INFLUENCE OF BOARD INFORMAL HIERARCHY ON CORPORATE GOVERNANCE EFFICIENCY: AN ANALYSIS BASED ON PSYCHOLOGICAL PERCEPTION

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Abstract
The difference among directors in psychological perceptive gives rise to an informal hierarchy in the board, known as board informal hierarchy. This hierarchy helps to coordinate the interactions between directors, making it more likely for the board to contribute to corporate governance efficiency. This paper explores the relationship between board informal hierarchy and corporate governance efficiency from the perspective of cognitive psychology, considering the mediating role of psychological perception in the relationship. The research data were collected from the Chinese companies listed in 2015 and 2016, and subjected to descriptive and regression analyses. The results show that the stronger the board informal hierarchy, the better the corporate governance efficiency; this positive correlation is fully mediated by psychological perception. The research results enrich the theories on the board structure and corporate governance.

Key words: Psychological Perception, Board Informal Hierarchy, Corporate Governance Efficiency, Cognitive Psychology.

INTRODUCTION
The board is an important part to formulate corporate strategies and major decisions and determine corporate development direction. Informal hierarchy is often formed in the board because of differences in the competence and influence of members, which is an invisible order at the psychological level (Ma, Gao, & Du, 2019) and is the result of the combined action of social norms and member cognition. Individuals are cognitively limited in handling of information (Miller, 1956), and directors who don’t meet often have to browse a large number of documents during relatively short meeting and discuss many issues (Finkelstein & Mooney, 2003). By studying the cognitive psychology of cognitive process through information processing, the existence of cognitive conflict is confirmed. In the board informal hierarchy, cognitive conflict refers to difference in the judgment of board members based on specific issues to be discussed (Ye, 2018). This kind of difference will directly influence the corporate internal resource integration, and then affects corporate governance efficiency. Forbes and Milliken point out that the cognitive conflict in the communication process of the board is the key to improve the quality of decision-making. Members can translate their advantages into influences on others, so as to restrain different opinions in the board and improve the integration efficiency of internal resources of the board (Ma, Gao, & Du, 2019). Given that the cognitive level required to process information is likely to be proportional to the amount of information, cognitive ability may be improved to a certain extent under the context of board informal hierarchy (He & Huang, 2011). In the
decision-making process of the board, the directors in higher positions will be respected and trusted by the directors in lower positions due to their higher authority and influence, thus reducing unnecessary communication and disputes and contributing to the improvement of the decision-making efficiency of the board (Jiao, 2017). The communication and coordination process of the board is a key link in its value creation. Board informal hierarchy, as an invisible force within the board, can help coordinate the interactions between the boards under the effect of psychological perception among members, thereby improving the possibility that the board will make effective contributions to corporate governance efficiency. From the perspective of cognitive psychology, this study, based on the level of psychological perception, introduces several variables to try to explain the internal mechanism of the influence of board informal hierarchy on corporate governance efficiency. Therefore, this study enriches the researches on the structure of board and the corporate governance efficiency to a certain extent. More importantly, this study makes senior executives attach importance to the psychological perception in the process of optimizing corporate governance and improving corporate governance efficiency.

LITERATURE REVIEW

Related researches on board informal hierarchy

Generally speaking, in a group environment, individuals will spontaneously make inferences about mutual ability and influence, which often leads to the creation of an informal hierarchical order to guide their mutual behaviors (Magee & Galinsky, 2008). Directors in the board, like members of other human groups, may be automatically classified in informal hierarchy based on respect for mutual personal ability and influence (Bales, 1970; Gould, 2002; Overbeck, Correll, & Park, 2005; Ridgeway & Johnson, 1990; Whyte, 1943). There is no explicit formal representation for board informal hierarchy that exists in silence as a collective understanding (Magee & Galinsky, 2008). Directors usually spend relatively little time together and the risks of directors are often too vague to be effectively guided by formal rules (Carter & Lorsch, 2003; Finkelstein & Mooney, 2003; Leblanc & Gillies, 2005). However, once an informal hierarchy is formed, it is likely to influence board interactions by acting as a coordinating mechanism (Magee & Galinsky, 2008). To some extent, an informal hierarchy provides directors of board with a submissive order and lack of such an informal hierarchy could lead them to a competition for status and ultimate respect (Gould, 2002; Overbeck, Correll, & Park, 2005). It can be seen that it is important for the board to act according to an informal hierarchy (He & Huang, 2011).

