

Power Allocation and Investment Efficiency of Parent-Subsidiary Company

—Empirical Analysis Based on the Perspective of Subdivision of Power

Jun Zhou, Zeyu Wong*

School of Economics, Wuhan University of Technology, Wuhan, China

Email: *3348907729@qq.com

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Abstract

Taking Shanghai and Shenzhen A-share non-financial listed companies in 2009 and 2019 as samples, from the perspective of financial rights and personnel rights, this paper makes an empirical study on the relationship between their allocation between parent and subsidiary and the overall investment efficiency of listed companies and their subsidiaries, and further analyzes the moderating effect of the two on the above two relationships. The research shows that: 1) in the current stage, the concentration of financial rights improves the investment efficiency of the parent-subsidiary company; 2) the concentration of the power over personnel has an inverted U-shaped relationship with investment efficiency; 3) from the moderating effect of the two, the concentration of financial power flattens the inverted U-shaped relationship between the concentration of personnel power and investment efficiency; 4) the concentration of personnel power amplifies the promoting effect of financial power concentration on investment efficiency, but this effect is not clear at the low level of personnel power concentration. The research of this paper is helpful to provide more concrete and operational reference and suggestions for the management and control of enterprise groups.

Keywords

Parent-Subsidiary Company, Business Group, Power Allocation, Investment Efficiency

1. Introduction

Based on the company's strategic planning, industrial development and market situation, efficient investment activities are the necessary premise for the sustainable operation of enterprises. Investments can be made to expand produc-

tion lines by purchasing production equipment and new plants, to establish new enterprises or develop new products, or to achieve rapid expansion through mergers and acquisitions. However, all kinds of risks and uncertainties contained in them need to be carefully considered by enterprises. If they are careless, a lot of resources invested in the early stage will turn into sunk costs, resulting in serious losses, and occupy the human and material resources needed for potential investment opportunities, causing enterprises to miss the precious growth outlet. In view of the importance of this issue, scholars have deeply discussed the influencing factors of enterprise investment efficiency from property rights, financial policy, corporate governance mechanism and other internal and external perspectives. But such studies have mainly looked at individual companies. With the evolution and development of China's enterprise groups with property rights as the link and the parent-subsidiary company system as the main form, the total revenue of China's top 500 enterprise groups accounted for 86% of GDP by the end of 2018 (Dou, 2019). As an organizational form with multiple legal persons at different levels, the influence of enterprise group covers all aspects of the national economy. Scholars have gradually begun to pay attention to the contagion effect (Zhang & Gao, 2019) and peer effect (Zheng & Chen, 2020) of enterprise behavior among enterprises. From the perspective of group management and control, investment efficiency presents new dimensions and patterns different from those of individual enterprises.

The core of group management and control is the distribution of power between parent company and subsidiary company. In order to give full play to the advantages of transaction cost saving in the group internal market and achieve economies of scale and scope, it is necessary to clearly define the relationship of power and responsibility between parent company and subsidiary company, as well as the coordination and control functions that the parent company should play in it. In a single company, the configuration of power is clear: shareholders, as owners, have the ultimate control of the company, and the actual control is exercised by entrusting the board of directors or the management by the board of directors. For the parent-subsidiary company, the company law grants the subsidiary the status of independent legal person. In principle, the subsidiary is independent in operation, responsible to its shareholders and responsible for its own profits and losses. From the legal point of view, the control of the subsidiary company for the benefit of the parent company or the group itself is in a legal ambiguous zone. The parent company can only exercise indirect control through its subsidiary organs by holding the majority of voting rights, and correspondingly separates its own responsibilities and risks, so it has a large choice between centralization and decentralization.

The structure of this paper is as follows. The first section introduces the research background and particularity. The second section describes the innovation of the research. The third section has carried on the concept definition and the theory hypothesis. The fourth section is the design of empirical model. The fifth

section is the empirical results. The sixth section is the conclusion and suggestion.

