Is There Gap between Operating Performance of Systemically Important and Non-Systemically Important Banks in China?-- Empirical Study based on Public Panel Data after Release of List

DAODI YAO
Department of Business Administration,
Sejong University,
Seoul 05006,
KOREA

Abstract: - On September 22, 2023, the People's Bank of China (PBOC) and the State Administration for Financial Regulation (SAFS) released the latest list of China Systemically Important Banks (D-SIBs). This study aims to analyze whether there is a gap in operational performance between (D-SIBs) and (D-SIBs) under additional regulation. The research method uses independent sample t-tests in statistics and the AHP_DEA model for financial bank operational performance. The research results indicate that there are differences in the operational performance of systemically important banks and non-systemically important banks in certain indicators. systemically important banks have a larger share in the entire banking system, and systemically important banks face more regulatory constraints than non-systemically important banks. This makes the cost of capital restructuring for systemically important banks higher, thereby reducing the speed of capital restructuring. However, further analysis indicates that there is no significant difference in operational performance and risk control between banks with systemic importance and nonsystemic influence. In view of this, systemically important banks must invest in technology and innovation to improve operational efficiency.

Key-Words: - Systemically Important Banks, Non-Systemically Important Banks, Business Performance.

1 Introduction

China's financial system is dominated by indirect financing, and banks are the mainstay of indirect financing. In reality, the total assets of China's financial industry are around RMB 300 trillion, of which the total assets of the banking industry are RMB 268 trillion, accounting for 89% of the financial industry. Listed banks are the representatives of the banking industry. As of August 31, 2023, 59 Chinese listed banks exist in China (including A-share and Hong Kong shares). Among them are 6 large state-owned commercial banks, 10 joint-stock commercial banks, 30 urban commercial banks, and 13 rural commercial banks. The 59 listed banks can be further categorized into 15 A+H-listed banks, 27 pure A-share-listed banks, 17 pure H-share-listed banks, and the number of A-share-listed Chinese banks is 42. The large size and volume of assets of domestic banks and the existence of cross-regional and cross-industry situations are relatively standard. Since the global financial crisis in 2008, macro-prudential policies have gradually become the central tenet of improving the financial regulatory system, [1].

Among them, strengthening the supervision of systemically important financial institutions is crucial for maintaining financial stability and enhancing prudential management. Thus, the Additional Supervisory Requirements for Systemically Important Banks (for Trial Implementation), a critical regime issued by the China Banking Regulatory Commission (CBRC), is explained in detail from 2021 onwards. Influential banks must meet additional capital requirements of 0.25%,0.5%,0.75%,1%, and 1.5%. The People's Bank of China (PBOC) and the State Financial Supervision and Administration Bureau (SFSAB) have conducted a systemic importance evaluation of the 30 selected banks, which is published annually and provides additional supervision of this category of banks, internal capital constraints mechanisms, enhanced liquidity, significant risk exposures, and risk statement summaries, [2]. At the same time, developing a recovery and treatment plan for the treatability assessment is necessary.2023 On September 22, 2023, the latest list for the current year was published, with a total of 20, whose combined assets accounted for 61% of the total

assets of China's banking sector (the banking sector accounted for RMB 379.39 trillion of the total assets of the financial sector institutions as published by the People's Bank of China (PBoC) at the end of 2022), and of which, except for GFB, all are A-share-listed Banks.

Due to its large scale, it has a high degree of structural complexity and close connection with other financial institutions. It is essential in the whole financial system, and if there is a severe risk resulting in the decline of the enterprise's viability, it will negatively impact the whole financial system and the real economy, [3]. Therefore, an in-depth study of China's banking industry is essential and of great practical significance for its stability and safe development. The continuous strengthening of the state's supervision of bank capital is ultimately reflected in the capital adequacy ratio of banks, which increases capital or improves the quality of assets and reduces the proportion of risky assets. However, it is difficult to achieve the goal of increasing capital in the short term, so systemically important banks tend to make adjustments to their operating structure by cutting high-risk interest business and improving low-risk non-interest business to realize the reduction of risky assets and proportion, [4]. Current research on systemically important banks by scholars mainly from the perspective of regulation on how to prevent the risk of "too big to fail" research, respectively, from the quantile regression based on the static Covar model for the identification of systemically important banks, the identification of systemically important banks in China to conduct a comparative study, some scholars on the identification of systemically important banks in China to conduct an empirical study, and some scholars on the identification of systemically important banks in China to conduct a comparative study, [5]. Some scholars have empirically analyzed the identification of systemically important banks in China and concluded that the entropy value method can identify several large state-owned commercial banks and some joint-stock commercial banks as the current systemically essential banks in China, [6]. However, up to now, there is little research in the academic community on whether there is a gap between the operational performance of systemically important banks and that of non-systemically important banks after they are subject to additional regulatory requirements. Therefore, there is a lack of research on the question, "Is the operating performance of the 20 systemically important banks in China significantly different from that of the 23 listed non-systemically important banks?" There is some value in researching the question.

