is used to prove whether "enterprise digital transformation" plays a role as an intermediary variable in the transmission chain of "executive heterogeneity to enterprise performance", and the test results are shown in Table 6.

Table 6. Regression results of intermediate effect test

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	Tobin'sQ	DCG	Tobin'sQ	Tobin'sQ	DCG	Tobin'sQ	Tobin'sQ	DCG	Tobin'sQ
Hage	0.761*** (3.86)	-0.834*** (-6.23)	0.791*** (4.00)						
Hfin				0.278*** (3.56)	0.171*** (3.16)	0.272*** (3.47)			
Hove							0.425*** (5.57)	0.521*** (9.78)	0.409*** (5.39)
DCG			0.037*** (3.63)			0.034*** (3.41)			0.031*** (3.10)
Cash	0.303*** (3.56)	0.021 (0.39)	0.302*** (3.55)	0.307*** (3.61)	0.007 (0.13)	0.307*** (3.61)	0.304*** (3.58)	0.000 (0.01)	0.304*** (3.58)
Foc	-0.332*** (-5.72)	-0.238*** (-5.36)	-0.324*** (-5.54)	-0.320*** (-5.50)	-0.235*** (-5.28)	-0.312*** (-5.33)	-0.323*** (-5.56)	-0.233*** (-5.27)	-0.316*** (-5.41)
Income	-0.005* (-1.70)	-0.001 (-0.92)	-0.005* (-1.68)	-0.005 (-1.63)	-0.001 (-0.83)	-0.005 (-1.62)	-0.005* (-1.65)	-0.001 (-0.75)	-0.005 (-1.64)
Grow	-0.001*** (-5.14)	0.001*** (3.33)	-0.001*** (-5.31)	-0.001*** (-4.93)	0.001*** (3.38)	-0.001*** (-5.09)	-0.001*** (-4.96)	0.001*** (3.38)	-0.001*** (-5.10)
FI	0.024* (1.95)	-0.001 (-0.93)	0.024* (1.95)	0.023* (1.94)	-0.001 (-1.11)	0.023* (1.94)	0.023* (1.93)	-0.001 (-1.17)	0.023* (1.93)
constant	2.347*** (26.66)	0.628*** (7.10)	2.324*** (26.32)	2.429*** (28.76)	0.521*** (6.00)	2.411*** (28.52)	2.417*** (28.70)	0.501*** (5.74)	2.402*** (28.48)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	21789	21789	21789	21786	21786	21786	21789	21789	21789
R ²	0.239	0.477	0.24	0.239	0.477	0.24	0.24	0.479	0.241
R ² _Adj	0.236	0.475	0.236	0.236	0.475	0.237	0.237	0.477	0.237
F	61.703	278.424	61.021	61.557	283.639	60.888	61.58	286.725	60.905

Note: t-statistics are marked in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

First, this paper uses model (5) to verify the influence path of "executive team heterogeneity-firm performance". On the basis of controlling the fixed time effect and the fixed industry effect, the heterogeneity of top executive team age, financial background and overseas background are all positively correlated at the significance level of 1%, with regression coefficients of 0.761, 0.278 and 0.425, respectively, indicating that the total effect of top executive heterogeneity on firm performance is established.

Second, model (5) is used to test the relationship between "executive team heterogeneity and digital transformation". The heterogeneity of executive team is used as the independent variable and digital transformation is used as the dependent variable for regression. The regression coefficient of Hage on enterprise digital transformation (DCG) is -0.834, which is significant at 1% significance

level. The higher the age heterogeneity of the senior management team, that is, the more dispersed the age of the team members, the more unfavorable to enterprise digital transformation, which confirms hypothesis H3a. The age difference between senior executives will aggravate the conflict between senior executives and young executives, leading to the decline of executive power in decision-making. Meanwhile, senior executives are more risk averse, which is not conducive to the digital transformation and innovation of enterprises.

The heterogeneity of executive team's financial background (Hfin) and heterogeneity of overseas background (Hove) are significantly and positively correlated with digital transformation (DCG) at 1% level, with regression coefficients of 0.171 and 0.521 respectively, indicating that hypotheses H3b and H3c also hold. Executives with financial backgrounds also have stronger risk resistance and innovation awareness, and can help companies obtain information about digital transformation from multiple perspectives, so the higher the heterogeneity of financial backgrounds, the more beneficial to corporate digital transformation; when the heterogeneity of executive team's overseas background is higher, the more inclusive and concerned about digital transformation derived from the wave of digital economy, so the more beneficial to corporate digital transformation. Thus, it is concluded that the executive team heterogeneity is significant for the digital transformation of enterprises, which can further indicate the significant mediating effect.

