



The Impact of Top Executive Team Heterogeneity on Firm Performance and Financial Leverage

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Abstract. This paper empirically analyzes the impact of top executive team heterogeneity on firm performance and financial leverage with fixed effects model based on data of Listed Companies in China's software and information technology service industry from 2012 to 2018. The results show that age heterogeneity has a significant negative correlation with short-term performance, but not with long-term performance. The relationship between occupational background heterogeneity and enterprise performance is not significant. Moreover, age heterogeneity has a significant negative effect on financial leverage, while occupational background heterogeneity has a significant positive effect.

Keywords: Top management team · Age heterogeneity · Occupational background heterogeneity · Long-term and short-term performance · Financial leverage

1 Introduction

In 1984, Hambrick and Mason put forward the "High-level Echelon Theory", pointing out that the characteristics of enterprise managers influence their strategic choice, and thus affect enterprise behavior [1]. With the development of social economy and the strengthening of professional division of labor, the differences among senior management members gradually increase. This difference covers age, experience, personality, values and many other aspects. Due to the existence of differences, the senior management team may put forward different views on the acquisition and understanding of information in the process of solving problems cooperatively, resulting in team conflicts. Such conflicts may not only deepen the understanding and analysis of complex issues by the senior management team as a whole, but also promote the development of the enterprise, and may also increase the internal friction of the team and bring chaos to the enterprise operation [2].

Therefore, in the new development period when China is promoting economic transformation through structural reform, the relationship between TMT heterogeneity and corporate performance and capital structure in Chinese enterprises is worth exploring.

2 Literature Review

In the process of studying executive heterogeneity and firm performance and behavior, scholars mainly form two theoretical bases: information decision theory and social generalization theory. According to the information decision theory, the differentiation among senior executives can bring more resources and information, provide rich and diversified viewpoints and perspectives, realize the complementarity of information, knowledge and resources among senior management team members, guarantee the comprehensiveness of decision-making, effectively solve the problems faced by enterprises, and contribute to the development of enterprises [3]. However, the social generalization theory emphasizes the disadvantages brought by heterogeneity, and believes that individuals tend to classify themselves and others into different social categories through attribute differences, and develop social identity and positive evaluation for the group they belong to, while excluding or even hostile to other groups. Its core lies in the people with their background, age, personality, values, etc., has the similarity of the individuals are more likely to attract each other and appreciate, but with a different individual their own discomfort and distance, so the higher degree of diversification will bring down the team cohesion and deepen the conflict, and negative affect enterprise development [4].

In the research process of executive heterogeneity and firm behavior and performance, scholars draw different conclusions about which is the more influential factor between information decision theory and social generalization theory. Buyl et al., for example, believe that TMT heterogeneity is significantly positively correlated with corporate performance [5]. However, the research results of Haleblan and Finkelstein show that heterogeneity is significantly negatively correlated with firm performance [6]. For this reason, some scholars try to classify heterogeneity, believing that heterogeneity with little relevance to work, such as age and gender, will have a negative impact on enterprises mainly due to the effect of social generalization theory. On the other hand, the heterogeneity of high job relevance, such as professional background and educational background, plays a positive role through information decision theory. However, a large number of studies have shown that it is not feasible to divide heterogeneity by task relevance, and the level of job relevance is not the determinant of whether there is a positive effect. In general, the research on the relationship between executive heterogeneity and firm performance has not reached a consistent conclusion. The reason for the difference in research results may be that the application of the two types of theories ignores the comprehensiveness, timeliness and dynamics of enterprise performance, and some studies ignore the difference in the nature of the industries the research objects belong to [7]. Sun Haifa et al. pointed out that in highly dynamic, innovation-oriented and competitive industries, the heterogeneity of senior management team has a more obvious impact on enterprises [8].