2 Background of the Study

In recent years, along with the deepening of the reform of the financial system, the emergence of a series of issues, such as "de-mediatization" and "marketization of interest rates", has had a more significant impact on China's commercial banks. After the last global economic crisis, the concept of "systematic banking" has become well-known and more common in recent years. Banks are a category of financial institutions that are large, complex, and vulnerable to external risks, [7]. Once they fail, they may have a domino effect on the entire financial system, causing a significant impact on the real economy and even triggering an economic crisis. However, the overall value of a bank cannot be fully reflected in the size of individual banks and the complexity of their business. However, the current financial system in China still has many problems, and some departments' internal control mechanisms are incompatible with the market economy's development, making its development not sound enough, [8]. In this context, to achieve "maximum efficiency", the financial holding company adopts the operation mode, which can expand the scope of operation, improve operational efficiency, and prevent the spread of risk. Using net interest rate, input-output ratio, operating income growth rate, and other indicators can comprehensively reflect the company's profitability and solvency. Modern scholars use "profitability", "operation", "debt service", and "future development" to evaluate the enterprise, [9]. Evaluation. Mutual contagion between real and financial risks reduces the trust of market participants in the financial system and, in severe cases, may lead to bank runs or panic selling of assets. At the same time, the rapid spread, diffusion, and outbreak of systemic financial risks will be accelerated through various related networks. The performance evaluation system is a specific application in the banking business, [10].

In China, the regular operation of the financial system has a vital significance to the development of the macro-economy. The operation and management of the financial system and the operational efficiency of the development of the whole society impact it. With the integration of the world economy, the number of financial banks in our country is also increasing. Nowadays, several banking institutions coexist in the pattern of mutual competition. The traditional "indicator method" based on individual correlation is no longer suitable,

and the network analysis method based on global correlation is better adapted to the current regulatory needs, [11]. However, with the changes in financial patterns, the global network constructed solely on micro-financial data can no longer truly reflect the complex network within the financial system, and its "time-varying" characteristics are pronounced here. At the same time, insurance companies, finance companies, leasing companies, stock markets, investment funds, etc., and even those non-financial institutions that can provide financing intermediary, payment, and settlement services for banks will compete with banks. Therefore, a gap comparison between the operating performance of systemically important banks and that of non-systemically important banks is a practical necessity.

3 Research Methodology

3.1 Systemically Important Bank (SIB) Identification

The failure of the core financial institutions (SIFS) in this system would significantly impact the financial system as a whole and severely negatively impact the real economy. SIFIS can be divided into two types: one is a large, highly indebted institution whose asset losses will spread to the entire financial system and have a severe negative impact on the overall economy; the other scenario is that the failure of certain large, more closely interconnected financial institutions will have a domino effect on all parties to the trade. SIBs generally refer to banks with significant operations, high business complexity, low substitutability, and strong linkages with other financial institutions. Currently, academic methods for identifying systemically important banks (SIBs) are divided into two main categories: network analysis method and composite index method. The network analysis method is based on the inter-bank debt network model and identifies systemically essential banks in terms of loss-shock contagion risk measurement and network topology properties, [12]. The loss-shock contagion risk measure is based on the magnitude of the contagion risk caused by the loss of assets of other banks in the system due to the failure of a bank as a measure of the bank's systemic importance. The composite index method identifies systemically essential banks through the selection of indicators and the determination of weights and is a standard method used by international and domestic regulators to identify SIBs. The FSB has published

an annual list of G-SIBs since 2011, which scores banks on systemic importance based on five core tier-1 indicators: complexity, substitutability/financial infrastructure, cross-border operations, connectedness, and size. The FSB has also published a list of banks that are "excessively connected" to the rest of the system, including banks that are not "excessively connected". "Overconnectedness" may be the most direct factor contributing to financial risks in China's financial system, closely related to economic development. The domestic central bank and CBIRC refer to the FSB and Basel Committee's SIBs scoring criteria to develop the Assessment Methodology, which scores 30 domestic banks on four dimensions, namely, complexity, substitutability, size, and connectedness, and ultimately identifies 19 banks as China's systemically important banks (D-SIBs).