Related researches on corporate governance efficiency

The OECD Principles on Corporate Governance, amended in 2004, mentions the necessity of corporate governance efficiency for enhancing investor confidence and maintaining the normal operation of the market economy, and points out that effective corporate governance can not only reduce the cost of capital, but enable existing resources to be more efficiently allocated and utilized (Chen, 2017). Good governance is the precondition to improve the corporate economic efficiency and enhance the corporate competitiveness and the core of the modern corporate system (Xin, 2013). The level of corporate governance efficiency determines the operating performance of the company (Wang & Yin, 2015). Many scholars have studied corporate governance efficiency from the influence factors. Lei and Long (2005) point out that board of directors, board of supervisors and high-paid members’ holding incentive are the main factors influencing the corporate governance efficiency. Su & Li (2014) adopt “DEA two-stage method” and Tobit regression to study the factors that influence the corporate governance efficiency in China. Although the research conclusions are different, many studies indicate that improving corporate governance efficiency is the basis and core of corporate governance and the goal of improving corporate governance, as well as the fundamental driving force for strengthening the core competitiveness of the enterprise and the key for the enterprise to formulate long-term strategies (Xin, 2013; Chen, 2017; Jiao, 2017).

Related researches on psychological perception

Researches on psychological perception begin with Adams. Then Kaufman (1999) carries
out a series of economic analysis to human rational choice, and points out that emotion, cognition and other psychological factors could affect human behavior. Later, Gamache, McNamara, Mannor et al. (2015) also propose that psychological perception is a mediating variable between the compensation of managers and corporate performance. Some researchers also point out that psychological perception plays a direct role in the capital investment decision-making of managers (Zeng, 2014). In addition, Chen, Jia, Li et al. (2006) hold that human behavior attitude is mainly dominated by psychological perception. People always understand human behavior from the perspective of psychological factors. If they want to conform to this unwritten convention, they should start from the perspective of psychological perception. Although there are differences in the research angles and methods of psychological perception among scholars in the past, the final conclusion lies in the influence of psychological perception on the performance of employees or managers and companies. Based on the previous researches, this study aims at exploring the mediating role of psychological perception between board informal hierarchy and corporate governance efficiency.

THEORETICAL ANALYSIS AND RESEARCH HYPOTHESIS

Board informal hierarchy and corporate governance efficiency

As an invisible order, board informal hierarchy often plays an important role in the internal decision-making of the board. On the one hand, board informal hierarchy can save discussion time when the opinions of the members participating in decision-making are inconsistent. On the other hand, invisible dominance of status board informal hierarchy can greatly motivate lower-level members to comply with higher-level members’ opinions if decision-makers conflict over a particular issue. A director with great personal competence or prestige has great personal authority in the board, and the internal informal hierarchy of the board will be stronger (Zhang, Chen, & Li, 2015). Wang & We (2018) point out that the stronger the informal hierarchy is, the more conducive it will be to the formulation of strategic change decision-making of the company. The invisible control power granted to the directors at the higher level by the informal hierarchy will complete change decision-making in a relatively short time and improve the decision-making quality, so as to improve corporate governance efficiency. In the case of imperfect and differentiated capital market, an interaction-based board informal hierarchy has a significant alternative to a formal hierarchy (Xie, Zhang, Zhang et al., 2015). According to Belliveau, when directors discuss decision-making opinions, differences in the degree of respect and acceptance of each person can affect the process and outcome of decision-making. All the above researches prove that the informal hierarchy produces a certain coordination mechanism which influences the interaction among the members of the board and guides the decision-making process of the board. (Wu, Xue, & Wang, 2018) This guidance is mostly positive, namely, improving corporate governance efficiency. Based on the above, we make the following hypothesis:

H1: Board informal hierarchy has a significant positive impact on corporate governance efficiency.