2. Innovation and Main Contribution of Research

Existing literature study of power allocation between parent-subsidiary mainly referring the case study (Liu & Han, 2020) and inductive analysis (Chen, 2014), a few large sample empirical study according to their own research purposes, or decision rights based on the overall concept, or for power by different standards, discusses the investment efficiency (Xin & Qian, 2015), shares crash risk (Wang & Tian, 2020), internal capital market efficiency (Zhang & Chen, 2013), Corporate performance (Chen & Zheng, 2016) and other specific topics. But few studies have investigated the heterogeneity of the role of different power allocations and their interactions. Contribution of this paper is: under the background of the study of the investment efficiency to investigate two kinds of specific power, financial rights and personnel rights, respectively, to explore its role in the effect of investment efficiency and way of doing so has the theoretical and empirical necessity. Theoretically for deductive analysis purpose of abstract power concept does not is what matters for power, although has the universal significance, but far from reality. There is a lack of targeted guidance for different control lines and sub-modules in the business, and more detailed discussion is urgently needed. From an empirical point of view, the indicators derived from data often represent only one side. To measure power in the theoretical sense, it is inevitable to “cut one’s feet to fit one’s shoes”. And specifically, On the basis of studying the relationship between financial rights and personnel rights and the investment efficiency of the company, this paper further takes financial rights and personnel rights as moderating variables and discusses the moderating relationship between financial rights and personnel rights and the moderating relationship between financial rights and investment efficiency respectively. This paper preliminarily explores the interaction process of governance between powers, and also clarifies the boundary conditions of their influence on investment efficiency. As an in-depth study of the past, it has certain theoretical significance and practical enlightenment.

3. Theoretical Analysis and Research Hypothesis

3.1. Key Concept

In order to facilitate the subsequent discussion, the main concepts in this paper need to be clearly defined.

Investment efficiency refers to the ratio of investment income to cost. Effective investment refers to the increase of investment for investment projects with positive net present value, and the cessation or withdrawal of investment for projects with negative net present value. From the perspective of actual operation of an enterprise, the investment of an enterprise can be roughly divided into two ways: by purchasing new production equipment for internal self-investment in new plants or businesses, and rapid expansion through external mergers and

acquisitions, which is a more aggressive and risky investment approach. Research results show that the scale of self-investment of listed companies in China is much larger than the scale of Mergers and acquisitions (Jiang, 2009). Self-investment is more sensitive to the business situation and investment opportunities of enterprises, and M & A investment is closely related to the top-level decision of the group parent company of listed companies. The research object of this paper is listed companies and their subsidiaries, which are in the lower level of the group internal capital market. Different from the upper internal capital market, which is dominated by asset and equity allocation and has strong financial attributes, the capital allocation of this level serves the sinking productive business of subsidiaries, and the listed company plays the role of financing platform. Taking the above considerations into account, this paper will focus on internal investment.

The concept of comprehensive power is used to discuss the centralization and decentralization of power in an enterprise, which corresponds to the corporate control right. The concept of control right has a wide connotation, and scholars' definitions are also complicated. It can be roughly divided into appointment power, decision-making power, influence power, controlling interest (Zhou, 2016). Generally speaking, control is the power to coordinate and command various elements in order to accomplish various goals. In a single company, the CEO or senior team is often taken as the main body to exercise power. However, the power relationship of a parent-subsidiary enterprise group lies between organizations. Due to the complexity of management activities, it is more streamlined and streamlined. The typical characteristics of institutionalization are more dependent on organizational procedures and practices. Different modules may not keep the same pace in terms of decentralization and control intensity. Therefore, it is necessary to change the analysis of group power from one dimension to multiple dimensions. This paper does not focus on the decision-making power of flow matters, which is difficult to observe in a large sample study. Instead, it focuses on the financial and personnel rights, which are most closely related to investment activities and depend on the financial and personnel management systems. As above, this article does not specifically distinguish between "power" and "right".

3.2. Financial Power and Investment Efficiency

Financial rights refers to the control and use of financial resources in business activities at which level the financial resources are collected in the group, which usually means the operation of funds at this level. At the same time, it also becomes the soil for the breeding of agency problems, which is different from a single company, except for shareholders and managers. Besides the agency problem between major shareholders and minority shareholders, the group also has the third agency problem between parent company and subsidiary company. Pyramid at group, the control chain downstream of the enterprise, and the actual control room the higher the degree of information asymmetry, insider con-

trol of agency problems are more serious Based on across the level between the preference of inconsistency between the principal and agent, subsidiary management often through a variety of means to expand his business empire, maximize their self-interest. For example, for investment projects with negative net present value, they exaggerate the feasibility and capital needs of the projects to the management of the parent company through lobbying activities or various excuses to seek explicit or implicit benefits (Zhang & Lu, 2012). Although there are problems such as hollowing out of major shareholders at the level of the listed parent company, with the development of the domestic capital market, the internal and external governance mechanism is gradually improved, especially from the perspective of the parent-subsidiary two-way governance, the managers of the listed company with strong ability can effectively curb the interests encroachment of the controlling shareholders (Xu, Zhang, & Xu, 2019). Therefore, the problem is more serious in the subsidiaries of listed companies, which are difficult for both the parent company and outside investors to observe. In addition, the collection of funds in the parent company is also conducive to giving full play to the resource allocation function of the internal capital market, namely the so-called “Smarter-money Effect” (Stein, 1997).