There are three main methods for its indicators: network analysis method, collaborative risk modeling method, and indicator method. Then, based on a stable external financing environment and internal risk supervision perspective, the relationship between direct and indirect financing caused by public risk factors was studied. Stock prices measured the systemic importance of banks at different times, mainly due to the varying degrees of impact of credit risk between financial institutions at different levels, [13]. There is usually a corresponding reaction in stock prices. The transmission path of risk should be a convergent structure, with "diffusion" and "absorption" at its core; on the contrary, if the risk transmission path is of the discrete type of "diffusion", the financial system is unstable. On the contrary, if the risk transmission path is discrete "diffusion", the financial system is unstable. However, most existing studies have been conducted from the perspective of leverage, asset size, and maturity mismatch.

3.2 Bank Operational Performance

Revised total asset return indicators (capital preservation and appreciation rate, sales profitability, cost, and expense profitability) and adjusted current asset turnover indicators.

In addition, enterprise performance evaluation is based on indicators such as asset operation status, financial efficiency status, development ability status, and solvency status of the enterprise. Among these indicators, the Financial Efficiency Index is an important indicator that reflects a company's profitability, [14]. In addition, the Asset Operating Condition Index reflects the ability of a company to earn profits from all assets and is an essential financial management tool, [15]. The solvency

index measures a company's ability to repay its debts when they mature. The development capacity index is a measure of a firm's potential to expand the scale of its operations based on its development, such as operating income growth rate, capital preservation and appreciation rate, capital accumulation rate, operating profit, total assets, technology investment ratio, three-year capital, and three-year operating income. Whereas there are several rating methods for evaluating bank performance, the Wall Score method is a process of calculating the score by using the weights assigned to seven financial indicators, such as quick ratio, current ratio, equity ratio, etc., to obtain the corresponding standardized ratio values, and then comparing the actual ratio values with the standardized ratios to arrive at the relative ratios, to multiply the relative ratios by the weights they are assigned in turn to obtain the overall score, [16]. In essence, many financial indicators are linearly linked, and the resulting values are used to measure the enterprise's financial position. DuPont analysis: from the perspective of return on equity, the return on net assets is broken down item by item into the multiplication of multiple financial ratios, which breaks down the roles of the various influencing factors, prompting corporate managers to gain an in-depth understanding of the factors affecting the return on net assets, and to analyze the correlation among the factors; however, this method is not suitable for evaluating commercial banks from a financial perspective, [17]. However, this method assesses commercial bank performance from a financial perspective and does not comprehensively reflect the effect. Balanced Scorecard: Compared with the DuPont analysis method, which focuses too much on short-term financial data, this method breaks down the core objectives of the enterprise and conducts inter-temporal assessment, which is conducive to the rationalization of the relationship between long-term and near-term goals, operational efficiency indicators and non-operational efficiency indicators.

3.3 AHP_DEA Business Performance Model for Financial Banks

The APH_DEA model classifies the financial banks' operation performance into three levels: based on the analysis method of APH_DEA, the operation status of China's financial banks is analyzed and evaluated from three dimensions. The first level is the decision-making level, which evaluates the business performance of commercial banks; the second level is the management level, which evaluates the business performance of commercial

banks in three dimensions from the viewpoint of safety, liquidity, and profit; and the third level is the specific indexes, such as capital adequacy ratio, non-performing loan ratio, borrowing ratio, liquidity ratio, and deposit-to-lending ratio, [18]. Liquidity criteria can be used to select financial indicators such as non-performing loan ratio, borrowed funds ratio, current ratio, liquidity ratio, deposit-to-loan ratio, interest recovery ratio, return on capital, etc... In contrast, profitability is measured by non-performing loan ratio, current ratio, deposit-to-loan ratio, interest recovery ratio, return on capital, etc., and these indicators intersect.

Select the BCC model in DEA and use mathematical programming to calculate the relative efficiency between the evaluated organizations. This involves comparing the evaluated organizations with the reference decision-making unit to obtain relative efficiency, [19].

