Top Management Team Characteristics, Accounting Information Quality and Enterprise Investment Efficiency

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ABSTRACT
The purpose is to study the influence of top management team characteristics (i.e., top management team size, education level and average tenure) on enterprise inefficient investment, and the joint effect of top management team characteristics and accounting information quality on inefficient investment. Based on the empirical analysis and test of non-financial listed companies in China from 2010 to 2019, it was concluded that the top management team size, education level and average tenure were all negatively correlated with inefficient investment. Moreover, the interaction between top management background characteristics and accounting information quality had a negative impact on inefficient investment. This work supplemented the influencing factors and ways of enterprise investment efficiency and offered a theoretical basis for Chinese enterprises to select and train senior managers and improve accounting information quality.
Keywords*: Top management team characteristics; Enterprise inefficient investment; Accounting information quality*

1. INTRODUCTION

Economic globalization is the trend of today's society, which brings opportunities as well as pressures to enterprises. Improving the enterprise investment efficiency is conducive to enhancing the competitiveness of enterprises to cope with the pressure. The efficiency of enterprise investment decision-making is closely related to the future development of the enterprise. It determines whether the enterprise can maximize the scale of operation, increase the profit margin of products, and maximize the interests of shareholders. The low investment efficiency (i.e., over-investment and under-investment) affects the performance of enterprises. The top echelon theory shows that the individual characteristics of a company's top management team can influence psychological attributes such as behavior patterns, values and knowledge base that are difficult to measure to a certain extent, and thus having a significant impact on strategic decisions such as investment decisions. When enterprises are urgently needed to improve investment efficiency, it is worth studying what kind of characteristic managers can influence the degree of inefficient investment. This work selected three characteristics of top management team (including team size, education background and tenure) to study their interaction with accounting information quality (measured by discretionary accruals) on investment efficiency and supplemented the way that top management team and accounting information quality affect enterprise investment efficiency.

2. LITERATURE REVIEW AND HYPOTHESIS

Under the ideal condition of eliminating agency costs and capital market defects, the enterprise can maximize the enterprise value under a certain level of investment. At this time, the investment efficiency is the best, and the downward or upward deviation from this optimal allocation is the under-investment and over-investment. Bushman & Smith (2001) research showed that the defects such as under-investment and over-investment were mostly based on the agency problem and information asymmetry between the principal and the principal. In the case of abundant capital, over investment increases the personal interests of managers, such as additional income, empire building, personal competence, or entrenchment. Managers are likely to make excessive investment, so that the enterprise investment deviates from the optimal allocation.

Akerlof (1970) believed that the one with information advantage between the two parties in a transaction would make use of the information difference to seek personal gains. In the presupposed ideal capital market, there is no difference in the financing cost between internal and external financing. However, information asymmetry makes it difficult for investors to comprehensively evaluate the company's future prospects in reality. This makes them increase the expected rate of return, forcing the cost of external financing to increase and forming

financing constraints, which is the reason for the under-investment.

The accounting information quality is a relatively broad definition, and it is difficult to quantify. Therefore, substitute variables, such as earnings quality, audit opinion, etc., are often used. Penman (2002) believed that the measurement of accounting information quality can also be obtained by measuring earnings quality. The basic accounting information disclosure included in enterprise financial report includes earnings status. Therefore, the two are in an equal position to a certain extent. Bushman & Smith (2001) proposed that the higher the quality of earnings information, the higher the investment efficiency. The reason is that the information asymmetry between shareholders and managers is alleviated, and investors' supervision and incentive role on the decision-making of controlling shareholders and the company's senior management team is strengthened. Thus, it weakens the motivation of controlling shareholders and senior managers to seize interests, weakens the agency conflict, and improves the investment efficiency.

Healy & Palepu (2001) found that high accounting information quality can alleviate the information asymmetry. Also, it can weaken the motivation of managers to obtain their own interests by strengthening supervision and incentive, thus alleviating the agency problem and improving the investment efficiency. On the other hand, accounting information is the basis for forecasting the returns of investment projects. The investment decisions based on the financial statements with low information quality will deviate from the optimal investment level, resulting in inefficient investment. Therefore, it is proposed that:

Hypothesis 1: the accounting information quality is negatively correlated with inefficient investment.

The top management team is the core of the enterprise in making and implementing decisions. Hambrick (1984) put forward the theory of top echelon for the first time that the background characteristics of executives can influence their investment choices. The age, gender and other personal characteristics of managers will affect managers' cognition and risk preference, and the change of management cognition and leadership style is the starting point of managers' behavior choice. The behavior choice and the change of decision focus will affect the strategic decision-making and enterprise performance from the macro perspective. The research object of this work is the enterprise investment efficiency, and the scope of top managers is defined as the managers who have the decision-making power of enterprise management, such as president, CEO, CFO, general manager, deputy general manager and secretary.