Intermediary role of psychological perception

Cognitive psychology is an advanced psychological process to study human beings. It mainly refers to the cognitive process, such as attention, perception, representation, memory, creativity, problem solving, speech and thinking. However, it is precisely in the process of mutual cognition that the position perception among the members of board informal hierarchy. Seeman and Berkman believe that the position perception is based on the subjective assessment of the individual, which means that the individual judges the relative position that he/she may be in the organization mainly through his/her subjective feelings, namely the degree to which members of board informal hierarchy are respected or admired by other members (Blader & Chen, 2012), their reputation and influence in the organization (Chen, Jia, Li et al., 2006), degree of support from the organization. The study finds that those in relatively high positions tend to have more advantages than those in relative low positions in the enjoyment of privileges and position constraints (Magee & Galinsky, 2008). The psychological perception between the board informal hierarchies is based on the differences
in political background, academic background, overseas background, whether or not to serve as chairman and CEO and whether or not to serve concurrently as shareholder of members of board informal hierarchy. Differences in the positions members of board informal hierarchy will promote internal exchange and communication of the board, shorten decision-making time, and promote efficient and scientific collective decision-making of the board (Wang & Wei, 2018). Based on this, we propose the following hypothesis:

H2: Psychological perception has a significant positive regulating effect on the relationship between board informal hierarchy and corporate governance efficiency.

### DATA DESCRIPTION AND RESEARCH MODEL

#### SETTING

**Data description**

This study collects the data of all listed companies in China for two years from 2015 to 2016 as the final sample. According to the credibility and validity of the sample data, the sample is treated as follows: (1) excluding companies in the financial sector; (2) excluding the companies with missing information or incomplete data; (3) excluding companies of ST* and ST. Finally, 5,190 sample data are selected, and all the sample data are downloaded from CSMAR for multiple manual sorting and proofreading. The missing data are supplemented by consulting the annual reports of companies and Sina Finance to ensure the accuracy of the data.

#### Table 1. Variable definition and measure

| Variable Type     | Name                          | Symbol | Method                                                                 |
|-------------------|-------------------------------|--------|------------------------------------------------------------------------|
| **Independent Variable** |                               |        |                                                                        |
|                   | Informal level of board of directors | G      | $G = \frac{\text{cov}(y, r_y)}{N\bar{y}}$ where $y$ represents the total number of part-time external directors on the board of directors; $r_y$ represents the ranking of each director on the basis of an external part-time quantity; $\text{cov}(y, r_y)$ represents the covariance of $y$ and $r_y$; $N$ represents the size of the board of directors; $\bar{y}$ represents the mean of $y$. |
| **Dependent Variable** | Corporate governance efficiency | SC     |                                                                        |
|                   |                               |        | $\text{OGR}: \frac{\text{(general expenses+business expenses)}}{\text{operating income}} \times 100\%$ | $\text{T-Q}: \frac{\text{(Market value of tradable shares at the end of the year+Non-circulating shares at the end of the year*Net assets per share+Total liabilities at the end of the year)}}{\text{(Net assets at the end of the year+Total liabilities at the end of the year)}}$ | $\text{ROE}: \text{The return on the company's net assets.}$ |
|                   |                               |        |                                                                        |
|                   | Oversea Back                   | ob     | The number of people in the company's executive team who have studied or worked abroad. |
|                   | Academic Back                  | aca    | The number of members of the board of directors of the company who have taught in colleges and universities and served in associations or research institutions. |
|                   | Political Back                 | pol    | Number of members of the board of directors of the company who have served as deputies to the National people's Congress, members of the Chinese people's political Consultative Conference or other government bodies. |
| **Intervening Variable** |                               |        |                                                                        |
|                   | Number of part-time workers in shareholder units | sha    | Whether in the shareholder unit concurrently. |
|                   | Whether to be chairman and CEO at the same time | ap     | Both positions in the company are assigned 1 at the same time; not at the same time as assignment 2. |
|                   | The proportion of the top three paid executives | C3ex   | $\text{Ln (top three executive compensation)} / \text{Ln (owner’s equity)}$ |
|                   | Number of paid executives      | Npex   | Number of paid executives / $\text{Ln (number of shareholders)}$ |
|                   | Ownership concentration        | HHI    | The sum of squares of the proportion of the top five shareholders |
|                   | Firm size                      | Size   | $\text{Ln (total assets of the company at the end of the year)}$ |
Variable measurement

Board informal hierarchy

In the past, the measurement methods of board informal hierarchy are not uniform. Some scholars combine with the specific social situations of China and use the measurement methods of He and Huang (2011) and Wu, Xue, & Wang (2018) for reference to measure individual ability and influence that result in different levels of informal hierarchy (Wang & Wei, 2018). Some scholars study the relationship between board informal hierarchy and corporate governance efficiency by measuring the clarity of board informal hierarchy. However, these are measured by the Gini coefficient. The degree of hierarchy difference can be easily determined by using the Gini coefficient. This study will continue the previous measurement method and uses the Gini coefficient to measure board informal hierarchy.

