Managerial Power and Investment Efficiency in a Social Network Perspective - An Empirical Study Based on Panel Data

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Abstract: Through the analysis of panel data of Chinese A-share listed companies from 2016-2021 by Stata software, we examine the impact of managerial power on investment efficiency. Based on the perspective of social network relations, we construct the board network centrality by Ucinet software to examine the moderating effect of board interlock on the relationship between managerial power and investment efficiency. The results show that there is positive correlation between managerial power and inefficient investments, and board interlock eases this relationship.

Keywords: social networks; managerial power; investment efficiency; board interlock, metrology models

1   Introduction

Individuals are susceptible to the influence of their external environment when making decisions. Social network is a collection of relationships formed by directly or indirectly connected individuals. Social capital embedded in director network is a channel for enterprises to obtain heterogeneous information. Executive are influenced by the location of the network when making decisions, then they share information with members of the social network, which effectively improves investment efficiency [1]. Throughout current literatures, scholars have explored managerial power and investment efficiency from various aspects, such as corporate governance [2], financing constraints [3] and media monitoring [4], but there are few literatures based on the social network research perspective. Therefore, we examine the impact of board interlocks on managerial power and investment efficiency from a social network perspective.

2   Theoretical Analysis and Research Hypothesis

2.1   Managerial Power and investment efficiency

With the separation of ownership and operation of enterprises, executive tend to maximise their self-interest by expanding their investments as much as possible in face of information asymmetry and inadequate corporate governance systems, which results in over-investment. However, when investments are exposed to more significant risks, executive may forgo investment

opportunities for reasons of reputation and occupational safety, which results in under-investment. Either over-investment or under-investment will reduce investment efficiency. The following research hypothesis is proposed based on the above analysis:

H1: The greater managerial power, the less efficient the investment.

2.2 Moderating effect of board interlocks on managerial power and investment efficiency

The growth of enterprises depends on access to core resources, most of which come from outside the enterprises. The network of directors is an essential medium for enterprises to pass information to each other and communicate effectively. The closer to the centre of the director network, the more valuable and critical information executive can obtain, which facilitates investment decisions. The board of directors relies on the law or the company's articles of association to discipline executive's behaviour. However, when internal governance mechanisms fail, executive are more likely to seek hidden income through power-seeking. As a complement to informal mechanisms, board interlocks can compensate for internal governance deficiencies and the environment's uncertainty. The following research hypothesis is proposed based on the above analysis:

H2: The closer the enterprise is to the centre of the network, the lower likelihood of over-investment or under-investment due to inflated managerial power.

3 Empirical research design

3.1 Sample selection and data sources

Data are selected from China A-share listed companies from 2016 to 2021, excluded financial and insurance categories, ST and delisted, missing and abnormal samples. They are finally collated into a panel of 7,947 observations, and the main continuous variables are tail-trimmed. All data are obtained from the CSMAR database, and others are completed via Excel and Stata software.

3.2 Variable design

3.2.1 Explained variable

Investment efficiency INV. This paper is based on the residual model of Richardson (2006)[5] to calculate investment efficiency. The following model is first constructed:

$$INV_{i,t} = \alpha_0 + \alpha_1 INV_{i,t-1} + \alpha_2 Cash_{i,t-1} + \alpha_3 Growth_{i,t-1} + \alpha_4 Stock_{i,t-1} + \alpha_5 Age_{i,t-1} + \alpha_6 Size_{i,t-1} + \alpha_7 LEV_{i,t-1} + \sum Ind + \sum Year + \varepsilon_{i,t} \quad (1)$$

$INV_{i,t}$ represents the level of new investment, Cash is the amount of cash held, Growth represents the growth of the enterprise, Stock is the annual stock return, in addition to the enterprise age (Age), enterprise size (Size) and balance ratio (LEV), ε is the residual. The absolute value of the residuals from the regression of model (1) reflects the deviation of the actual investment level of the enterprises from the expected investment level, so we use it to measure investment

efficiency, this indicator is an inverse indicator, the higher the value, the less efficient the investment.

3.2.2 explanatory variable

Managerial Power. Based on Finkelstein [6], this paper selects six indicators from four dimensions to measure managerial power. Following the calculation steps of the principal component analysis method, a total of three principal components are extracted by using Stata software, and finally we get a model for the composite indicator of managerial power:

$$Power = 0.372k_1 + 0.316k_2 + 0.312k_3 \tag{2}$$

3.2.3 Moderating variable

Degree centrality[7]. First, extract the personal characteristics files of directors from the CSMAR, use Python software to filter from the name, gender, and age, assign unique names to the duplicate directors to ensure the uniqueness of each director's identity, then construct the "company-company " adjacency matrix with the listed companies as the node, and finally import the social network analysis software Ucinet to calculate the network centrality. The degree centrality represents the sum of the number of nodes directly connected to a node and is calculated as:

$$Degree_i = \frac{\sum_{j \neq i} C_{ij}}{g - 1} \tag{3}$$

Where i denotes a node, j denotes the other nodes in the network, and g is the total number of nodes. C_{ij} is equal to 1 if there is at least one direct linkage between node i and node j, and 0 otherwise, and the size difference is eliminated by g-1.