Chemmanur, Paeglis & Simonyan (2009) found that companies with high-quality executives and higher reputation face lower information asymmetry, and thus the equity issuance rate is higher. This finding shows that companies with more well-known top management team can obtain external financing more easily and have lower financing constraints. This is conducive to ensuring investment in higher net present value projects, thus reducing the situation of under-investment.

Hambrick (2007) proposed that large teams can improve their problem-solving ability by increasing the number of potential solutions and expanding their horizons. The stronger ability, more resources and richer information channels of large teams can show that managers choose projects with higher net present value. Larger team size also means a broader information pipeline. It can not only obtain more information about investment opportunities, but also better convey the future benefits and team reputation of its investment projects to the outside world, thus alleviating the impact of information asymmetry. Therefore, it is proposed that:

Hypothesis 2: enterprises with a large top management team have less inefficient investment.

The knowledge and education level of the members can reflect the quality of the management team to a certain extent. Barker & Mueller (2002) found that top managers with higher education were more likely to propose more complex solutions when they encountered problems. Moreover, having a well-educated management team can have a positive impact on the company's reputation, and reduce the return rate required by investors, thus reducing the impact of information asymmetry and reducing financing constraints. Therefore, it is proposed that:

Hypothesis 3: enterprises whose senior management team members have higher education level have less inefficient investment.

Previous research by Kor (2006) showed that long-serving managers were more familiar with the company's resources and business. This enables them to establish a cognitive framework to evaluate investment opportunities and pursue riskier investment strategies. At the same time, increased tenure means that managers are more familiar with the company and more sensitive to investment opportunities. Therefore, it is proposed that:

Hypothesis 4: enterprises with a longer tenure of senior management team members have less inefficient investment.

Top management team with large scale, long average tenure and high education level has more channels, more experience and stronger investment decision-making ability. They can use higher quality accounting information more effectively to identify better investment opportunities. These top management team characteristics also provide a positive signal for the accounting information quality, thus decreasing the financing constraints and reducing the under-investment. The interaction between top management background characteristics and accounting information quality has a negative impact on inefficient investment. Therefore, it is proposed that:

Hypothesis 5a: the negative correlation between accounting information quality and inefficient investment is more significant for companies with a large top management team.

Hypothesis 5b: the negative correlation between accounting information quality and inefficient investment

is more significant for companies with longer average tenure of top management team.
Hypothesis 5c: the negative correlation between accounting information quality and inefficient investment is more significant for companies with higher average education level of top management team.

3. RESEARCH DESIGN

3.1. Sample selection

Due to the implementation of the new accounting standards in China since the beginning of 2007, there is a transitional period in the implementation of system changes. This work analyzed the data of China's A-share listed companies from 2009 to 2019, and the data were derived from CSMAR and manual sorting and calculation. As the measurement of inefficient investment and accounting information quality needs to use the previous year's data, the actual samples are from 2010-2019. In addition, financial and insurance company samples, ST, *ST, PT company samples and samples with missing data were excluded. All continuous variables were indented by 1%. The final sample size was 13,393.

3.2. Variable definition

3.2.1. Inefficient investment

In this study, a more reasonable and widely used Richardson (2006) model, which can calculate the level of inefficient investment for a specific firm, is used to calculate the level of inefficient investment for a firm:

$$Invest_t = \beta_0 + \beta_1 Growth_{t-1} + \beta_2 Lev_{t-1} + \beta_3 Cash_{t-1} + \beta_4 Age_{t-1} + \beta_5 Size_{t-1} + \beta_6 Return_{t-1} + \beta_7 Invest_t + \Sigma industry + \Sigma year + \xi_t \quad (1)$$

Among them, Investt is the investment level of the enterprise in year t. Growtht-1 is the growth of the enterprise in year t-1. Levt-1 is the leverage level in year t-1. Casht-1 is the proportion of cash and cash equivalents in total assets in year t-1. Aget-1 is the listing period of the enterprise in year t-1. Sizet-1 is the scale of the enterprise in year t-1. Returnt-1 is the annual return of the stock in year t-1. Investt is the investment level of enterprises in year t-1.

By regression to model 1, the residual is the level of inefficient investment for a firm. In order to show the degree to which the actual investment deviates from the expected level, the absolute value of the residual is needed. The larger the value, the higher the degree of actual investment deviation from the expected level (i.e., the higher the level of inefficient investment).

3.2.2. Top management team characteristics

This work mainly studied top management team characteristics from two aspects of team resources and team structure: top management team size, education level and average tenure of top management team. These three characteristics are measured in the following ways. The size of top management team refers to the total number of top executives disclosed in the annual report. The educational level of top management team is obtained by calculating the average value of its team members educational level. The average tenure of top management team is measured by calculating the average months of members tenure.

