Analysis of Equity Structure and Operating Performance of Electric Power Enterprises

--Empirical Study on A-share and H-share Listed Companies

Xupeng Wang[*], Liang Liu[a]

State Grid Energy Research Institute Co., LTD, Beijing, China

[*]wangxupeng@sgeri.sgcc.com.cn, [a]liuliang@sgeri.sgcc.com.cn

Abstract. The research is based on 476 listed power companies in A-shares and H-shares from 2009 to 2023, and empirically examines the impact of equity structure and business performance analysis. The research results indicate that increasing the concentration of equity in enterprises is beneficial for improving the operational performance of power enterprises, but it varies for different types of enterprises. The increase in equity concentration in state-owned power enterprises has a greater promoting effect on operational performance, while the balance of equity in non-state-owned enterprises has a greater promoting effect on operational performance. Based on the research results, this article proposes targeted equity structure adjustment suggestions for different types of power enterprises, including state-owned and non-state-owned ones, with the goal of improving their operational performance through service enhancement.

Keywords: Equity structure; State-owned enterprise; Operating performance

1   Introduction

With the introduction of the "carbon peak" and "carbon neutrality" targets in 2020, China's power industry has a relatively high carbon emissions, making it an important responsibility subject for implementing carbon reduction targets and a key industry for transitioning to clean energy under the "dual carbon" goals. Faced with the dual constraints of carbon emission intensity and total carbon emissions, coupled with the rise in coal prices and the decline in new energy generation prices, both traditional and clean energy power companies have suffered varying degrees of losses. As one of the important factors affecting the operational performance of power enterprises, establishing a scientific and reasonable equity structure and corporate governance structure can help mobilize the enthusiasm of various entities such as management and improve the operational performance of power enterprises.

There are different mechanisms and transmission paths for how equity structure affects the operational performance of power enterprises: on the one hand, equity concentration has a positive supervisory effect on operational performance, while equity balance is prone to internal factional struggles among management. On the other

hand, the concentration of equity has a benefit deprivation effect, which can lead to the infringement of the interests of major shareholders on small and medium-sized shareholders (Abdullah,2023) [1]. Equity balance can prevent a shareholder from making decisions that are unfavorable or harmful to other shareholders or enterprises in order to achieve their own interests, thereby improving company performance.

In summary, on the one hand, there are opposing views on the role of equity structure in the operational performance of power enterprises, and a unified conclusion has not yet been reached; On the other hand, there is a lack of literature on the relationship between equity structure and business performance based on a sample of listed Chinese power companies, and further categorizing the relationship between equity structure and business performance of different types of enterprises such as state-owned enterprises and non-state-owned enterprises. Based on the above reasons, this article selects 476 A-share and H-share listed companies of Chinese power enterprises from 2009 to 2023, and empirically examines the impact of equity structure on business performance of power enterprises. It provides suggestions for power enterprises to implement equity structure optimization, improve corporate governance level, promote stable operation and increase profits.

2   Theoretical Analysis and Research Hypotheses

Some scholars believe that the increase in equity concentration will enhance corporate performance. Amneh (2022) found a positive correlation between institutional ownership and ROE based on data from 62 companies listed on the Amman Stock Exchange from 2012 to 2019 [2]. Orsag (2021) found in a study of the largest public company in Bosnia and Herzegovina that ownership concentration has a statistically significant positive impact on firm value [3]. Jianwei Ma (2021) selected data from A-share listed companies from 2014 to 2018 and found that equity concentration and equity balance have a positive impact on corporate performance [4]. Suzana et al. (2021) studied 265 Indian companies and found that moderate to high ownership concentration ranging from 25% to 75% can improve company performance [5].

In summary, this article proposes hypothesis H1a: Concentration of equity will enhance the operational performance of enterprises; Equity balance will reduce the operational performance of enterprises.

Some scholars have also found that equity concentration may reduce corporate performance. Salema (2023) found through data analysis of non-financial listed companies operating in Oman and the United Arab Emirates from 2012 to 2021 that ROA is significantly negatively correlated with management ownership [6]. Ganguli (2021) found that the profitability of state-owned joint-stock companies was lower than that of private joint-stock companies by studying Slovenian joint stock companies from 2005 to 2017 [7].

In summary, this article proposes hypothesis H1b: Concentration of equity will reduce the operational performance of enterprises; Equity balance will enhance the operational performance of enterprises.