Based on the above analysis, this article proposes:

Hypothesis 1: Other conditions remain unchanged, the relationship between financial rights and investment efficiency is monotonous, and the concentration of financial rights is conducive to improving investment efficiency.

3.3. The Power over Personnel and Investment Efficiency

Personnel rights refers to the company’s power to control the appointment, appointment, dismissal and transfer of personnel. In practice, a group usually appoints directors, supervisors or financial personnel to subsidiaries as a means to exert influence over the subsidiaries, and the parent company usually reserves the right to examine and decide on the compensation of the appointed personnel. The different distribution of financial resources leads to the heterogeneity of fund utilization efficiency at different organizational levels, but the accumulation of funds at a certain level does not necessarily mean that the level has the right to invest. In fact, even if the parent company subsidiary in many aspects of daily business to give considerable discretion, but on the question of big investment and budget usually cautious, in the process may involve complex report and approval process Subsidiary to the parent in the subsidiary to embedded with trust, a symbol of the subsidiary company of control and supervision. Concentration is conducive to the appropriate staffing alleviate the information asymmetry between the parent-subsidiary company, to promote their business and management state of familiarity with and understand, improve unit staff’s work enthusiasm and sense of mission, thereby reducing subsidiary agent cost, but also effectively promoted the human capital, and the resulting social capital in the group of personnel in the network flow, make enterprise obtaining the required

strategic knowledge resources and management experience enable enterprise to respond more quickly to changing market conditions (Xu, Chen, & Ma, 2020). Excessive concentration of personnel rights means that the private knowledge related to the local market that the subsidiary managers have a better understanding of is divorced from the decision-making power of related matters. In addition, more personnel are only responsible for the parent company but have the power to interfere with the subsidiary's business activities. The mismatch of rights, responsibilities and interests will also lead to the misallocation of resources. From the perspective of behavioral economics, there are not only explicit financial contracts, but also implicit psychological contracts between the parent company and the subsidiary company. If the parent company is too strong, the subsidiary will perform the contract negatively or even break the contract. If the parent company does not fully respect the autonomy of the subsidiary, the subsidiary may have a low incentive level (Pan & Dai, 2013). Correspondingly, excessive delegation of power will naturally produce serious information barriers, which will reverse the feasibility of subsidiaries distorting information, lobbying or blindly exaggerating project value for their own interests. The advantages of the internal market are not reflected, resulting in low investment efficiency.

Based on the above analysis, this article proposes:

Hypothesis 2: Other conditions unchanged, the concentration degree of personnel rights and investment efficiency showed an inverted U-shaped non-monotonic relationship.

3.4. The Synergistic Effect of the Subdivision of Power

Financial rights and personnel rights respectively have their own connotations and focuses. They both belong to the subheadings of group management and control and correspond to different management and control modules. In practice, it is cross-linked and forms multiple forms, which have different operating mechanisms and effects in multi-level enterprise groups. Therefore, the discussion on the interaction between subdivided powers is helpful to further clarify the ways in which abstract powers play their effects in practice (Tan & Chen, 2019).

From the perspective of personnel power concentration, at the low level of personnel power concentration, there is not only the geographical distance between the listed parent company and its subsidiaries, but also the inevitable difference in the institutional environment (Li, 2015). There is a lack of effective communication between parent and subsidiary, and there are serious free cash flow agency problems between listed companies and their subsidiaries. At this time, the financial rights of the subsidiary will be delegated to the rent-seeking motivation of the subsidiary, and the agency cost will be increased. And under the premise of high concentration level of personnel power, the large number of personnel dispatched by the parent company not only continue to play the function of fully communicating the strategic intention of the parent company and

establishing a good personnel network foundation for the overall coordination of the parent company, but also can further improve the construction of informal systems such as the group's cultural values and business philosophy at the subsidiary level, thus reducing transaction costs. On the other hand, at this time, the subsidiary is constrained by the staff of the parent company in its own strategic initiative, and it is difficult to have enough sense of control and motivation to make new project development plans. Therefore, it is a superior choice to concentrate the financial power on the parent company, and the subsidiary assumes the role of strategic executor. In other words, the concentration of financial power can neutralize and even restrain the negative effects of excessive decentralization or concentration of personnel power, which is conducive to improving the investment efficiency on the side of the concentration level of personnel power. From the perspective of the concentration of financial rights, it is relatively simple, because the concentration of financial rights promotes the relationship of investment efficiency mainly by reducing the agency cost between parent company and subsidiary company. To optimize the allocation of financial resources within the group, the concentration of personnel rights itself will not harm the process. As mentioned above, on the contrary, the soft information and social capital flow within the organization are complementary to the concentration of financial rights. Moreover, the negative incentive effect brought by the two kinds of power concentration to lower organizations is not linear additive, but there is a certain degree of overlap. Therefore, it can be considered that personnel power concentration optimizes the process of financial power concentration.