Third, using model (6), we determine whether there is a full mediation of the mediating variable digital transformation (DCG). According to the results in Table 8, both executive team heterogeneity and corporate digital transformation as independent variables are significant at the 1% level for corporate performance, then it is proved that the full mediating effect of corporate digital transformation does not hold, and corporate digital transformation plays a partial mediating effect in the transmission process between executive team heterogeneity and corporate performance.

4.4. Robustness tests

Table 7. Robustness test base regression results excluding IPO year data

Variables	(1) Tobin'sQ	(2) Tobin'sQ	(3) Tobin'sQ	(4) Tobin'sQ	(5) Tobin'sQ	(6) Tobin'sQ
Hage	1.135*** (3.27)			1.207*** (3.51)		
Hfin		0.320** (2.54)			0.240** (1.97)	
Hove			0.374*** (2.93)			0.334*** (2.65)
Cash				1.750*** (9.50)	1.731*** (9.45)	1.732*** (9.44)
Foc				-0.140 (-1.60)	-0.149* (-1.67)	-0.155* (-1.75)
Income				-0.003 (-1.23)	-0.003 (-1.14)	-0.003 (-1.14)
Grow				-0.001*** (-4.63)	-0.001*** (-4.44)	-0.001*** (-4.42)
FI				0.033*** (6.12)	0.033*** (5.99)	0.033*** (6.01)
constant	2.879*** (17.68)	3.013*** (19.62)	2.990*** (19.67)	2.375*** (12.50)	2.532*** (14.05)	2.511*** (14.00)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
N	11412	11409	11412	11412	11409	11412
R ²	0.252	0.252	0.252	0.273	0.273	0.273
R ² _Adj	0.247	0.246	0.246	0.267	0.267	0.267
F	41.737	41.659	41.672	42.678	42.655	42.661

Note: t-statistics are marked in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

At present, IPO resources in the A-share market are relatively scarce. In order to be listed successfully, some enterprises have information to "optimize" their performance, so as to gain recognition from more investors. In order to prevent the impact of this situation on the analysis results in this paper and ensure the reliability of the analysis results, the samples of IPO in the same year of the company are excluded for robustness test. Among the 21,789-sample data, there exist 11,995 data listed in the period of 2010-2019. After removing the data of IPO year, the previous basic regression and mediating effect test are repeated, and the data of regression results according to Table 7 and Table 8 show that the sign of correlation coefficient and significant relationship of main variables remain consistent with the previous paper, which indicates that the results of this paper have good robustness.

Table 8. Regression results of robustness test for mediating effects excluding IPO year data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	Tobin'sQ	DCG	Tobin'sQ	Tobin'sQ	DCG	Tobin'sQ	Tobin'sQ	DCG	Tobin'sQ
Hage	1.207*** (3.51)	-0.393** (-2.04)	1.195*** (3.47)						
Hfin				0.240** (1.97)	0.287*** (3.92)	0.249** (2.03)			
Hove							0.334*** (2.65)	0.668*** (8.64)	0.357*** (2.84)
DCG			-0.029* (-1.83)			-0.032* (-1.95)			-0.035** (-2.18)
Cash	1.750*** (9.50)	0.235*** (2.72)	1.757*** (9.53)	1.731*** (9.45)	0.225*** (2.59)	1.738*** (9.48)	1.732*** (9.44)	0.220** (2.55)	1.740*** (9.47)
Foc	-0.140 (-1.60)	-0.053 (-0.89)	-0.142 (-1.61)	-0.149* (-1.67)	-0.032 (-0.55)	-0.150* (-1.68)	-0.155* (-1.75)	-0.036 (-0.62)	-0.156* (-1.76)
Income	-0.003 (-1.23)	-0.000 (-0.08)	-0.003 (-1.23)	-0.003 (-1.14)	0.000 (0.09)	-0.003 (-1.13)	-0.003 (-1.14)	0.000 (0.15)	-0.003 (-1.13)
Grow	-0.001*** (-4.63)	0.001*** (6.42)	-0.001*** (-4.51)	-0.001*** (-4.44)	0.001*** (6.95)	-0.001*** (-4.31)	-0.001*** (-4.42)	0.001*** (6.30)	-0.001*** (-4.26)
FI	0.033*** (6.12)	-0.000 (-0.20)	0.033*** (6.15)	0.033*** (5.99)	-0.000 (-0.41)	0.033*** (6.01)	0.033*** (6.01)	-0.000 (-0.26)	0.033*** (6.04)
constant	2.375*** (12.50)	0.426** (2.15)	2.388*** (12.48)	2.532*** (14.05)	0.354* (1.81)	2.543*** (13.99)	2.511*** (14.00)	0.301 (1.57)	2.521*** (13.94)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	11412	11412	11412	11409	11409	11409	11412	11412	11412
R ²	0.273	0.471	0.273	0.273	0.471	0.273	0.273	0.475	0.273
R ² _Adj	0.267	0.466	0.268	0.267	0.467	0.267	0.267	0.471	0.267
F	42.678	146.948	42.237	42.655	145.230	42.222	42.661	149.185	42.234