3 Method

3.1 Theoretical Analysis and Research Hypothesis

3.1.1 Age Heterogeneity and Firm Performance

Top management team members at a similar age tend to have similar life experiences and growth trajectories. Communication barriers between them are relatively small and it is easy to reach the same views and opinions on things. However, groups with large age heterogeneity are more likely to have conflicts due to different values and cognitive concepts, which is not conducive to the realization of organizational goals [9]. Younger members are more receptive to new knowledge and ideas, more aggressive towards investment and innovation, and try to improve corporate performance and thus enhance the value of individual human capital. However, older members have experienced more ups and downs in business, and their way of viewing problems is mainly based on experience. They may be approaching retirement, so they do not expect big problems to occur in the enterprise, and they value the stability of enterprise development more, and are relatively conservative in thinking about problems. Age heterogeneity will lead to senior management team on business planning and decision making to produce the generation gap, and the difference of absolute age of the generation gap is very difficult to rely on coexist for a long time to fully adjust, that is to say, the age heterogeneity and the relationship between the corporate performance in the social class has a negative effect, and the negative effect is not going to disappear over time. Therefore, the hypothesis is proposed:

Hypothesis 1A: Age heterogeneity of senior management team is significantly negatively correlated with short-term corporate performance.

Hypothesis 1B: Age heterogeneity of senior management team is significantly negatively correlated with long-term corporate performance.

3.1.2 Occupational Background Heterogeneity and Firm Performance

Due to the functional departments work experience similar management concept is relatively similar, different backgrounds of executive functions of cognitive differences on the same thing, so it is difficult to reach a consensus in the short term, prone to social generalization effect and negative influence on the team internal communication, reduce the team cohesion and the information processing ability, As a result, the quality of decision-making declines [10] and corporate performance is affected. However, with the passing of time and mutual communication, team members gradually cooperate with each other, conflicts and communication barriers are reduced, and information and resource advantages brought by different functional backgrounds gradually come into play. Managers can better weigh advantages and disadvantages when making decisions, making the decisions more comprehensive and conducive to the long-term development of enterprises [7]. Based on this, the hypothesis is proposed:

Hypothesis 2A: Functional background heterogeneity of senior management team is significantly negatively correlated with short-term corporate performance.

Hypothesis 2B: Functional background heterogeneity of senior management team is significantly positively correlated with long-term corporate performance.

3.1.3 Heterogeneity and Financial Leverage

The capital of an enterprise in a certain period can be divided into debt capital and equity capital. The ratio of debt capital and equity capital measures the financial leverage of an enterprise. Empirical studies show that financial leverage is positively correlated with performance, and most companies with higher financial leverage also have better performance [11]. On the other hand, financial leverage increases financial risks. Higher financial leverage increases debt repayment pressure and fund recovery pressure of enterprises, resulting in higher debt risks [12]. In general, the capital structure of an enterprise to some extent reflects the trade-off between profitability and financial risk.

In terms of age heterogeneity, executives of different ages have different preferences for returns and risks. Generally speaking, older executives are more conservative and risk-averse, while younger executives are more flexible and adventurous, have strong risk tolerance and are willing to be exposed to certain risks in order to improve corporate performance [9]. Due to the different concepts of profit and risk, the decision-making efficiency is relatively low, which hinders enterprises from adopting high-risk strategies requiring high decision-making quality. Meanwhile, when the average age is the same, the greater age heterogeneity means that there may be more older and younger senior executives. Based on common sense, senior executives with conservative risk preferences are more likely to dominate the decision-making of enterprises, which also hinders enterprises from choosing high financial leverage. Therefore, the hypothesis is proposed:

Hypothesis 3: Compared with senior management teams with significantly negative correlation between age heterogeneity and corporate financial leverage and small difference in functional background, senior management teams with high heterogeneity have diversified, rich knowledge and skills and wider external resources, and have more advantages in reasonably avoiding risks and identifying profit opportunities. Especially, the more turbulent the external environment is, the more teams with high functional background heterogeneity are needed to deal with the uncertainty and unpredictability of the environment [13], and the information technology industry has such characteristics. Therefore, this paper believes that the heterogeneity of functional background can help enterprises better deal with and resolve risks and choose relatively high financial leverage to obtain more profits. Make assumptions:

Hypothesis 4: Functional background heterogeneity of senior management team is significantly positively correlated with corporate financial leverage.