Based on the above analysis, the following hypothesis is proposed:

Hypothesis 3: Financial rights and personnel rights have synergistic effect.

Hypothesis 3a: The concentration of financial power flattens the inverted U-shaped relationship between the concentration of personnel power and investment efficiency.

Hypothesis 3b: The centralization of personnel power amplifies the role of the centralization of financial power in promoting investment efficiency.

4. Research Design

4.1. Sample Source and Selection

The samples selected in this paper are listed companies in Shanghai and Shenzhen A-share markets. Due to the implementation of new accounting standards in 2007, the final sample interval selected is from 2009 to 2019 in consideration of the unification of the calculation aperture, the calculation of the inclusion ratio and the lagging items in the previous data processing. The samples are also processed as follows: 1) The financial sector sample was excluded; 2) ST and ST* samples were excluded; 3) The sample from the year of the IPO was excluded; 4) Samples with missing values of variables were eliminated. The data used in this paper are all from the CSMAR database. STATA16 is used for data collation and regression analysis, and all continuous variables are treated with 1% tail reduction.

4.2. Variable Selection and Definition

1) Explained variables

Referring to similar studies, this paper uses the mainstream Richardson (2006) model to measure investment efficiency, and chooses to express it as inefficient investment ($Absinv$). The higher the absolute value, the lower the investment efficiency. As shown in Formula (1), where Inv represents the newly added self-investment of the enterprise, the difference between “Cash paid for the purchase and construction of fixed assets, intangible assets and other long-term assets” minus “Net cash recovered from disposal of fixed assets, intangible assets and other long-term assets” divided by the total assets. $Size$ represents the Size of the enterprise and the natural logarithm of the total assets. Lev is the level of leverage, which is total liabilities divided by total assets. $Growth$ refers to the current operating revenue growth rate. Ret refers to the annual return on shares, which is “the annual return on an individual share taking into account the reinvestment of cash dividends”. Age is the Age of the enterprise, which is calculated by taking the natural logarithm of the difference between the current year and the listing year. $Cash$ is ending Cash and Cash equivalents divided by total assets. “ $t - 1$ ” represents the one-phase lag term; the estimated residual is positive, which represents over-investment; negative, which represents under-investment; and its absolute value is the level of inefficient investment.

$$Inv_{i,t} = \beta_0 + \beta_1 Size_{i,t-1} + \beta_2 Lev_{i,t-1} + \beta_3 Growth_{i,t-1} + \beta_4 Ret_{i,t} + \beta_5 Age_{i,t} + \beta_6 Cash_{i,t-1} + \beta_7 Inv_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

2) Explanatory variables

Concentration of financial power ($CenF$). Cash allocation is the core content of financial resource allocation in internal capital market, and cash distribution comprehensively reflects the parent company’s various strategic arrangements for internal financial resource allocation (Zhang & Wu, 2011). Drawing on previous studies (Xin & Qian, 2015; Chen & Zheng, 2016), financial rights are measured by the parent company’s excess cash holdings ratio obtained from Equation (2). Among them, operational cash expenditure (OCE) is the sum of “cash paid for goods and services”, “cash paid to and for employees”, “taxes and fees paid” and “cash paid for other business activities”. The subscript “A” represents data in the parent company’s financial statements, and the subscript “B” represents data in the consolidated financial statements. The larger the value of $CenF$, the higher the ratio of excess cash held by the parent company and the higher the concentration of financial rights within the group.

$$CenF = \frac{Cash_A}{Cash_B} - \frac{OCE_A}{OCE_B} \quad (2)$$

Concentration of personnel right ($CenP$). The parent company sends directors, supervisors or financial personnel to the subsidiary company, and retains the right to examine the dispatched personnel and decide on salary. Through the centralization of personnel right, the parent company transmits the strategic in-

tention of the parent company, supervises or guides the operation activities of the subsidiary company, and promotes the communication between the parent company and the subsidiary company. This index also needs to exclude the impact of the parent company itself on the arrangement of the focus of business activities. Through the regression of the model shown in Formula (3) by year and industry, the residual estimated value is the measurement of personnel rights (Tan & Chen, 2019; Pan, Zhu, & Chen, 2018). Where, PSalary refers to the employee salary ratio paid by the parent company, which is derived from the result of “cash paid to and for employees” in the parent company’s statement divided by the corresponding item in the consolidated statement; PAsset represents the proportion of the parent company’s assets, which is obtained by dividing the “total assets” in the parent company’s report by the corresponding item in the consolidated report. The larger the estimated residual is, the higher the concentration of personnel rights within the group under the condition that the ratio of parent company size remains unchanged.