Corporate governance efficiency

Corporate governance efficiency, as a dependent variable, is a multi-attribute index. This study refers to the research method of, chooses the operating cost of the company, corporate value and return on equity as three indexes to measure corporate governance efficiency. The period charge is used to represent the company’s operating cost, and the commonly used Tobin Q index is used to measure the corporate value.

Psychological perception

In order to verify that psychological perception has a positive regulating effect on the relationship between board informal hierarchy and corporate governance efficiency, this study chooses several dimensions: overseas background, academic background, political background, whether or not to serve concurrently as shareholder and whether or not to serve as chairman and CEO.

Relevant researches show that there are differences in corporate governance efficiency among companies of different scales, and the proportion of the top three senior executives receiving remuneration, the number of senior executives receiving remuneration, the concentration of equity, corporate scale also have an impact on corporate governance efficiency. Thus, the above variables are introduced as control variables. Table 1 is the variables selected in this study.

Model setting

Based on the above analysis, this study constructs the following model:

\[ H_1: SC = \beta_0 + \beta_1 G + \beta_2 \Sigma \text{control variable} + \epsilon \]

\[ H_2: SC = \beta_0 + \beta_1 G + \beta_2 \Sigma \text{mediating variable} + \beta_3 \Sigma \text{control variable} + \epsilon \]

where, \( \beta_0 \) is a constant term (intercept), \( \beta_1 \), \( \beta_2 \) and \( \beta_3 \) are related variable coefficients respectively, \( \epsilon \) is an error term.

EMPIRICAL TEST AND DISCUSSION

Descriptive statistics and correlation analysis of variables

(1) The measurement method of corporate governance efficiency (SC) is based on the swallowtail catastrophe system in the catastrophe progression theory, and the treatment method is as follows:

Firstly, the evaluation index system is constructed. SC variable is measured by the three dimensions of OGR, T-Q and ROE, and goes through dimensionless treatment according to the nature of the indexes (positive index, moderate index or reverse index), so that all the indexes are in the same quantity level. Secondly, the type of catastrophe system is determined. There are three secondary variables, so swallowtail catastrophe system is adopted, and the corresponding potential function is:

\[ f(x) = \frac{1}{5}x^5 + \frac{1}{3}ax^3 + \frac{1}{2}bx^2 + cx \]

Table 2. Total variance explanation

| Ingredient | Initial eigenvalue | Extraction load sum of squares |
|------------|-------------------|-------------------------------|
|            | Aggregate | Variance Percentage | Accumulate % | Aggregate | Variance Percentage | Accumulate % |
| 1          | 1.072     | 35.744              | 35.744       | 1.072     | 35.744              | 35.744       |
| 2          | 1.003     | 33.425              | 69.169       | 1.003     | 33.425              | 69.169       |
| 3          | 0.925     | 30.831              | 100.000      |           |                     |              |
The regression formula of swallowtail catastrophe system is as follows:

\[ x = a^{1/2}, \quad y = b^{1/3}, \quad z = c^{1/4} \]

Finally, the regression formula is used for the measurement, and the measurement results are shown in Table 2.

According to principal component analysis, the score coefficients of components are obtained: OGR is 0.688, T-Q is 0.654, ROE is -0.178, so the order is: OGR, T-Q, ROE. The correlation coefficient between OGR and T-Q is 0.070, which is significantly correlated at the significance level of 0.05, the correlation coefficient between OGR and ROE is 0.178, so the order is: OGR, T-Q, ROE.

Table 3: Descriptive statistics

| Variable | N  | Min   | Max   | Mean   | SD   |
|----------|----|-------|-------|--------|------|
| SC       | 5190 | -0.004976 | 0.438948 | 0.08379115 | 0.038579963 |
| G        | 5190 | 1.000000 | 0.000000 | 0.40136353 | 0.374695063 |
| ob       | 5190 | 0.000000 | 1.000000 | 0.08575649 | 0.106522093 |
| aca      | 5190 | 0.000000 | 1.000000 | 0.12600040 | 0.081885054 |
| sha      | 5190 | 0.000000 | 24.000000 | 3.47822736 | 3.140600653 |
| ap       | 5190 | 0.000000 | 1.000000 | 0.30982659 | 0.462466521 |
| pol      | 5190 | 0.000000 | 1.000000 | 0.05279108 | 0.095310990 |
| C3ex     | 5190 | 0.511299 | 0.927014 | 0.66850808 | 0.036545566 |
| Npex     | 5190 | 0.089905 | 3.440170 | 0.74850877 | 0.350834100 |
| HHI      | 5190 | 0.000015 | 0.809874 | 0.15800947 | 0.114212519 |
| size     | 5190 | 0.733103 | 28.5402615 | 64.1358906 | 318.882440 |

SPSS.24 software is used to carry out descriptive statistical analysis on the sample data. The statistical results are shown in Table 3.