3.2 Research Technique

3.2.1 Data Sources and Sample Selection

This paper takes A-share listed companies of Shanghai and Shenzhen Stock Exchanges (main board) as the research object and selects the data of software and information technology service enterprises in CSMAR database from 2012 to 2018 according to industry classification of China Securities Regulatory Commission (CSRC) 2012 edition.

In order to ensure the objectivity, integrity and validity of the data, the following processes are carried out during sample selection:

- (1) Exclude ST and *ST listed companies
- (2) Eliminate the samples with missing information (Tobin Q value)
- (3) Eliminate the companies whose senior executives' background information and relevant data cannot be obtained

3.2.2 Variable Definition and Measurement

3.2.2.1 Dependent Variable

The dependent variables in this paper are short-term performance (accounting performance), long-term performance (market value) and financial leverage. Following the measurement methods of Wang Sherry, Ma Lin, Wang Yanli [7], Sun Haifa, Yao Zhenhua [8] and other scholars, short-term performance and long-term performance were measured by return on Total assets (ROA) and Tobin's Q value respectively. Financial leverage is measured using asset-liability ratio.

Since the composition of senior management team has a lag effect on enterprise performance, the observation time of enterprise performance is the corresponding observation value of the next year [8].

3.2.2.2 Independent Variable

The independent variables in this paper are age heterogeneity and occupational background heterogeneity of senior management team. The age of senior executives is a continuous variable, and the age heterogeneity is measured by the standard deviation coefficient method, that is, the standard deviation of the variable is divided by the mean value of the variable to measure the age difference. Functional background is a categorical variable, and the herfindal-Hirschma coefficient (also known as Blau coefficient) is used to calculate its heterogeneity.

The calculation formula is:

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

P_i refers to the percentage of members with category i functional background in the senior management team, and n is equal to the number of categories of functional background. The H value is between 0 and 1, and the larger the value is, the higher the degree of heterogeneity of the functional background of the senior management team is. Referring to the practice of Sherry Wang, Lin Ma and Yanli Wang [7], this paper mainly divides the occupational background into four types: "production type", "peripheral type", "output type" and "management type", and the classification is carried out according to the professional background of senior executives provided by CSMAR database. "Production-oriented" functions focus on the improvement of production efficiency, and their work is mainly the management of production equipment and processes; "Peripheral" functions are finance, law and other support work that do not involve the core business of the enterprise, and solve related financing and legal issues in the operation of the enterprise; "Output-oriented" function emphasizes on expanding the market

share of enterprise products and services, mainly including marketing, product development and design, sales and other work; The "management type" does not have the characteristics of the above three functions, but only has the background of participating in enterprise management.

3.2.2.3 Control Variable

In order to make the test more accurate, other factors that may affect enterprise performance and financial leverage are controlled. When taking corporate performance as independent variable, the company size, senior management team size, average age of senior management, proportion of female senior management, proportion of state-owned shares and asset-liability ratio were selected as control variables by referring to the practices of Xueli Wang, Lin Ma, Yanli Wang [7], Haiyuan Zheng, Kun Li [9] and Haifa Sun, Zhenhua Yao and Maosheng Yan [8]. Among them, the company size is measured by the natural logarithm of the number of employees, the size of the senior management team is the number of senior management team members in the current year, the average age of senior management is the average age of senior management team members, the proportion of female senior management is the number of female senior management divided by the total number of senior management, and the proportion of state-owned shares is the proportion of state-owned shares in the total share capital.

When financial leverage was taken as independent variable, company size, senior management team size, average age of senior executives, proportion of female senior executives, proportion of state-owned shares and corporate performance (ROA) were selected as control variables.

3.2.3 Model Method

ROA, Tobin's Q and asset-liability ratio were taken as explained variables to construct regression respectively. Hausman test was conducted, and the test results of the three models were Prob > chi2 = 0.000, 0.0039 and 0.000, respectively. Therefore, the null hypothesis was rejected and the fixed-effect model was selected as the regression estimation method.