$$PSalary_{i,t} = \beta_0 + \beta_1 PAsset_{i,t} + \varepsilon_{i,t} \quad (3)$$

3) Control variables

Based on previous studies on this topic, and considering that commonly used variables such as enterprise size, financial leverage, age and growth have been considered in residual estimation and index calculation in the first stage, if included in the formal estimation in the second stage, it will cause errors in regression (Chen, Hribar, & Melessa, 2018). The final selected control variables in this paper are shown in Table 1, respectively involving the complexity of the enterprise’s

Table 1. Definition of control variables.

Variable name	Variable symbol	Variable definitions
Environmental uncertainty	Eu	Standard deviation of abnormal sales revenue over the last 5 years/Average sales revenue over the last 5 years
Free cash flow	Fcf	The natural logarithm of the difference between net cash flows from operating activities and estimates of normal investment levels
Management cost ratio	Adm	Management fees/Total assets
Majority shareholders capital occupying	Otac	Net other receivables/Total assets
Share ratio of the largest shareholder	Top1	Number of shares held by the largest shareholder/Total number of shares
Separation of two rights	Sep	The difference between the control and ownership of a listed company owned by the actual controller
Management stock position proportion	Ms	Management shareholding/The total number of shares
Executive compensation	Comp	Take the natural logarithm of the total compensation of the top three executives
Minority ownership	Mino	Minority equity/Owner’s equity
Board size	Bsize	Take the natural log of the number of directors
Ratio of independent directors	Indep	Number of independent directors/Number of directors

external environment and the internal operation and governance of the enterprise.

4.3. Model Setting

Following the suggestion of Peterson (2009), on the basis of controlling the fixed effects of years and industries, the clustering robust standard error at the firm level is used and the following regression model is constructed to test the above hypothesis. For brevity, the subscripts marking companies and years are omitted, where “ Σ Control” represents all Control variables. “ Σ Year” and “ Σ Industry” represent dummy variables of Year and Industry respectively. In this paper, the curve moderating effect test method is used to demonstrate the above hypothesis. See Section 5.3 for specific steps. Specifically, Equation (4) is used to test hypothesis 1 and 2, and Equation (5) is used to test hypothesis 3, etc.

$$\text{Absinv} = \beta_0 + \beta_1 \text{CenF} + \beta_2 \text{CenF}^2 + \beta_3 \text{CenP} + \beta_4 \text{CenP}^2 + \sum \text{Control} + \sum \text{Year} + \sum \text{Industry} + \varepsilon \quad (4)$$

$$\text{Absinv} = \beta_0 + \beta_1 \text{CenF} + \beta_2 \text{CenP} + \beta_3 \text{CenP}^2 + \beta_4 \text{CenF} * \text{CenP} + \beta_5 \text{CenF} * \text{CenP}^2 + \sum \text{Control} + \sum \text{Year} + \sum \text{Industry} + \varepsilon \quad (5)$$

5. Empirical Results and Analysis

5.1. Descriptive Statistics

Table 2 shows the results of the descriptive statistics. It can be seen from the table that the minimum and maximum values of Absinv are 0.009 and 0.119 respectively, the standard deviation is 0.023, and the mean value is 0.022, indicating that the investment efficiency of different companies is quite different, and the investment efficiency of some companies is relatively low. The two centralized indexes also show obvious span in the sample distribution. The mean and standard deviation of CenF are -0.044 and 0.317 respectively, and the mean and standard deviation of CenP are 0.325 and 0.279 respectively. Other variables were added to the regression to control the heterogeneity of the sample in the parent-subsidiary business and governance.

5.2. Correlation Analysis

Pearson correlation coefficient test is shown in **Table 3**, and all results are not shown due to space limitations. It can be seen from the table that most variables are significantly correlated with inefficient investment, and all variables are significantly correlated with at least one of the two centralized indexes, indicating the rationality of control variable selection to a certain extent. In addition, there is a significant negative weak correlation between the centralization indexes, indicating that although they are both measures of the degree of centralization, there is some overlap in the connotation, but they are still two concepts of different dimensions. The negative relationship may be reflected in the supervision and implementation of the decision-making will of the parent company management

Table 2. Descriptive statistics.