3 Empirical Research Design

3.1 Model Setting and Variable Definition

Regarding the impact of equity concentration and equity balance on the operational performance of power enterprises, this article sets up the following two regression models: equation (1) explains the variable of equity concentration, and equation (2) explains the variable of equity balance.

$$Performance_{i,t} = \beta_0 + \beta_1 CR1_{i,t} + \beta_2 Controls_{i,t} + \varepsilon_{i,t} \tag{1}$$

$$Performance_{i,t} = \beta_0 + \beta_1 Z_{i,t} + \beta_2 Controls_{i,t} + \varepsilon_{i,t} \tag{2}$$

In terms of the dependent variable, this article selects nine indicators from five dimensions based on financial indicator analysis, and uses principal component analysis to design and construct a comprehensive performance index to measure the operational performance of listed companies. Specific indicators include current ratio, quick ratio, total asset growth rate, current asset turnover rate, total asset turnover rate, return on total assets, cost expense ratio, operating profit margin, and earnings per share. After determining the indicators of each dimension, the research data was first subjected to KMO and Bartlett tests. The results are shown in Table 1, which shows that the Bartlett value is significant (P value close to 0) and the KMO value is greater than 0.5. Therefore, principal component analysis can be used. Secondly, after the principal component applicability test, relevant factors were extracted for analysis. It can be seen that the eigenvalues of the first three factors are all greater than 1, and the cumulative contribution rate reached 80.6%. Therefore, this article extracted three principal components as proxy indicators for enterprise performance for analysis.

Table 1. KMO and Bartlett test.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.696
Bartlett Sphericity Test	Approximate chi Square	2.28×10^5
	Freedom	36
	Significance	0.000

In terms of explanatory variables, this article measures it through the shareholding ratio of the largest shareholder (CR1) and the shareholding ratio of the top five shareholders (CR5). The higher CR1 and CR5, the higher the concentration of equity; The degree of equity balance is measured by the shareholding ratio of the largest shareholder (Z), where a larger Z represents a higher degree of equity balance.

In terms of control variables, six indicators are selected as control variables: (1) enterprise size (SIZE), taking the logarithm of total assets. (2) Corporate Growth Organization (GRO), (year-end total assets - beginning total assets)/beginning total assets (3) Revenue Growth Rate (IRB) (4) Board Size (DIR), natural logarithm of board size (5) Proportion of Independent Directors (IND), ratio of independent directors to board size (6) Average Age of Directors and Supervisors (AGE)

3.2 Data Sources and Sample Selection

This study takes Chinese A-share and H-share listed companies from 2009 to 2023 as the initial research sample, with a total of 476 listed companies in the power industry, including three sub industries: power generation, power grid, and power equipment. To avoid the impact of data outliers on the regression results, this paper truncated all continuous variables at the 1% and 99% positions of their distribution.

4 Empirical Result Analysis

4.1 Analysis of Basic Regression Results

Table 2 shows the regression results of equity concentration and equity balance on the operational performance of power enterprises. However, the results indicate that the CR1 and CR5 coefficients for equity concentration are not consistent, and the equity balance coefficient is not significant. The difference in results may be due to endogeneity issues.

Table 2. The impact of equity concentration and equity balance on business performance.

Variable	(1) Performance	(2) Performance	(3) Performance
CR1	0.658** (0.059)		
CR5		-1.305* (0.087)	
Z			-9.602 (1.952)
SIZE	0.756*** (0.009)	0.350*** (0.009)	0.391*** (0.009)
GRO	-0.083*** (0.002)	-0.084*** (0.002)	-0.084*** (0.002)
DIR	-0.132*** (0.042)	-0.103** (0.041)	-0.152*** (0.043)
IND	-0.395** (0.126)	-0.143 (0.124)	-0.602 (0.129)
Observations	7172	7059	7059

4.2 Instrumental Variable Regression

Considering the endogeneity issue, this article selects the Shareholder Responsibility Index (SRI) of the professional evaluation system for social responsibility reports of listed companies as the instrumental variable. It involves earnings per share, dividend financing ratio, dividend yield, etc., which are highly correlated with the explanatory variable equity concentration. The Wald test value of the exogeneity null hypothesis shows that it is significant at a 1% confidence level. At the same time, the F-value of the first stage in the two-stage estimation method is also significant. Therefore, the in-

strumental variable and the dependent variable are exogenous, and the empirical test results show that weak instrumental variables will not be generated.