3.2.3.1 Regression Equation of ROA on the Heterogeneity of Senior Management Team

$$ROA_{it} = \beta_1 * Enterprise\ scale_{it} + \beta_2 * Top\ management\ team\ size_{it} + \beta_3 * Average\ age\ of\ top\ executives_{it} + \beta_4 * Percentage\ of\ female\ executives_{it} + \beta_5 * Asset - liability\ ratio_{it} + \beta_6 * Proportion\ of\ state - owned\ shares_{it} + \beta_7 * Age\ heterogeneity\ of\ top\ management\ team_{it} + \beta_8 * Occupational\ background\ heterogeneity_{it} + a_i + u_{it}$$

3.2.3.2 Regression Equation of TOBIN'S Q to the Heterogeneity of Senior Management Team

$$Tobin's\ Q\ Ratio = ROA_{it} + \beta_1 * Enterprise\ scale_{it} + \beta_2 * Top\ management\ teamsize_{it} + \beta_3 * Average\ age\ of\ top\ executives_{it} + \beta_4 * Percentage\ of\ female\ executives_{it} + \beta_5 * Asset - liability\ ratio_{it} + \beta_6 * Proportion\ of\ state - owned\ shares_{it} + \beta_7 *$$

$$\text{Age heterogeneity of top management team}_{it} + \beta_8 * \text{Occupational background heterogeneity}_{it+a_1+u_{it}}$$

3.2.3.3 The Regression Equation of Asset-Liability Ratio to the Heterogeneity of Top Management Team

$$\text{Asset - liability}_{it} = \text{ROA}_{it} + \beta_1 * \text{Enterprise scale}_{it} + \beta_2 * \text{Top management team size}_{it} + \beta_3 * \text{Average age of top executives}_{it} + \beta_4 * \text{Percentage of female executives}_{it} + \beta_5 * \text{Asset - liability ratio}_{it} + \beta_6 * \text{Proportion of state - owned shares}_{it} + \beta_7 * \text{Age heterogeneity of top management team}_{it} + \beta_8 * \text{Occupational background heterogeneity}_{it+a_1+u_{it}}$$

3.2.4 Multicollinearity Test

Before regression, this paper tested whether there was collinearity between independent variables and found that the maximum value of VIF was 1.39, far less than 10, so there was no multicollinearity problem.

3.3 Empirical Analysis

3.3.1 Descriptive Statistics

Table 1 provides descriptive statistical results of variables with 464 observed values, from which it can be seen that: (1) the mean value of ROA of short-term performance of enterprises is 0.035, the minimum value is -0.983, and the maximum value is 0.273; The mean value of Tobin’s Q of long-term performance was 3.43, the minimum value was 0.960, and the maximum value was 102.430. There was a large gap between the performance of different enterprises. (2) The average age of senior executives is 45.953 years old, which is relatively small compared with other industries and has little age heterogeneity, indicating that most senior executives in software and information technology service industries are in the middle age of their career. This is in line with the view put forward by some scholars that it is better for the senior managers of science and technology enterprises to be younger than those of traditional industries [14]. (3) The average proportion of female senior executives is 0.179, which is significantly higher than the average of 0.12 in the industry from 2004 to 2010 [7], indicating that women are more and more involved in the senior management of enterprises, but the proportion is still at a low level. (4) The average proportion of state-owned shares is 0.025, and the maximum value is 0.5816109, indicating that the level of state-owned shares in software and information technology service enterprises is relatively low.

3.3.2 Regression Analysis

3.3.2.1. Regression Analysis of Enterprise Performance to Age Heterogeneity and Occupational Background Heterogeneity

Table 2 shows the influence of age heterogeneity and occupational background heterogeneity on short-term corporate performance. The results show that the age heterogeneity of senior executives is significantly negatively correlated with short-term corporate performance at the level of 0.005, which supports hypothesis 1A. Occupational background

Table 1. Descriptive statistics [self-generated]

Variable	Obs	Mean	Std. Dev.	Min	Max
<i>ROA</i>	464	.0350377	.098519	-.982639	.272556+
Tobin's Q	464	3.432044	6.510461	.959437	102.4296
<i>Asset – liability ratio</i>	464	.3831033	.404576	.031401	8.256422
<i>Enterprise scale</i>	464	7.513082	1.072474	2.197225	10.01695
<i>Top management team size</i>	464	8.157328	3.149793	1	20
<i>Average age of top executives</i>	464	45.95275	3.320481	31	54.75
<i>Percentage of female executives</i>	464	.1790965	.1585346	0	1
<i>Proportion of state – owned shares</i>	464	.0246429	.0791009	0	.5816109
<i>Age heterogeneity</i>	464	.1134906	.041727	0	.3035339
<i>Occupational background</i>	464	.2497803	.1953622	0	.6530612

