

# Analysis of Hospital Capital Structure and Financial Stability

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**Keywords:** Capital structure; Financial soundness; Financial risk; Leverage effect

**Abstract:** This study analyzes the impact of hospital funding allocation on their financial health, particularly in the context of economic uncertainty and policy changes, and how hospitals respond to these challenges. By collecting financial statements, industry reports and government data from multiple hospitals between 2018 and 2022, quantitative methods such as regression analysis, correlation analysis and variance analysis are used, combined with case studies, to analyze the changes in hospital financial robustness before and after capital structure optimization. The results show that the debt ratio of most hospitals increased slightly after optimizing the capital structure, but the capital adequacy ratio generally increased, reducing dependence on external financing and enhancing financial robustness. Specific data show that among the 50 hospitals, the capital adequacy ratio generally increased, especially for public and large hospitals, indicating that optimizing capital structure is crucial to improving financial robustness and risk resistance. The research conclusion emphasizes that improving capital adequacy ratio, optimizing financing structure and increasing the proportion of own funds are key strategies to improve the financial robustness of hospitals.

## 1. Introduction

The financial situation of a hospital will affect the quality of medical insurance and sustainable development, and is an important part of the public service system. Global economic fluctuations and the COVID-19 epidemic have put hospitals under financial pressure and debt pressure, especially high debt ratios and rising capital costs, which have exacerbated financial risks. Therefore, optimizing capital structure to enhance financial robustness has become the key. Most current studies focus on a single institution or region, lacking a comprehensive analysis of the mechanism of action of capital structure, especially research on the differences between different types of hospitals is relatively scarce.

This study explores the impact of hospital funding arrangements on economic health based on financial data from 50 different types of hospitals between 2018 and 2022. By constructing an analytical framework including variables such as debt ratio, capital adequacy ratio and capital cost, combined with regression analysis and case studies, the role of capital structure optimization on financial robustness is revealed. The study shows that reasonable control of liabilities, improving capital adequacy ratio and reducing capital costs are key strategies to enhance the financial robustness of hospitals.

## 2. Related Work

As the global economic situation continues to evolve, the financial stability of various industries has been profoundly affected. Many scholars have explored the impact of various factors on financial soundness through different research methods. Swalih et al. used the Z-score formula to measure the financial soundness of the Indian automobile industry<sup>[1]</sup>. Tran et al. empirically evaluated the accounting and market risks of banks during the COVID-19 pandemic and found that the epidemic led to increased accounting risks and increased volatility of returns in banks, and government response measures played an important role in alleviating risks and stability in the banking industry<sup>[2]</sup>. Kirimi et al. studied and analyzed the moderating effect of bank size on the

relationship between financial soundness and financial performance of Kenyan commercial banks<sup>[3]</sup>. Arzova and Sahin investigated the impact of financial soundness variables on bank performance in emerging countries<sup>[4]</sup>. Khalil and Boulila examined the characteristics of the Shariah Board and empirically diagnosed its impact on the financial soundness of Islamic banks<sup>[5]</sup>. Moreno et al. compared six different Z-score methods to study which one is most suitable for insurance companies<sup>[6]</sup>. CHIHI and KHALIL used panel data regression to analyze the impact of board characteristics on the financial soundness of Islamic banks<sup>[7]</sup>. Mahmud and Rahman evaluated and compared the financial soundness of Islamic and conventional PCBs operating in Bangladesh from 2015 to 2019 based on the CAMEL method<sup>[8]</sup>. Siska analyzed the financial soundness of PT Bank Jago Tbk under the CAMEL framework and found that the bank performed well in terms of capital and asset quality, but still faced challenges in profitability and liquidity. In the future, it plans to improve financial performance by increasing loans<sup>[9]</sup>. Daoud and Kammoun examined the impact of the COVID-19 pandemic on the soundness and dynamics of Islamic banks in eight countries, including Saudi Arabia, the United Arab Emirates, and Bahrain, and found that banks in different regions responded differently. Some regions, such as Saudi Arabia and Southeast Asian countries, remained stable, while other regions faced challenges. Policy support measures showed significant improvement effects<sup>[10]</sup>. Although the above studies provide rich empirical analysis, most of them focus on a single region or a specific industry, lacking cross-national or cross-industry comparative studies. The innovation of this study is that it provides a more comprehensive perspective on financial soundness by integrating the analysis of multiple countries and different industries.