Note: t-statistics are marked in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.5. Heterogeneity analysis

Based on the relevant documents of "Strategic Emerging Industry Classification Catalogue", the industry code of high-tech listed companies is determined. The sample is divided into high-tech industries (HT=1) and non-high-tech industries (HT=0) based on the differences in company industry attributes, in an attempt to explore the different effects that differences in company attributes may have on the relationship between "executive heterogeneity - corporate digital transformation - corporate performance".

Table 9. Regression results for the grouping of high-tech and non-tech industries

Variables	Non-high-tech industries			High Technology Industry		
	(1)	(2)	(3)	(4)	(5)	(6)
Hage	0.764***			0.725***		
	-2.78			-2.62		
Hfin		0.309***			0.258**	
		-3.07			-2.15	
Hove			-0.072			0.740***
			(-0.77)			-6.77
Cash	0.267**	0.261*	0.271**	0.376***	0.391***	0.372***
	-1.99	-1.95	-2.01	-3.4	-3.53	-3.39
Foc	-0.357***	-0.353***	-0.363***	-0.297***	-0.278***	-0.282***
	(-5.02)	(-4.98)	(-5.10)	(-3.26)	(-3.04)	(-3.12)
Income	-0.004	-0.004	-0.004	-0.005	-0.005	-0.005
	(-1.33)	(-1.36)	(-1.38)	(-1.16)	(-1.10)	(-1.06)
Grow	-0.001***	-0.001***	-0.001***	0.021	0.028	0.02
	(-4.89)	(-4.77)	(-4.78)	-1.02	-1.28	-1.01
FI	0.032***	0.032***	0.032***	-0.018***	-0.020***	-0.019***
	-3.86	-3.84	-3.86	(-2.81)	(-2.93)	(-2.85)
constant	2.423***	2.513***	2.527***	2.400***	2.468***	2.446***
	-22.88	-25.71	-25.79	-26.85	-29.15	-29.05
Year	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
N	10364	10362	10364	11425	11424	11425
R ²	0.301	0.301	0.3	0.193	0.193	0.198
R ² _Adj	0.295	0.296	0.295	0.191	0.191	0.195
F

Note: t-statistics are marked in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Regarding the possible impact of the different attributes of the company's industry on the regression results, the analysis in this paper is as follows. According to Table 9, the regression coefficients of age heterogeneity of executive team (Hage) and financial background heterogeneity of executive team (Hfin) do not differ significantly in both high-tech and non-high-tech industries, and the signs remain consistent and are significant with firm performance at the 1% level, while the overseas background heterogeneity of executive team (Hove) differs. In non-high-tech industries, the heterogeneity of executive team's overseas background shows a negative but statistically insignificant relationship with firm performance. This may be due to the fact that the heterogeneity of the executive team's overseas background is greater in non-high-tech companies, and executives with overseas backgrounds are not familiar with the domestic market (Guoxin Yu et al, 2010) and have experienced the technological gap between different countries, which leads them to be easily motivated to innovate on their own and want to take measures to improve the company's intelligence, but this does not match with the company's industry attributes. Therefore, there is a certain amount of internal conflict, which leads to a lack of clarity in the direction of the company's development and negatively affects the overall company performance in the short term. However, in a longer period of time, executives with overseas background may change their ideas, or the impact of the actual economic environment on corporate performance may be more complex and diversified than the heterogeneity of the overseas background of the senior management team. Therefore, in non-high-tech enterprises, the regression result of the heterogeneity of the overseas background of the senior management team and corporate performance is not significant. In contrast, in high-tech industries, talents with overseas backgrounds have cutting-edge knowledge, technology and international perspective, which help to