Table 2. Regression results of short-term performance on heterogeneity [self-generated]

ROA	Conef.	Std. Err.	t	P > t	[95% Conf. Interval]
<i>Enterprise scale</i>	-.0513234	.0101444	-5.06	0.000	-.0712706 -.0313763
<i>Top management team size</i>	-.0006221	.0024256	-.26	0.798	-.0053917 .0041475
<i>Average age of top executives</i>	.0034361	.0022864	1.50	0.134	-.0010597 .0079318
<i>Percentage of female executives</i>	-.0239016	.0460298	-0.52	0.604	-.1144111 .0666608
<i>Asset – liability ratio</i>	-.0381595	.0138612	-2.75	0.006	-.0654152 -.0109038
<i>Proportion of state – owned shares</i>	-.022958	.0807088	0.28	0.776	-.181658 .1357479
<i>Age heterogeneity</i>	-.4448363	.1516511	0.004	0.004	-.7430319 -.1466406
<i>Occupational background</i>	.054366	.0349169	0.120	0.120	-.0142921 .123024
_cons	.324184	.1240259	0.009	0.009	.0803085 .5680595

heterogeneity is positively correlated with short-term corporate performance, but fails the significance test ($P = 0.120$), and hypothesis 2A is not supported. It can be seen that in terms of age heterogeneity, social generalization theory plays a major role in listed companies in software and information services. Senior executives of different ages have different thinking styles, which may hinder communication, reduce the effectiveness of decision making and negatively affect corporate performance.

Table 3 shows the influence of age heterogeneity and occupational background heterogeneity on enterprise long-term performance. The results show that both age heterogeneity and occupational background heterogeneity of senior executives are negatively correlated with long-term corporate performance, but are not significant. Hypothesis 1B and hypothesis 2B are not supported. Look from age heterogeneity, the short-term performance have a significant negative effect on the role of long-term performance was not significant ($p = 0.129$), the reason may be that over time, the information decision theory, gradually reduce the disadvantage of part of the social generalization theory, but this effect does not completely eliminate the age heterogeneity to hinder the development of the enterprise.

3.3.2.2. Regression Analysis of Financial Leverage on Age Heterogeneity and Occupational Background Heterogeneity

Table 4 shows the influence of age heterogeneity and occupational background heterogeneity on corporate financial leverage. Look from the result, executives age heterogeneity and financial leverage is significantly negative correlation, heterogeneity and financial leverage is significantly related to the professional background to verify the hypothesis 3, and the correctness of the hypothesis 4, shows high heterogeneity of executive team will because different age risk gains preference and the role of social generalization theory and the enterprise financial leverage decision quality is low, Unable to reach effective consensus, hinder enterprises from using higher financial leverage; The high heterogeneity of career background brings more information and resources to the team, and the advantages of information decision theory can be reflected. Enterprises can better reduce risks, which provides support for enterprises to adopt high financial leverage.

3.3.2.3. Robustness Test

In terms of control variables, the selected control variables are not thorough at present. As there are many missing values of executive education in CSMAR, the average executive education and educational heterogeneity are not included in the model as control variables. In order to ensure the robustness of the above regression results, this paper added these two control variables and used a small sample size for regression. The regression results were basically consistent with the original model, and the signs of independent variable coefficients were all the same. However, in the model with ROA as the dependent variable, age heterogeneity decreased significantly ($P = 0.16$). In addition, the lack of educational data may not be exogenous, and such test results are acceptable, indicating that our conclusions are robust.