$$\text{Performance}_{i,t} = \beta_0 + \beta_1 CR1'_{i,t-1} + \beta_2 \text{Controls}_{i,t-1} + \varepsilon_{i,t-1} + \beta_1(CR1_{i,t-1} - CR1'_{i,t-1}) \quad (3)$$

$$\text{Performance}_{i,t} = \beta_0 + \beta_1 Z'_{i,t-1} + \beta_2 \text{Controls}_{i,t-1} + \varepsilon_{i,t-1} + \beta_1(Z_{i,t-1} - Z'_{i,t-1}) \quad (4)$$

Table 3 shows the regression results of equity concentration and equity balance on business performance. From the results in columns (1) and (2), it can be seen that the coefficients of equity concentration are significantly positive, indicating that higher equity concentration can improve business performance. From the results in column (3), it can be seen that the coefficient of equity balance is significantly negative, indicating that the higher the equity balance, the less conducive it is to improving the operational performance of the enterprise.

Table 3. Instrumental variable regression.

Variable	(1) Performance	(2) Performance	(3) Performance
CR1	0.966***		
	(0.065)		
CR5		1.476***	
		(0.072)	
Z			-7.547***
			(1.721)
Observations	7172	7059	7059
First-stage F	165.74***	389.24***	225.02***
Wald test	15.26***	19.34***	21.85***

4.3 Further Analysis

To further investigate whether the impact varies under different types of enterprises, this paper divides listed enterprises into two categories based on whether they belong to state-owned enterprises. If they belong to state-owned enterprises, then nature=1, and if they belong to non-state-owned enterprises, then nature=0. The study is conducted through grouped regression and the addition of cross terms (nature $\times$ CR1, nature $\times$ Z). As shown in Table 4, the coefficient of nature $\times$ CR1 in column (3) is significantly positive, indicating that compared to non-state-owned enterprises, the higher the concentration of equity in state-owned enterprises, the more helpful it is to improve their business performance. The coefficient of nature $\times$ Z in column (6) is significantly negative, indicating that compared to state-owned enterprises, a higher degree of equity balance in non-state-owned enterprises can improve their operational performance.

Table 4. The impact of equity concentration and equity balance on technological innovation in state-owned and non-state-owned enterprises.

Variable	(1)Non state-owned enterprises	(2)State-owned enterprises	(3)Full samples	(4)Non state-owned enterprises	(5)State-owned enterprises	(6)Full samples
CR1	-1.277*** (0.082)	0.557*** (0.111)	1.338*** (0.080)			
Z				6.746*** (2.007)	-15.833*** (3.311)	-5.734*** (2.006)
nature×CR1			1.157*** (0.133)			
nature×Z						-10.54*** (3.917)
Observations	5317	1855	7172	5233	1826	7059
First-stage F	589.63***	285.45***	365.12***	165.49***	206.38***	387.09***
Wald test	74.25***	10.06***	12.26***	120.83***	18.42***	26.93***

5 Conclusion and Implications

5.1 Empirical Analysis Conclusion

Through empirical research, it has been found that the higher the concentration of equity in power companies, the better the company's operational performance; The higher the degree of equity balance, the less conducive to improving the business performance of the enterprise. However, there are differences in the nature of different types of enterprises. The increase in equity concentration in state-owned power enterprises has a greater promoting effect on business performance, while the balance of equity in non-state-owned enterprises has a greater promoting effect on business performance.

5.2 Empirical Analysis Provides Insights

Based on the empirical analysis of the equity structure of A-share and H-share listed power companies in China, and taking into account the characteristics of equity concentration and balance, the following insights are provided for the equity structure of different types of power companies:

Firstly, for state-owned power enterprises, it is recommended to optimize the equity structure, appropriately increase the concentration of equity, improve internal governance mechanisms, enhance decision-making efficiency, and respond more efficiently and quickly to the market situation of different types of power enterprises such

as coal-fired power, wind power, and photovoltaic power in terms of price fluctuations, cost changes, and supply changes.

Secondly, for units with a high level of marketization, it is recommended to reasonably reduce some equity holdings, supplement funding sources through issuing new shares, introducing strategic investors, etc., and leverage resource complementarity or industrial synergy effects to help improve business performance. At the same time, implementing stock incentives to managers and core technical employees appropriately can help stimulate their work enthusiasm and thus improve enterprise performance.

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