Applicable to the measurement of relative efficiency values at different levels of compensation, the APH-DEA modeling process is shown in Fig. 2. The first step is to develop a research hypothesis that systemically important banks have significant assets. Systemic-importance banks with important business operations face the challenge of maintaining high operational efficiency. However, investments in technology and process optimization by systemically important banks can help manage operational costs. In China, due to the needs of China's economic system reform, research on this topic is still in its early stages. Due to its more direct operation and strict regulation. Based on the above analysis, a research hypothesis is proposed that there is no significant difference in operational performance between systemically important banks and non-systemically important banks.

Research Methodology Using an independent samples t-test is an effective statistical method for comparing the differences between two groups of data in quantitative research, and it is appropriate to use an independent samples t-test to discuss the operational performance between systemically essential banks and non-systemically important banks in China by comparing whether there is a statistically significant difference between the two groups of data in terms of the mean value, [20]. It is mainly supplemented by databases such as Wind and CSMAR and relevant data disclosed in each bank's annual reports. Statistical analysis was done using SPSS statistical software. In this paper, four indicators, namely, earnings per share, return on total assets, return on net assets, and growth rate of net profit, were selected to evaluate the company's

operating performance, and two indicators, namely, non-performing loan ratio, and provision coverage ratio, were used for risk management. Systemically essential and non-systemically important banks, totaling 43 banks, were divided into two groups.

Forty-three Chinese banks were selected as samples to construct panel data for 2021-2023. The sample selection is divided into a sample group and a control group. Sample group: 20 Chinese systemically essential banks were selected as the sample group in 2023, including 6 state-owned commercial banks, 9 joint-stock commercial banks, and 5 urban commercial banks. According to the systemic importance score from low to high, they are China Everbright Bank, China Minsheng Bank, Ping An Bank, Huaxia Bank, Bank of Ningbo, Bank of Jiangsu, Bank of China, Guangfa Bank, Bank of Shanghai, Bank of Nanjing, Bank of Beijing, China CITIC Bank, Pudong Development Bank, Postal Savings Bank of China, Bank of Communications, China Merchants Bank, Industrial Bank of China, Industrial and Commercial Bank of China, Bank of China, China Construction Bank, Agricultural Bank of China.

Control group: 23 non-systemically important listed banks in China are selected as the control group in FY2023: Bank of Lanzhou, Bank of Jiangyin, Zhangjiagang Bank, Bank of Zhengzhou, Bank of Qingdao, Qingdao Agricultural and Commercial Bank, Bank of Suzhou, Bank of Wuxi, Bank of Hangzhou, Bank of Xi'an, Yu Agricultural and Commercial Bank, Bank of Changshu, Bank of Xiamen, Ruifeng Bank, Changsha Bank, Bank of Qilu, Shanghai Agricultural and Commercial Bank, Bank of Chengdu, Zijin Bank, Zheshang Bank, Bank of Chongqing, Guiyang Bank, and Sunon Commercial Bank.

Data collection of earnings per share, return on total assets, return on net assets, net profit growth rate, and non-performing loan ratio, provision coverage ratio in the last three years, based on which carry out the statistical analysis of the total distance, minimum, maximum, mean, standard deviation, variance, etc. in different years, carry out the statistical analysis of the test of normality and chi-squareness to find abnormal data and deal with them accordingly. Carrying out independent samples t-tests to objectively present the results of the t-statistics and P-values of the tests; if the P-value is less than the chosen level of significance (e.g., 0.05), it means that the difference between the means of the two groups is statistically significant; otherwise, it means that there is no significant difference.

This article will include descriptive statistical analysis, inferential statistical analysis, and correlation analysis, calculated correlation types (such as Pearson, Spearman), and whether they are used to evaluate the strength and direction of relationships. A threshold can be specified to define weak/strong correlation. Providing transparency in this way makes statistical analysis more robust and replicable.

4 Conclusion

4.1 Trends and Related Gaps in the Performance of Systemically and Non-Systemically Important Banks

4.1.1 Descriptive Statistics

In order to understand the differences between the sample group and the control group in each research variable, descriptive statistics were conducted on the raw data, and statistical software SPSS was used for analysis. It was observed that there was a significant difference in earnings per share between systemically important banks and non-systemically important banks.

In terms of the correlation between EPS, ROE, NPL, and NPL, the average earnings per share of systemically important banks in the past three years were 1.32, 1.50, and 1.64, respectively, while the average earnings per share of non-systemically important banks were 0.78, 0.86, and 0.95, respectively. This seems to indicate that "the larger the bank, the more profitable it is." However, in-depth analysis reveals that although the nature of the bank's business is the same, due to differences in the number of common shares, the bank's profits are not as good as those of other banks. Therefore, this single indicator cannot directly prove the significant difference in the operating performance of these two groups of banks but needs to be combined with other indicators for comprehensive observation.