It can be seen from Table 3 that the minimum value of SC is -0.004976, and the maximum value is 0.438948, indicating that there is a big gap in governance efficiency between companies. In addition, the minimum value of G is 0, the maximum value is 1, the mean value is 0.4014, and the standard deviation is 0.3747, indicating that the bipolar distribution between companies is serious.

Regression results

Regression analysis is performed on the sample data by using the Eviews8 software. The results are shown in Table 4:

As shown in Table 4, Model 1 examines the influence of board informal hierarchy on corporate governance efficiency, and Model 2 examines the relationship between board informal hierarchy and corporate governance efficiency after the introduction of mediating variable (psychological perception).

Table 4: Regression result

| Var. | Model 1 | Model 2 |
|------|---------|---------|
| G    | 0.033632*** | 0.026600*** |
| (11.95001) | (9.192198) |
| ob   | 0.001526**  | 0.477506**  |
| aca  | 0.022454*   | 0.222391 |
| sha  | -0.001160*** | -10.38803 |
| ap   | 0.002833**   | 3.971434 |
| pol  | -0.011549*   | -3.318414 |
| C3ex | 0.253543     | 0.242634 |
| (27.00361) | (25.58270) |
| Npex | 0.000797***  | -0.000225*** |
| (0.840545) | (-0.228496) |
| HHI  | -0.012980*   | -0.005748** |
| (-4.465273) | (-1.955951) |
| size | -0.006276 ** | -0.005932** |
| (-37.41656) | (-33.95620) |

Notes: T-statistics are reported in parentheses; ***, **, and * represent significance levels at 1%, 5%, and 10%, respectively.

The regression results of Model 1 show that some control variables in this study are significantly correlated with dependent variables. For example, the number of senior executives receiving remuneration has a significant positive impact on corporate governance efficiency, that is, the large number of employees contributes to the improvement of corporate governance efficiency. The scale of the company has a significant negative impact on corporate governance efficiency. The smaller the scale of the company is, the better the corporate governance efficiency will be.

The regression results of Model 2 show that the Gini coefficient is obviously positive and is significant at the level of 1%, the influence of independent variables on dependent variables obviously exists in the model, that is, board informal hierarchy has a positive influence on corporate governance efficiency. Thus, H1 can be verified.

In addition, by comparing Model 1 with Model 2, it is easy to see that under the effect of psychological perception, the fitting degree of data is better, that is, psychological perception has a significant positive regulating effect on the psychological perception, the fitting degree of data is better.
relationship between board informal hierarchy and corporate governance efficiency. Therefore, H2 can be verified.

CONCLUSIONS AND SHORTCOMINGS

Based on a series of theoretical basis and previous research results, this study adopts empirical analysis to explore the relationship among psychological perception, board informal hierarchy and corporate governance efficiency. The conclusions are as follows: 1. board informal hierarchy, as an internal invisible force in the board, has a significant positive impact on corporate governance efficiency. The stronger the board informal hierarchy is, the better the corporate governance efficiency will be. 2. Psychological perception has a significant positive regulating effect between board informal hierarchy and corporate governance efficiency. Members of the board will be consciously graded internally according to political background and other factors, and play a role when the company’s decision-making opinions are not uniform. Such respect and compliance among members can reduce unnecessary disputes, optimize decision-making procedures, and improve corporate governance efficiency. This study plays a guiding role in the future reform of structure of board in China, and reminds the companies to pay attention to the invisible power of board informal hierarchy, especially the role of psychological perception in this power in adjusting the governance structure and improving the governance efficiency.

In addition, there are still some limitations in this study, which need to be expanded and verified in follow-up researches. Due to the individual differences, the psychological perception of different individuals is also relatively different. There may be other influence factors other than those mentioned in this study. What’s more, this study is only confined to the statistics of existing data. With the subsequent reform of the corporate structure and the deepening of the research on board informal hierarchy, there may be other relationships among psychological perception, board informal hierarchy and corporate governance efficiency. For example, under the effect of psychological perception, board informal hierarchy may have a reverse impact on corporate governance efficiency.

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