promote firms' innovation activities (Guoliang Huang and Jiawu Xu, 2016), thus helping firms to achieve better performance in high-tech industries.

The reason why only the overseas background heterogeneity (Hove) of the executive team differs in the case of companies with different industry attributes is that, regardless of non-high-tech or high-tech industries, age is approximately equivalent to the seniority level of executives, and when companies face a complex external environment, the experience of older executives can be combined with the innovative thinking of younger executives to improve the efficiency of decision making, thus promoting the performance improvement (Xiaohui Zhou et al, 2017).

Generally speaking, high-tech enterprises have strong financing ability and need to invest more capital in a certain period of time. The research and development cycle are long, and the speed of capital recovery is slower than the speed of capital investment. Therefore, due to the existence of "principal-agent" relationship, executives with financial background tend to inhibit the financial growth of enterprises. Put a lot of money into the daily construction of the business, so as to get better financial data. For non-high-tech industries, enterprises occupy a large degree of capital, have large fixed assets, complex management structure, and little operating space for investment experience. Executives with financial background often do not make investment decisions in related financial fields (Hongyang Sun, 2019). Therefore, even if the industry attributes of the company are different, the higher the heterogeneity of the financial background of the senior management team, the more likely the senior executives with financial background are to restrain the financial growth of the enterprise and invest money in the daily management of the enterprise, so as to improve the performance of the enterprise.

5. Conclusions and Recommendations

5.1. Conclusion

Based on the high-level echelon theory, this paper studies the impact of background heterogeneity of top management team on firm performance, and further discusses the role of digital transformation in the impact of background heterogeneity of top management team on firm performance. Based on the sample data of China's A-share listed companies from 2010 to 2019, the following conclusions are drawn:

First, age heterogeneity of executive team, financial background heterogeneity of executive team, and overseas background heterogeneity of executive team are significantly and positively related to firm performance.

Second, age heterogeneity of the executive team is significantly negatively related to corporate digital transformation, and heterogeneity of the executive team's financial background and heterogeneity of the executive team's overseas background are significantly positively related to corporate performance.

Third, there is a significant positive correlation between the digital transformation of enterprises and enterprise performance. The embedding of digital technology can interoperate various resources that originally operated independently, reduce the information barriers between enterprises and the external environment, and help enterprises establish a unique competitive advantage, thus facilitating the development of enterprise performance.

5.2. Recommendations

5.2.1. Executive level

The executive team is the core part of a company and the importance of the decisions they make is self-evident for the development of the company, and with the advent of the digital economy, digital transformation will become an important way for companies to develop in a high-quality way in the future. According to the conclusion of this paper, executives should learn financial knowledge, enrich their overseas background, and align their thinking with the digital era to improve corporate

performance. Moreover, the executive team should independently develop ways to regulate conflicts and reduce decision costs, for example, pay attention to the reasons and frequency of conflicts that occur during decision making, analyze the personality of each colleague executive to understand each other, strive not to have a second argument over the same issue, and increase team cohesion.

5.2.2. Enterprise level

When companies make the selection of top management, they should pay attention to the reasonableness of the background configuration of the whole team to ensure that the members achieve complementary strengths, reduce decision-making conflicts and improve decision-making efficiency, so as to come to improve corporate performance. In terms of age composition, the heterogeneity should be appropriately increased to improve the age span of the executive team, thus contributing to corporate performance; in terms of financial background composition, the relatively inconsistent financial background can help the executive team to be more oriented when making decisions, thus enhancing the decision-making efficiency; in terms of overseas background composition, attention should be paid to the introduction and cultivation of overseas talents to make the team's decisions more in line with the development trend of the times. We should give full play to the positive effect of advanced ideas on corporate performance. Moreover, digital transformation of enterprises can greatly reduce information asymmetry and break the information barrier between enterprises and the outside world, thus promoting innovation and improving enterprise performance. Therefore, enterprises can set up executive innovation incentive mechanism, and correlate the quality of innovation projects with the compensation system of executive members, so as to enhance the initiative of executives to innovate on their own and face the digital transformation more actively.