3.2.3. Accounting information quality

The definition of accounting information quality is broad and difficult to quantify. Referring to the mainstream view, this work measured the accounting information quality by earnings quality. Referring to the research of Dechow, Patricia, Richard & Amy (1995), this study first used the modified Jones model to obtain the discretionary accruals. The absolute value AbsDA was taken and multiplied by the constant -1. Therefore, the FRQ of accounting information quality was obtained by making the variable size converge with the change direction of accounting information quality.

3.2.4. Control variables

Based on previous literature [e.g., Chen Feng, et al (2011), Cheng Xinsheng, Tan Youchao and Liu Jianmei (2012)], the following control variables were selected. Enterprise size (ESIZE) is measured by the natural logarithm of total assets. Asset liability ratio (LEV) is the leverage level of an enterprise. Total assets turnover (SAR) is the enterprise income or total assets. Executive compensation level (WAGE) is the natural logarithm of the total compensation for top three executives. Enterprise age (EAGE) is the natural logarithm of enterprise age. Free cash flow (FCF) is measured by free cash flow or total assets. For AUDIT, if the audit is performed by a big four accounting firm, it is 1, otherwise, it is 0. Growth opportunity refers to the revenue growth rate of the main business.

3.3. Model building

In order to verify the relationship between accounting information quality and inefficient investment, model 2 was first constructed. Then, according to the research of Balli & Sørensen (2013), the intersection item between top management team characteristics and accounting information quality was centralized to maintain the comparability of coefficient symbols. Model 3 of Hypothesis 5 is as follows:

$$INEFFINV = \beta_0 + \beta_1 FRQ + \beta_n Control\ Variables + \Sigma industry + \Sigma year + \xi \quad (2)$$

$$INEFFINV = \beta_0 + \beta_1 FRQ + \beta_2 TMT + \beta_3 FRQ*TMT + \beta_n Control\ Variables + \Sigma industry + \Sigma year + \xi \quad (3)$$

Among them, INEFFINV is inefficient investment. FRQ is accounting information quality. TMT refers to top management team characteristics. It refers to the size of top management team, the education level of top management team and the average tenure of top management team. Control Variables refers to control variables.

4. REGRESSION RESULT ANALYSIS

4.1. Descriptive statistics

First of all, descriptive statistics are carried out for each variable. As shown in Table 1, the average value, standard deviation, maximum value and minimum value of each variable are shown in each column.

Table 1. Descriptive statistics

	Obs	Mean	Str	Min	Max
INEFFINV	13393	0.043	0.052	0.001	0.339
FRQ	13393	-0.065	0.071	-0.421	-0.001
EDU	13393	3.276	0.559	1	5
TSIZE	13393	6.587	2.451	2	15
TENURE	13393	47.01	16.52	14.86	97.08
ESIZE	13393	22.35	1.354	16.76	28.64
LEV	13393	0.447	0.204	0.059	0.896
SAR	13393	0.64	0.432	0.077	2.534
WAGE	13393	14.42	0.723	11.07	18.05
EAGE	13393	2.776	0.37	1.099	3.964
AUDIT	13393	0.062	0.242	0	1
FCF	13393	0.005	0.103	-0.382	0.26
Growth	13393	0.21	0.448	-0.518	2.966

4.2. Correlation analysis

Secondly, the preliminary coefficient correlation analysis of variables is carried out to explore the relationship between variables. The specific results are shown in Table 2. It can be seen from the table that the level of inefficient investment is significantly negatively correlated with the accounting information quality at the 1% level. It shows that the lower the accounting information quality, the higher the level of inefficient investment, which preliminarily verifies Hypothesis 1. However, there is a negative correlation between the level of inefficient investment and the education level of top management team, the size of top management team and the tenure of top management team. The correlation coefficient is significant, which preliminarily verifies Hypothesis 2-4.

Table 2. Correlation analysis

	INEFFINV	FRQ	EDU	TSIZE	TENURE	ESIZE	LEV	SAR	WAGE	EAGE	AUDIT	FCF	Growth
INEFFINV	1												
FRQ	-0.120***	1											
EDU	-0.035***	0.01	1										
TSIZE	-0.068***	0.078***	0.053***	1									
TENURE	-0.087***	0.103***	-0.037***	0.021**	1								
ESIZE	-0.086***	0.070***	0.254***	0.335***	0.094***	1							
LEV	-0.068***	-0.127***	0.073***	0.146***	-0.062***	0.481***	1						
SAR	-0.086***	-0.032***	-0.041***	0.046***	-0.019**	0.057***	0.171***	1					
WAGE	-0.047***	0.069***	0.260***	0.245***	0.103***	0.485***	0.106***	0.092***	1				
EAGE	-0.085***	-0.023***	0.056***	-0.022***	0.129***	0.131***	0.171***	-0.020**	0.169***	1			
AUDIT	-0.042***	0.031***	0.144***	0.177***	-0.007	0.371***	0.112***	0.036***	0.246***	0.011	1		
FCF	-0.116***	0.141***	0.008	0.028***	0.057***	0.016*	-0.003	0.063***	0.042***	0.014	0.044***	1	
Growth	0.288***	-0.212***	0.001	-0.013	-0.107***	0.023***	0.039***	0.066***	0.003	-0.031***	-0.021**	-0.083***	1