Variables	Sample size	Mean	Standard deviation	Minimum	Median	Maximum
Absinv	10,825	0.022	0.023	0.009	0.015	0.119
CenF	10,825	-0.044	0.317	-1.310	-0.015	0.675
CenP	10,825	0.325	0.279	-0.144	0.310	0.801
Eu	10,825	0.150	0.144	0.013	0.106	0.905
Fcf	10,825	19.337	1.622	15.060	19.277	23.698
Adm	10,825	0.049	0.030	0.002	0.044	0.160
Otac	10,825	0.017	0.030	0.000	0.008	0.558
Top1	10,825	35.326	15.074	8.560	33.450	75.050
Sep	10,825	4.931	7.714	0	0	29.098
Ms	10,825	0.122	0.194	0	0.001	0.681
Comp	10,825	14.261	0.737	12.239	14.260	16.239
Mino	10,825	0.069	0.092	-0.012	0.032	0.440
Bsize	10,825	2.146	0.201	1.609	2.197	2.708
Indep	10,825	0.373	0.053	0.308	0.333	0.571

Table 3. Correlation coefficient of major variables.

	Absinv	CenF	CenP	Eu	Fcf	Adm	Otac
Absinv	1						
CenF	-0.050***	1					
CenP	0.102***	-0.119***	1				
Eu	0.026***	-0.012*	-0.164***	1			
Fcf	-0.065***	0.063***	-0.171***	-0.033***	1		
Adm	0.003	0.028***	0.027***	-0.136***	-0.226***	1	
Otac	-0.051***	-0.022***	-0.158***	0.095***	-0.016**	-0.036***	1

when the financial power is dispersed.

5.3. Regression Analysis

The results of multiple regression are shown in **Table 4**.

In order to control the impact of the correlation between the concentration of financial power and the concentration of personnel power on the estimation, the relationship between the two and inefficient investment is tested by regression, as shown in column (1). Strictly speaking, the significance of the coefficients of higher order terms is not a sufficient condition for the non-monotonicity relationship. In this paper, according to the steps of strictly testing the U-shaped curve proposed by Lind and Mehlum (2010), it is carried out in three steps: 1) First check whether the quadratic coefficients are significantly positive; 2) If so, test whether the slope coefficient at the left end of the curve is significantly negative

Table 4. Regression result.

Variable	(1) Absinv	(2) Absinv	(3) Absinv	(4) Absinv
CenF	-0.003*** (-3.42)	-0.002** (-2.56)	-0.003*** (-2.97)	-0.003*** (-2.74)
CenF ²	0.001 (1.04)		-0.002 (-0.66)	
CenP	-0.003 (-0.90)	-0.002 (-0.71)	-0.003 (-0.93)	-0.003 (-0.89)
CenP ²	0.011** (2.55)	0.008** (1.98)	0.012*** (2.58)	0.010** (2.07)
CenF*CenP		0.008 (1.01)		0.011 (1.20)
CenF*CenP ²		-0.026* (-1.93)		-0.031** (-2.00)
Eu	0.010*** (4.50)	0.010*** (4.51)	0.009*** (3.90)	0.009*** (3.92)
Fcf	-0.000 (-0.91)	-0.000 (-0.95)	-0.000 (-0.62)	-0.000 (-0.67)
Adm	-0.034*** (-3.16)	-0.035*** (-3.26)	-0.030** (-2.43)	-0.032*** (-2.60)
Otac	-0.025*** (-3.03)	-0.024*** (-2.94)	-0.024** (-2.57)	-0.023** (-2.43)
Top1	-0.000 (-0.79)	-0.000 (-0.72)	-0.000 (-1.18)	-0.000 (-1.11)
Sep	-0.000 (-0.41)	-0.000 (-0.42)	-0.000 (-0.82)	-0.000 (-0.86)
Ms	0.005*** (2.70)	0.005*** (2.61)	0.005** (2.32)	0.005** (2.18)
Comp	0.000 (0.87)	0.000 (0.80)	0.001 (1.22)	0.002* (1.90)
Mino	-0.002 (-0.48)	-0.002 (-0.71)	-0.001* (-1.68)	-0.003 (-1.55)
Bsize	-0.001 (-0.59)	-0.001 (-0.60)	-0.001 (-0.32)	-0.001 (-0.35)
Indep	0.000 (0.08)	0.000 (0.08)	-0.003 (-0.48)	-0.003 (-0.49)
Year & Industry			Control	
Sample size		10,825		9084
AdjR ²	0.085	0.086	0.088	0.089

Note: *, **, *** mean significant at the level of 10%, 5%, and 1%. The t value under the robust standard error of heteroscedasticity is in parentheses.

and that at the right end is positive; 3) If so, check whether the inflection point (axis of symmetry) is within the range. If not, the relationship is still monotonic within the range.