Table 3. Regression results of long-term performance on heterogeneity [self-generated]

Tobin's Q	Conof.	Std. Err.	t	P > t	[95% Conf. Interval]
<i>Enterprise scale</i>	.0120298	.5586992	0.02	0.983	−.1.086556 1.110615
<i>Top management team size</i>	.087223	.1335917	0.65	0.514	−.1754619 .349908
<i>Average age of top executives</i>	−.5121183	.1259208	−4.07	0.000	−.7597198 −.2645167
<i>Percentage of female executives</i>	20.31282	2.535082	8.01	0.000	15.32802 25.29762
<i>Asset – liability ratio</i>	−.6228887	.7634053	−0.82	0.415	−2.123993.8782158
<i>Proportion of state – owned shares</i>	3.445524	4.445024	0.78	0.439	−5.294848 12.1859
<i>Age heterogeneity</i>	−12.70147	8.352159	−1.52	0.129	−29.12455 3.721606
<i>Occupational background</i>	−2.405181	1.923044	−1.25	0.212	−6.186514 1.376153
_cons	24.72143	6.830707	3.62	0.000	11.29003 38.15284

Table 4. Regression results of financial leverage on heterogeneity [self-generated]

<i>Asset – liability ratio</i>	Conof.	Std. Err.	t	P > t	[95% Conf. Interval]
<i>Enterprise scale</i>	−.4072885	.032499	−12.53	0.000	−.4711921 1.110615
<i>Top management team size</i>	−.0043754	.0089564	−0.49	0.625	−.0219865 .0132358
<i>Average age of top executives</i>	−.0077642	.00846	−0.92	0.359	−.0243993 −.0088709
<i>ROA</i>	−.5204923	.1890662	−2.75	0.006	−.8922582 −.1487263
<i>Percentage of female executives</i>	.6201682	.1670087	3.71	0.000	.2917744 .948562
<i>Proportion of state – owned shares</i>	−.6222105	.2963669	−2.10	0.036	−1.204965 −.0394563
<i>Age heterogeneity</i>	−.9818713	.564208	−1.74	0.083	−2.091289 .1275462
<i>Occupational background</i>	.3905657	.1277874	3.06	0.002	.139294 .6418375
_cons	3.771951	.4190539	9.00	0.000	2.947953 4.595948

4 Conclusion

Firstly, age heterogeneity of senior executives is significantly negatively correlated with short-term performance, long-term performance and financial leverage, which confirms the inapplicability of information decision theory in age heterogeneity. The "generation gap" caused by age difference will lead to different concepts and cognition among senior management team members, which is more likely to cause conflicts and is not conducive to the realization of organizational goals. Especially in the software and information technology service industry with high innovation degree and rapid development, the management needs to make many decisions in the operation process of the enterprise. Age heterogeneity is not conducive to reaching consensus among senior management members and making concerted efforts to contribute to the development of the enterprise. As team members run in and out with each other, the team becomes more inclusive, and senior managers of different ages gradually understand and recognize each other, and the negative effect of "generation gap" formed by age difference on enterprises will be reduced, but cannot be completely eliminated. Influenced by risk preference, senior managers of different ages have different understandings and decisions on financial leverage. Young executives prefer to expose their enterprises to certain risks to improve profits, while senior executives value the stability of enterprise operation and prefer a lower risk level. Differences of opinion caused by age heterogeneity lead to lower efficiency and quality of senior management team's decisions on financial leverage and hinder enterprises from choosing higher financial leverage.

Secondly, the heterogeneity of senior executives' career background is not significantly correlated with short-term and long-term corporate performance, but positively correlated with financial leverage. The heterogeneity of occupational background has no significant positive or negative effect on enterprise performance, which may be because the difference of occupational background not only leads to certain social classification of senior management team, but also increases the cost of communication between senior executives with different occupational backgrounds, and also causes certain conflicts due to different ways of looking at problems. At the same time, the heterogeneity of career background also brings more diversified viewpoints and ways of thinking, which makes decision-making more comprehensive and effective. Social generalization theory and information decision theory have opposite effects and partially cancel each other, so that the difference of occupational background has no significant impact on enterprise performance. In the decision-making of financial leverage, information decision-making theory plays a major role. More information and resources enable enterprises to identify risks more accurately and reduce the risk level, which can support enterprises to use high financial leverage to improve the rate of return on equity.

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