*** p<0.01, ** p<0.05, * p<0.1

4.3. Regression analysis

Firstly, it can be seen from the regression results in column 1 of Table 3 that the regression coefficient between accounting information quality and inefficient investment is -0.031, which is significant at the 1% level. Therefore, Hypothesis 4 is true (i.e., accounting information quality is negatively correlated with inefficient investment). Therefore, Hypothesis 1 is true. Then, regression analysis is carried out on Model 3 with cross multiplicative items. Since the VIF value of cross multiplicative items is greater than 5, there is a serious multicollinearity, and the three characteristics of top management team are regression respectively. The results in column 2-4 show that the education level of top management team, the size of top management team and the tenure of top management team are significantly negatively correlated with inefficient investment, which verifies Hypothesis 2-4. At the same time, the cross items of accounting information quality and inefficient investment are significantly negatively correlated. This suggests that a larger, better-educated top management team with a longer average tenure can more effectively use high-quality accounting information to develop and implement investment plans, thus further reducing over investment. On the other hand, these characteristics make investors have more confidence in the enterprise and guarantee the accounting information quality, which further reduces the expected rate of return required by investors and thus further reduces the under-investment. Hypothesis 5a, 5b and 5c are true.

Table 3. Regression analysis

	(1)	(2)	(3)	(4)
FRQ	-0.031***	-0.031***	-0.032***	-0.032***
	(-7.07)	(-7.12)	(-7.22)	(-7.11)
EDU		-0.002***		
		(-2.76)		
TSIZE			-0.001***	
			(-3.76)	
TENURE				-0.000***
				(-5.33)
FRQ*TMT		-0.015***	-0.001**	-0.000*
		(-2.61)	(-2.12)	(-1.80)
ESIZE	-0.002***	-0.002***	-0.002***	-0.002***
	(-5.12)	(-4.76)	(-4.25)	(-4.52)
LEV	0.003	0.003	0.003	0.002
	-1.11	-1.19	-1.25	-0.77
SAR	-0.018***	-0.018***	-0.018***	-0.018***
	(-14.62)	(-14.75)	(-14.66)	(-14.58)
WAGE	0.002***	0.003***	0.003***	0.002***
	-3.23	-3.53	-3.7	-3.18
EAGE	-0.009***	-0.009***	-0.009***	-0.008***
	(-6.61)	(-6.58)	(-6.62)	(-6.28)
AUDIT	-0.001	-0.001	-0.001	-0.002
	(-0.59)	(-0.39)	(-0.41)	(-0.79)
FCF	-0.038***	-0.038***	-0.038***	-0.037***
	(-9.06)	(-9.05)	(-9.03)	(-8.89)
Growth	0.032***	0.032***	0.032***	0.032***
	-32.93	-32.8	-32.73	-32.38
Constant	0.084***	0.085***	0.075***	0.084***
	-6.24	-6.27	-5.38	-6.13
Industry	controlled	controlled	controlled	controlled
Year	controlled	controlled	controlled	controlled
n	13,393	13,393	13,393	13,393
Adj R^2	0.148	0.149	0.149	0.15

*** p<0.01, ** p<0.05, * p<0.1

4.4. Robustness test

In this work, variable substitution method is used to conduct robustness test. Referring to the research of Biddle, Hilary & Verdi (2009), inefficient investment is measured in the following ways:

$$Invest_t = \beta_0 + \beta_1 Growth_{t-1} + \xi_t \quad (4)$$

Among them, $Invest_t$ refers to the investment level of the enterprise in year t, and the measurement method is consistent with model 1. Growtht-1 refers to the growth rate of business income in year t-1. The absolute value of residual after regression is the inefficient investment level (INEFFINVR). The INEFFINVR is used to replace INEFFINV to regress the models. After the substitution of variables, the regression coefficient and its significance have no significant change, and the results are still robust.

5. CONCLUSION

According to the results of empirical analysis, the following conclusions were drawn:
There is a correlation between top management team characteristics and inefficient investment. The results show that the larger the size of top management team, the lower the level of inefficient investment. Second, the higher the education level of top management team, the higher the investment efficiency of the enterprise. Third, the longer the average tenure of top management team, the lower the degree of inefficient investment.
The top management team characteristics and accounting information quality have an interactive effect on inefficient investment. In enterprises with higher education level, larger scale and longer tenure, the negative correlation between accounting information quality and inefficient investment is more significant.

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