The quadratic term of financial power concentration is not significant, indicating that there is no evidence for the existence of U-shaped relationship, so only the first order term is retained in the subsequent regression. The first order term is significantly negative at the level of 1%, indicating that under the condition that relevant factors remain unchanged, the concentration of financial rights reduces the level of inefficient investment of enterprises. Hypothesis 1 is established. Generally speaking, the agency cost of subsidiaries is a more serious problem.

The quadratic term of the concentration degree of personnel authority is significantly positive at the level of 5%, and the test results are further obtained through the procedural commands provided by Lind and Mehlum (2010). In the whole value range of CenP, the slope at the left end is significantly negative at the level of 10%, and the slope at the right end is positive at the significance level of 1%. The inflection point is 0.124. All three conditions are satisfied, and hypothesis 2 is established. There is an inverted U-shaped relationship between personnel authority allocation and investment efficiency (i.e. u-shaped relationship with inefficient investment).

The synergistic effect of financial authority and personnel authority allocation is tested by regression of the second model, as shown in Column (2). The interaction effect and the moderating effect are consistent in the sense of statistical analysis, focusing on the significance of the highest order interaction term. The difference lies in whether the relationship between the interaction variables is equal in the sense of research (Wen & Hou, 2005). Since the two power allocation methods have the same status in this study, we first make a preliminary test of their interaction effect, and then make in-depth analysis with each other as the regulating variable. Studies typically start with a centralization of the variables, but there is no material difference in estimates, with the added benefit of facilitating interpretation of the meaning of the main effect (Fang et al., 2015). At the same time, the focus of this part is mainly focused on the interaction term, because the centralization will change the interpretation of the estimated coefficient for the change of function property, so the centralization is not performed for convenience. The regression shows that the high-order interaction term is significantly negative at the level of nearly 5%, and the power allocation has a synergistic effect to improve the investment efficiency. Hypothesis 3 is established.

Further, Formula (6) represents the moderating effect of the concentration of financial authority (Z) on the relationship between the concentration of personnel authority (X) and investment efficiency (Y). Since it has no influence on the interpretation, the control variable is omitted in this formula. According to Hanns et al. (2016), the test of the regulating effect of u-shaped relationship can be divided into two types: inflection point movement and curve shape change. Take the first derivative of X with respect to Equation (6) and set it to 0 to obtain the inflection point, as shown in Equation (7). In order to find out how the in-

flexion point changes with the change of Z , take the derivative with respect to Z with respect to Equation (7) to obtain Equation (8). Obviously, the sign of the molecule at the right end of Equation (8) determines the sign of this item, and then determines the influence of the change of the value of Z on the inflection point. However, the result of the molecular parameter estimation is not significant, that is, there is no sufficient evidence to show how the concentration of financial power will affect the inflection point of the U-shaped relationship between the concentration of personnel power and investment efficiency. As for the shape of the curve, the curvature formula (9) can be obtained by taking the second derivative of X of Equation (6). It is easy to see that the change of curvature with respect to Z only depends on β_4 , that is to say, the only factor determining whether the U-shaped curve becomes flat or steep is the coefficient of the high-order interaction term. By the regression result, the estimated coefficient on the level of close to 5% of the significant negative, shows that the larger the Z , the flatter the u-shaped curve. This shows that to some extent in the power distribution of A-share listed companies, under a certain personnel rights concentration, concentration of financial power obviously alleviate the agency problem between the parent-subsidiary corporation, and giving full play to the advantages of the resources integration management, making up for the negative effect brought by the polarization of the concentration degree of personnel rights. Hypothesis 3a is established.

$$Y = \beta_0 + \beta_1 X + \beta_2 X^2 + \beta_3 XZ + \beta_4 X^2 Z + \beta_5 Z \quad (6)$$

$$X^* = \frac{-\beta_1 - \beta_3 Z}{2(\beta_2 + \beta_4 Z)} \quad (7)$$

$$\frac{dX^*}{dZ} = \frac{\beta_1 \beta_4 - \beta_2 \beta_3}{2(\beta_2 + \beta_4 Z)^2} \quad (8)$$