3.2.4 Control variables

It is necessary to control other internal and external factors. This paper selects return on assets (ROA), firm growth (Growth), management expense ratio (MER), cash holding ratio (Cash), Financial leverage ratio (LEV), nature of ownership (SOE), as well as industry dummy variables (Ind) and year dummy variables (Year).

3.3   Model design

The following multiple regression models are constructed to test the hypotheses:

$$INV = \beta_0 + \beta_1 Power + \beta_2 ROA + \beta_3 Growth + \beta_4 MER + \beta_5 Cash + \beta_6 LEV \\ + \beta_7 SOE + \sum Ind + \sum Year + \varepsilon \tag{4}$$

$$INV = \beta_0 + \beta_1 Power + \beta_2 Degree + \beta_3 Power * Degree + \beta_4 ROA + \\ \beta_5 Growth + \beta_6 MER + \beta_7 Cash + \beta_8 LEV + \beta_9 SOE + \sum Ind + \sum Year + \varepsilon \tag{5}$$

4 Empirical tests and analysis of results

The descriptive statistics are shown in Table 1. The mean value of INV is 0.0440, with the maximum and minimum values divided into 0.355 and 0, indicating that the problem of inefficient investment is widespread and highly differentiated among listed companies; the mean value of Power is -0.0580, with the maximum value of 2.041 and the minimum value of -1.473, indicating that there are differences of managerial power; The mean value of Degree is 0.131, the maximum value is 0.383 and the minimum value is 0.0220, indicating that the degree of network linkage varies.

Table 1. Descriptive statistics of the main variables

Variables	Number of samples 7,947	Average value	Standard deviation	Minimum value	Maximum value
INV	7,947	0.0440	0.0570	0	0.355
Power	7,947	-0.0580	0.557	-1.473	2.041
Degree	7,947	0.131	0.0660	0.0220	0.383
ROA	7,947	0.0290	0.0750	-0.339	0.194
Growth	7,947	2.216	1.518	0.833	9.824
MER	7,947	0.0900	0.0730	0.00800	0.475
Cash	7,947	0.0530	0.0760	-0.177	0.294
LEV	7,947	0.419	0.196	0.0660	0.894
SOE	7,947	0.287	0.452	0	1

The regression results of the model are shown in Table 2. The coefficient of the regression between managerial power and investment efficiency in row (1) is positive and significant at the 1% level, indicating that the greater the managrial power, the lower the investment efficiency and hypothesis 1 is tested. The coefficient of the interaction term Power*Degree in row (2) is -0.039 after adding the interaction term between managerial power and director network centrality and is significant at the 5% level. This result indicates that the closer the centre of the network, the greater the incentive for enterprises to engage in monitoring and internal governance, which mitigates to some extent the inefficiency of investment due to inflated managerial power.

Table 2. Regression results

Variables	Power	Degree	Power*Degree	ROA	Growth	MER	Cash	LEV	SOE	Ind/Year	Adjust-R^2	N
(1) INV	0.004*** (1.74)	0.009*** (2.29)		0.118*** (9.81)	0.002*** (2.68)	0.086*** (4.93)	0.020* (1.75)	0.065*** (7.72)	-0.009* (-1.74)	Control	0.1131	7,947
(2) INV	0.009*** (2.29)	-0.004 (-0.51)	-0.039** (-1.76)	0.118*** (9.79)	0.002*** (2.62)	0.086*** (4.93)	0.019* (1.70)	0.065*** (7.73)	-0.009* (-1.70)	Control	0.1136	7,947

Note: ***, **, * denote significant at the 1%, 5% and 10% levels respectively, with t-values in brackets.

5   Conclusions and Insights

Using data from A-share listed companies from 2016 to 2021 as a sample, this paper examines the impact of managerial power on investment efficiency while exploring the governance mechanism of board interlocks. The results show that investment efficiency decreases as managerial power increases, in addition, the higher the centrality of the network, the less managerial power contributes to reducing investment efficiency. The following insights are obtained: firstly, when hiring management, listed companies should examine various aspects, reasonably allocate the shareholding ratio and restrain managerial power to avoid damage to investment efficiency caused by the proliferation of managerial power. Secondly, strengthen director network and employ directors closer to the centre of the network to alleviate information asymmetry and enhance the role of supervision and governance over the investment process. This paper provides new research ideas for restraining managerial power and improving investment efficiency. Meanwhile, it provides valuable references for promoting the construction of director networks and cooperation among listed companies.

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