5.2.3. National level

The digital transformation of enterprises depends not only on the internal rules and regulations of enterprises, but also on the external market environment of enterprises. Therefore, the government should actively promulgate relevant documents to promote the digital transformation of enterprises, improve the legal provisions related to digital transformation, pay attention to industry differences, and provide different industries with appropriate digital transformation strategies, so that the process of digital transformation of enterprises can be smooth and play its due effectiveness, and thus promote the development of the whole market economy.

References

- [1] Liu, Dong-Hui, Bai, Fu-Ping, Dong, Kai-Yun. A study on the mechanism of digital transformation's impact on firm performance [J]. Finance and Accounting Communications, 2022, No.900 (16): 120 - 124. DOI: 10.16144/j.cnki.issn1002 - 8072.2022.16.010.
- [2] Chen Jian, Huang Shuo, Liu Yunhui. From empowerment to enablement - enterprise operation management in digital environment [J]. Management World, 2020, 36 (02): 117 - 128+222. DOI: 10.19744/j.cnki.11 - 1235/f.2020.0025.
- [3] Donald C. Hambrick, Phyllis A. Mason. Upper Echelons: The Organization as a Reflection of Its Top Managers [J]. The Academy of Management Review, 1984, 9 (2).
- [4] Sun Desheng. Executive teams and corporate social responsibility: A higher-order theory perspective [J]. Science and Technology Management, 2009, 30 (04): 188 - 193.
- [5] Li Kexin. The impact of executive heterogeneity on firm performance [D]. Zhejiang University, 2022. DOI: 10.27461/d.cnki.gzjdx.2022.000434.
- [6] Jonathan H. Turner, Peter M. Blau. Inequality and Heterogeneity: A Primitive Theory of Social Structure. [J]. Contemporary Sociology A Journal of Reviews, 1978, 7 (6).
- [7] van Knippenberg Daan, Schippers Michaéla C. Work group diversity. [J]. Annual review of psychology, 2007, 58.
- [8] Zhang ZG, Liu YW, Yang QH. A study on managerial tenure, promotion incentives and R&D investment [J]. Accounting Research, 2014 (09): 81 - 88+97.