$$\frac{d^2 Y}{dX^2} = 2(\beta_2 + \beta_4 Z) \quad (9)$$

From the perspective of the concentration degree of personnel rights as the regulating variable, the derivative of Z can be obtained in Equation (10). Since the coefficient β_4 is significantly negative, the derivative may have an inverted U-shaped relationship with X . However, the parameter estimation of the inflection point $-\beta_3/2\beta_4$ is not significant. The interval estimate shows that the inflection point is within the roughly 15% - 16% of the concentration degree of personnel power at the confidence level of 95%. Further substituting the values of the 10%, 25%, 50%, 75%, 90% and 95% quartile respectively into Equation (10), the results are all significantly negative and decrease to a large extent after the 25% quartile, that is, the larger X is, the smaller the slope is. It can be concluded that in most cases, the concentration of personnel rights strengthens the flow of hidden resources, plays a role in supervising and guiding the subsidiaries and implementing the development strategy of the parent company and strengthening the cultural construction of the group, and plays a lubricant effect for the re-

relationship between the concentration of financial rights and the improvement of investment efficiency. However, this effect is not clear at a low level of personnel power concentration, which may be because symbolic personnel dispatch at a low level provides a way for subsidiary managers to seek rent and reduces investment efficiency (Duchin & Sosyura, 2013).

$$\frac{dY}{dZ} = \beta_3 X + \beta_4 X^2 + \beta_5 \quad (10)$$

5.4. Robustness Test

In order to confirm the reliability of the empirical results, this paper made the following treatment at the same time with reference to existing studies: 1) Since a reasonable level of investment may exist in an interval, we can draw lessons from the practice of Zhang et al. (2014) to divide the regressive residual into positive and negative groups, namely the over-investment group and the under-investment group. Each group is divided into 10 equal groups according to the value, a total of 20 groups, and the middle two groups are excluded; 2) Use the parent company's operating income ratio to adjust the calculation of financial power concentration; 3) Considering the influence of executive compensation, when calculating PSalary, the executive compensation are subtracted from both the numerator and the denominator. As shown in the last two columns of Table 4, the results are essentially unchanged.

6. Conclusion and Suggestions

6.1. Research Conclusion

Taking the A-share listed companies in Shanghai and Shenzhen from 2009 to 2019 as samples, this paper studies the relationship between the allocation of financial rights and personnel rights between parent and subsidiary companies and the overall investment efficiency of listed companies and their subsidiaries, and further analyzes the moderating effect of the two subdivision of power on the above two relationships. Compared with previous studies on the same topic, this paper draws more detailed results. Keeping other conditions unchanged, the research conclusions are as follows: 1) concentration of financial power will improve the efficiency of investment, which is a monotonous relationship; 2) concentration of personnel rights had inverted u-shaped relationship with investment efficiency, which is more complicated than that of financial power; 3) the concentration of financial power flattens the inverted U-shaped relationship between the concentration of personnel rights and investment efficiency; 4) the centralization of personnel rights intensifies the relationship between financial power and investment efficiency, but this role is not clear at the low level of personnel rights concentration.

6.2. Research Recommendations

The enlightenment of this study for the parent-subsidiary company management

and control practice lies in that the subdivision power is heterogeneous. For different control lines and modules, targeted power allocation arrangements should be made according to the specific conditions of the internal and external environment of the enterprise and different performance targets. Business group management and control is a set of measures and processes for power allocation. As an organic whole, each part of it cannot be considered in isolation, and it needs to be fully investigated and carefully weighed when designing the organization at the group level. In terms of investment activities, it should be aware of different power allocation that has different mechanism of action.

Specifically, in the current background, the listed parent company needs to first hold the purse strings in order to relieve subsidiary agent problem. Financial centralization always seems to be a superior choice, which requires the group to improve the project management process and accounting informatization process, avoid large amounts of resources idle or squandered at the subsidiary level, and realize unified management of financial resources. Second, beware of the negative consequences of too scattered or too centralized personnel authority. Streamline the dispatch of personnel of the parent company, build a more standardized personnel management system of the parent company, maintain smooth communication between the parent company and the parent company, and avoid forming local separatism. The main task of the personnel dispatched by the parent company is to promote inter-level communication and supervise the activities of the subsidiary company, and to give appropriate suggestions, rather than to interfere in all matters. Third, we should also be aware of the cross and the synergistic effect between different power. A more unified centralized system means more effective information transmission, but at the same time, it will reduce the subordinate's work autonomy, which is a test for the upper organization's information response speed and coordination ability. Therefore, the group headquarters should pay more attention to maintain the flexibility of decentralization options to achieve system efficiency.

The limitation of the conclusion of this paper lies in the contingency factors brought about by the complexity of the real environment, and this paper regards the subsidiary as a whole and neglects the interaction between the companies (Luo, Yu, & Ji, 2012). How to make more targeted scientific advice on the allocation of different powers in different situations will depend on continued research in the future.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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