The descriptive statistics of EPS are shown in Table 1.

The Return on Equity (ROE) for the last three years shows that the ROE of systemically important banks is 10.26%, 10.47%, and 10.35%, while that of non-systemically important banks is 10.16%, 10.27% and 10.33% respectively. There is no significant difference between the two groups of banks on this indicator, so it is impossible to conclude that there is a significant difference between systemically important and non-systemically influential banks in terms of

performance. ROE descriptive statistics are shown in Table 2.

Table 1. EPS descriptive statistics

Variable # year	V1	N	Mean	Std. Deviation	Std. Error Mean
EPS#2022	1	20	1.6405	1.2479	0.2790
	0	23	0.9525	0.5739	0.1197
EPS#2021	1	20	1.5055	1.8264	0.2421
	0	23	0.8676	0.4569	0.0952
EPS#2020	1	20	1.3230	0.8627	0.1929
	0	23	0.7877	0.4137	0.0863

Table 2. ROE descriptive statistics

Variable # year	V1	N	Mean	Std. Deviation	Std. Error Mean
ROE#2022	1	20	10.3519	2.5350	0.5668
	0	23	10.3333	2.6479	0.5521
ROE#2021	1	20	10.4711	2.3403	0.5233
	0	23	10.2753	2.0367	0.4247
ROE#2020	1	20	10.2680	2.1712	0.4855
	0	23	10.1692	1.9908	0.4151

Table 3. NPL provision coverage descriptive statistics

Variable # year	V1	N	Mean	Std. Deviation	Std. Error Mean
NPL Provision coverage#2020	1	20	245.29	108.96	24.36
	0	23	288.45	88.05	18.36
NPL Provision coverage#2021	1	20	264.71	113.82	25.45
	0	23	327.49	119.79	24.97
NPL Provision coverage##2022	1	20	263.41	106.06	23.71
	0	23	351.08	140.62	29.32

Table 4. NPL Ratio descriptive statistics

Variable # year	V1	N	Mean	Std. Deviation	Std. Error Mean
NPL Ratio#2022	1	20	1.256	0.2848	0.0637
	0	23	1.181	0.3721	0.0776
NPL Ratio#2021	1	20	1.280	0.2951	0.0660
	0	23	1.243	0.2953	0.0616
NPL Ratio#2020	1	20	1.397	0.3094	0.0692
	0	23	1.357	0.2802	0.0584

In terms of risk control indicators, the non-performing loan (NPL) ratios of systemically important banks were 1.39%, 1.28%, and 1.25% in the last three years, while those of non-systemically important banks were 1.35%, 1.24%, and 1.18%, respectively, and there is no significant difference in this indicator either. Finally, in terms of provision coverage ratio, the provision coverage ratio of systemically essential banks was 245.28%, 264.71%, and 263.41% in the last three years, while it was 288.44%, 327.49%, and 351.07% for non-systemically important banks, respectively. Within the first two years of data analysis, this indicator did not show a significant difference, but in the last year, 2022, the statistics showed a significant difference. There are two main reasons for this

difference: first, since the 2020 Chinese government work report, the central government has been committed to promoting financial institutions to reduce financing costs and promote the development of the real economy, especially requiring large banks to support the development of small and micro enterprises, and large banks have developed small and micro enterprises with better business conditions into their available customers through lower interest rates, which has led to small and medium-sized commercial banks facing higher asset risk, requiring more provision coverage to cope with it; on the other hand, the impact of the epidemic on the real economy is gradually showing up, especially the value of a property, which is the primary collateral of banks, is declining, which

makes it necessary for small and medium-sized banks, which bear more significant business risks, to have adequate provision coverage to cope with the situation. The NPL Provision coverage descriptive statistics are shown in Table 3, and the NPL Ratio descriptive statistics are shown in Table 4.

From this analysis, it can be concluded that although systemically essential and non-systemically important banks show significant differences in specific financial indicators, these differences do not directly indicate that they are significantly different in terms of overall operating performance and level of risk control.