- [9] Xu Jingchang, Wang Shenghai. Research on the relationship between core executive characteristics and firm growth--an empirical study based on data of listed companies in Shanghai and Shenzhen, China [J]. *Economic Theory and Economic Management*, 2010, No. 234 (06): 58 - 65.
- [10] Karen A. Bantel, Susan E. Jackson. Top Management and Innovations in Banking: Does the Composition of the Top Team Make a Difference? *Strategic Management Journal*, 1989, 10.
- [11] Zhu, Jigao, Han, Fei-Chi, Lu, Zhengfei. Industrial policy, bank linkage and corporate debt financing--an empirical study based on A-share listed companies [J]. *Financial Research*, 2015 (03): 176 - 191.
- [12] YUAN R, WEN W. Managerial foreign experience and corporate innovation [J]. *Journal of corporate finance*, 2018 (48): 752 - 770.
- [13] Smith, K.G., Smith, K. A. & Olian, J. D. Top Management Team Demography and Process: The Role of Social Integration and Communication [J]. *Administrative Science Quarterly*, 1994, 39 (3): 412 - 438.
- [14] Meng Fansheng, Xu Ye, Zhao Gang. Research on the transformation process of high-end equipment manufacturing enterprises to smart manufacturing--based on digital empowerment perspective [J]. *Scientific Decision Making*, 2019 (11): 1 - 24.
- [15] Min, Ze-Hao. The impact of digitalization on operational efficiency of retail enterprises in the context of innovation drive [J]. *Business Economics Research*, 2021 (05): 120 - 123.
- [16] Peng Yongzhang and Tao Changqi. Can digital transformation promote enterprise performance? -From the perspective of public policy and innovation [J]. *Journal of Innovation & Knowledge*, 2022, 7 (3).
- [17] HOSSAIN M, 2017. Business model innovation: Past research, current debates, and future directions [J]. *Journal of Strategy amp; Management*, 10 (3): 342 - 359.
- [18] OLSEN R A, COX C M. The influence of gender on the perception and response to investment risk: the case of professional investors [J]. *psychology and financial markets*, 2001, 2 (1): 29 - 36.
- [19] Holmstrom, B. Agency Costs and Innovation [J]. *Journal of Economic Behavior amp; Organization*, 1989, 12 (3): 305 - 327.
- [20] Tang Xuan, Gao Xing, Zhao Tianqi et al. Executive team heterogeneity and corporate digital transformation [J]. *China Soft Science*, 2022, No.382 (10): 83 - 98.
- [21] Bernstein, S. Does Going Public Affect Innovation? [J]. *Journal of Finance*, 2015, 70 (4): 1365 - 1403.
- [22] Chen Q., Shi Y. P., Huang X. Does the financial background of CEOs increase the total factor productivity of firms? [J]. *Technology Economics*, 2020, 39 (11): 127 - 135.
- [23] Boubakri N, Cosset J, Saffar W. The Role of State and Foreign Owners in Corporate Risk-Taking: Evidence from Privatization [J]. *Journal of Financial Economics*, 2013, 3 (108).
- [24] Shen, M. H., Pang, Y. B., Tan, W. J. Different paths can lead to different ways: executive team heterogeneity and corporate digital strategy [J]. *Southern Finance*, 2023, No. 557 (01): 50 - 64.
- [25] CHESBROUGH H, 2010. Business model innovation: Opportunities and barriers [J]. *Long Range Planning*, 43 (2): 354 - 363.
- [26] CAMELO-ORDAZ C, GARCÍA-CRUZ J, SOUSA-GINEL E. The influence of top management team conflict on firm innovativeness [J]. *Group decision and negotiation*, 2015, 24 (6): 957 - 980.
- [27] Song Jianbo, Wen Wen. Can the overseas background of directors promote corporate innovation? [J]. *China Soft Science*, 2016 (11): 109 - 120.
- [28] Smith, K. G., Grimm, C. M., Gannon, M. J., Chen, M. J. Organizational Information Processing, Competitive Responses, and Performance in the U.S. Domestic Airline Industry. *Organizational Information Processing, Competitive Responses, and Performance in the U.S. Domestic Airline Industry.*, 1991, 34 (1): 60 - 85.
- [29] Statistical Evaluation Bureau of the State-owned Assets Supervision and Administration Commission of the State Council. 2005 Enterprise Performance Evaluation Standards. Beijing: Economic Science Press, 2005.
- [30] Zhang, Jinqing, Xiao, Jiaqi. A review of research on executive team heterogeneity and firm performance [J]. *Business Research*, 2018, No.491 (03): 115 - 122+161. DOI: 10.13902/j.cnki.syyj.2018.03.015.
- [31] Zhao, Chen-Yu, Wang, Wen-Chun, Li, Xue-Song. How digital transformation affects total factor productivity of enterprises [J]. *Finance and Trade Economics*, 2021, 42 (07): 114 - 129. DOI: 10.19795/j.cnki.cn11 - 1166/f.20210705.001.

- [32] Wu, Fei, Hu, Huizhi, Lin, Huiyan, Ren, Xiaoyi. Corporate digital transformation and capital market performance-empirical evidence from stock liquidity [J]. *Management World*, 2021, 37 (07): 130 - 144+10. DOI: 10.19744/j.cnki.11 - 1235/f.2021.0097.
- [33] Yu GX, Cheng J, Zhang JH. A study on the relationship between executive background characteristics and business performance of listed companies in high-tech industry in small and medium-sized board [J]. *Science and Technology Management Research*, 2010, 30 (1): 177 - 179
- [34] Huang G-L, Xu J-W. Overseas experience of executives and optimal capital structure adjustment - empirical evidence from GEM listed companies [J]. *Business Research*, 2016 (2): 142 - 148.
- [35] Zhou Xiaohui, Tian Mengmeng, Nie Haoran. Executive team heterogeneity, surplus management and corporate performance [J]. *Journal of Nanjing Audit University*, 2017, 14 (03): 75 - 85.
- [36] Sun Hongyang. Executives' financial background and corporate financialization [D]. Southwest University of Finance and Economics, 2019. doi: 10.27412/d.cnki.gxncu.2019.001912.