### 3. Methods

#### 3.1 Data Collection

The data sources for this study mainly include hospital financial statements, industry reports and government statistics. Hospital financial statements provide information such as income, expenditure, and balance sheet to help analyze capital structure and financial soundness; industry reports reflect the macroeconomic and policy environment and reveal the impact of external factors; government statistics provide operating data, policy support and economic measures to supplement the analysis. The study selected hospitals from multiple regions and different sizes, including public, private, and general hospitals, to ensure sample diversity and representativeness. The data spans from 2018 to 2022 to ensure timeliness and representativeness. Table 1 shows the types of sample hospitals and data overview:

Table 1. Sample hospital types and data overview

Hospital Type	Number of Hospitals	Sample Size (Total Assets, Billion RMB)	Data Time Span
Public Hospitals	15	150-500	2018-2022
Private Hospitals	10	50-300	2018-2022
General Hospitals	8	100-400	2018-2022
Small Hospitals	12	20-80	2018-2022
Large Hospitals	5	500-1000	2018-2022

#### 3.2 Analysis Methods

This study will use a combination of quantitative and qualitative analysis to comprehensively explore the impact of hospital funding arrangements on their financial health. First, this study will use statistical methods such as regression analysis, correlation test and variance analysis to evaluate the relationship between various financial variables. The relationship between debt ratio and net profit margin is explored through regression analysis:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \epsilon_{it} \quad (1)$$

Among them,  $Y_{it}$  is the net profit margin of hospital  $i$  at time  $t$ ,  $X_{it}$  is the debt ratio of the

hospital,  $\beta_0$  is the constant term,  $\beta_1$  is the regression coefficient, and  $\epsilon_{it}$  is the error term. Correlation analysis is used to detect the correlation between variables, while variance analysis helps identify differences in financial robustness between different types of hospitals. Qualitative analysis deeply analyzes the actual operations and challenges faced by different types of hospitals in capital structure decisions. In terms of model construction, the Z-score model is used to measure the financial health of hospitals. The calculation formula is as follows:

$$Z = 1.2 \times X_1 + 1.4 \times X_2 + 3.3 \times X_3 + 0.6 \times X_4 + 1.0 \times X_5 \quad (2)$$

Among them,  $X_1$  to  $X_5$  are different financial ratios that reflect the financial stability of the hospital. By combining the above models and methods, the study can comprehensively and systematically reveal the impact of capital allocation on hospital financial health.

## 4. Results and Discussion

This study collected key financial data of 50 hospitals before and after optimization and analyzed the impact of structural changes on the financial health of hospitals. The experimental design includes three links: data collection, indicator calculation and statistical analysis. The financial statement data of the hospital is collected, and the core indicators such as debt ratio, capital adequacy ratio and capital cost are extracted. The hospitals are grouped by "before optimization" and "after optimization" to compare and analyze their changing trends and magnitudes. Based on data summarization and classification, the changing patterns of debt ratio and capital adequacy ratio are identified, and the correlation is discussed in combination with financial stability indicators.

### 4.1 The Relationship Between Capital Allocation and Financial Health

The debt ratio is crucial to the financial health of hospitals in their capital structure. Although a high debt ratio can promote development, it also increases financial risks, especially during economic downturns. In contrast, own funds guarantee financial security, reduce debt burden, and enhance debt repayment capacity. External financing meets demand but comes with higher risks. Optimizing capital allocation requires controlling liabilities, increasing own funds, balancing financing methods, and improving capital management efficiency in order to achieve steady development and sustainable operations. Figure 1 shows the changes in the debt ratios of 50 hospitals:

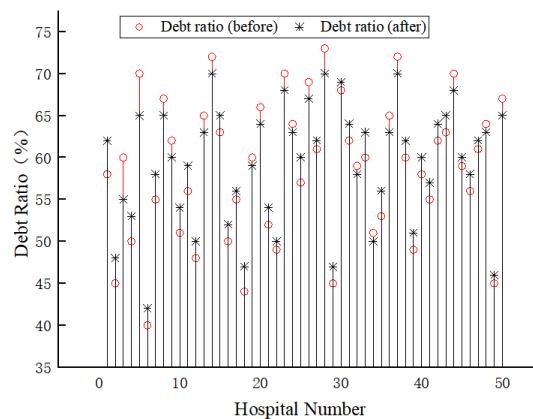


Figure 1. Comparison of hospital debt ratio before and after

The figure shows the changes in the debt ratios of 50 hospitals. The debt ratios of most hospitals increase, ranging from 2% to 4%, such as Hospital No. 1 (58% increased to 62%) and Hospital No. 5 (70% decreased to 65%). The debt ratios of a few hospitals decrease or remained stable, such as Hospital No. 34 (51% decreased to 50%). Hospitals with higher debt ratios has smaller changes, while hospitals with lower debt ratios do not change significantly. Although the debt ratios of most hospitals increase, the changes are small, indicating that hospitals may rely more on external

financing when facing economic pressure or expansion needs. These changes reflect the dynamic adjustment of hospital capital structure, which may be affected by market environment, policy changes and hospital development strategies.

#### 4.2 The Impact Mechanism of Hospital Capital Allocation on Financial Stability

The solvency ratio is an important indicator to measure the hospital's ability to resist risks. A low ratio indicates that the hospital relies on external financing, which increases financial risks. The analysis of the capital adequacy ratio of 50 hospitals shows that after optimizing the capital structure, most hospitals have improved their capital adequacy ratio, reduced their reliance on external financing, and enhanced their financial stability. Improving the capital adequacy ratio helps reduce financial risks and ensure the stable operation of hospitals during economic fluctuations. Figure 2 shows the changes in the capital adequacy ratio of 50 hospitals before and after.

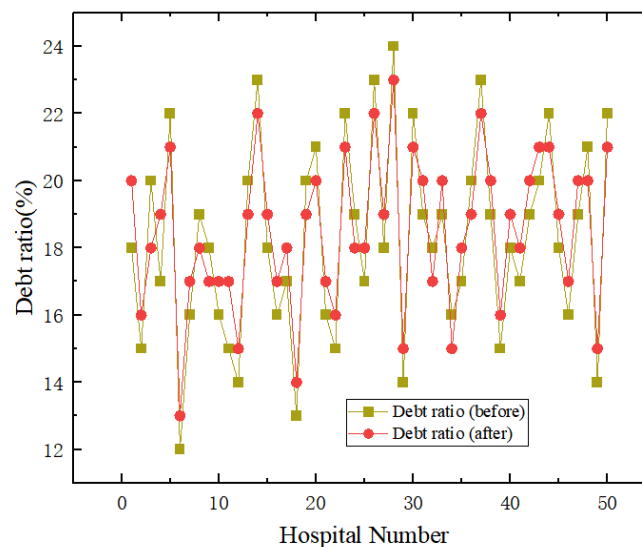


Figure 2. Comparison of hospital capital adequacy ratio before and after

The capital adequacy ratio of most hospitals has increased after optimizing their capital structure, and the overall trend is positive. The capital adequacy ratios of hospitals No. 1, 4, 7, 11, 15, etc. have increased significantly, indicating that they have reduced their reliance on external financing and enhanced their financial stability by increasing their own capital or optimizing their capital structure. However, the capital adequacy ratios of hospitals No. 3, 9, 32, 34, etc. have not changed much or have decreased, indicating that they face challenges in capital operation. In general, improving the capital adequacy ratio can help reduce financial risks, enhance risk resistance, and ensure long-term stable operations.

#### 5. Conclusion

This study analyzed the financial data of 50 hospitals and revealed the significant impact of capital structure optimization on financial robustness. The study showed that moderately controlling liabilities, improving capital adequacy ratios and reducing capital costs are key strategies to improve hospital financial robustness. In particular, public and large hospitals have reduced their reliance on external financing and enhanced their ability to resist risks by optimizing their capital structure. The contribution of the study is that it fills the research gap on the mechanism of the impact of capital structure on hospital financial robustness through comparative analysis of multiple types of hospitals. However, the study still has limitations in sample areas and can be expanded to more regions and different types of medical institutions in the future. By further optimizing financing strategies and fund management, hospitals can achieve more robust financial development.

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