4.1.2 Trends and Differences

Bank capital is the funds invested by the shareholders, that is, the funds held by the shareholders, including capital, surplus, surplus reserves, and undistributed profits. The primary funding sources for a bank are debt, owner's equity, and proprietary equity. Therefore, debt financing is a method that can reduce a bank's overall cost of funds and increase profits. However, as a bank's debt ratio increases, its financial leverage and operational risk increase. With too much financial leverage, a bank may fail due to its inability to repay its debts, and while debt capital can reduce the cost of capital, it can also increase a bank's operational risk. Equity investment is risk-free, but it will increase the bank's capital cost. When the debt ratio changes, the risk faced by the bank also changes. The cost of financing also changes, which affects the operational performance of the bank. EPS is an essential measure of the value of an investment and a basis for analyzing the value per share, which is an important indicator that provides a comprehensive picture of the profitability of systemically and non-systemically essential banks, which reflects over a period, a portion of a bank's net profit, which is the after-tax profit it generates, and many investors pay close attention to earnings per share when examining a bank's financial situation. Earnings per share is a bank's net assets divided by its total equity, is a measure of current earnings per share and annualized return, and is the most intuitive way to measure a bank's operating conditions. ROE is average net income divided by shareholders' equity, and this indicator reflects the level of return on shareholders' equity, providing a measure of the efficiency of a company's use of its capital, with higher indices indicating a higher return on investment. This indicator reflects the ability of one's capital to earn net income.

NPL is an important indicator for assessing the safety of assets; a higher NPL ratio indicates that non-performing loans account for a more significant proportion of total loans, and a lower NPL ratio indicates that the financial institution is safer. NPL Provision Coverage From a practical point of view, the ratio of the allowance for doubtful loans to the allowance for bad loans issued by a bank determines whether a bank has adequate credit provisioning. This indicator reflects the risk level of bank credit and the socio-economic environment and credit conditions at the macro level. According to the "Risk Rating System of Joint-Stock Commercial Banks (Provisional)", the provision coverage ratio is the ratio of actual lousy debt provisions to non-performing assets, and the ideal condition of this indicator is 100%. The trend of the performance of EPS, ROE, NPL, and NPL Provision Coverage is shown in Fig. 1.
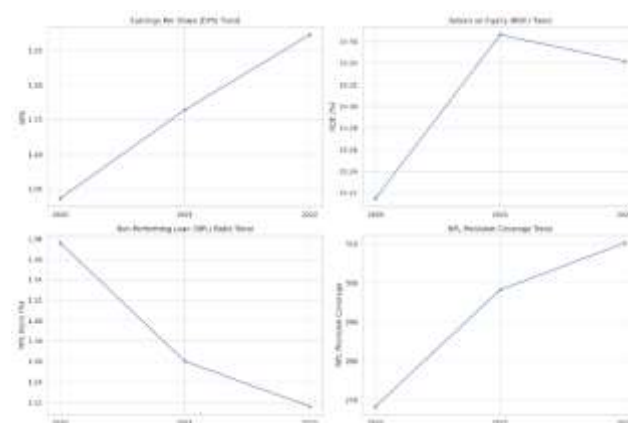

Fig. 1: EPS, ROE, NPL, NPL provision coverage performance trends

The correlation difference judgment matrix obtained the weighting of the importance of each program by comparing and calculating the relative importance of two pairs of factors for each element in each level and then obtained the guidelines for the preferred program. Then, the relative importance of each influential factor was used to analyze each indicator's weight. At both the macro and micro levels, it will affect not only the business performance of the system and non-system vital banks but also the business performance of the financial industry in which the system's critical financial institutions are located, as well as the business performance of banks in different systems and different systems. The primary and secondary indicators of the regional financial system are the same as the traditional statistical framework of D-SIBs. The indicators of external claims daoi external debts are added at the level of cross-administrative activities to collect data on the structural characteristics of the region, to comprehensively

reflect the relationship between internal and external claims and debts in the region, and to evaluate the impact of the risk and its scope of propagation. In other aspects, information collection on their regional characteristics is emphasized while meeting the overall information requirements. The APH model has only one level, and there is no need to check the compatibility of the judgment matrix and the eigenvectors located in which position also reflect the superior and inferior values of the performance of the commercial bank as a way to evaluate these commercial banks more precisely. To determine the conditions under which the matrix can realize the compatibility test, the order of a judgment matrix can be expressed in terms of a specific numerical value, and under certain conditions, the judgment matrix satisfies the following conditions, or else it needs to be corrected appropriately. Combining the results of the model processing derived from the method with the method can make up for the shortcomings of the model in different commercial banks in the performance evaluation to understand the differences between systemically important and non-systemically influential bank business performance, the relevant difference judgment matrix, as shown in Fig. 2.
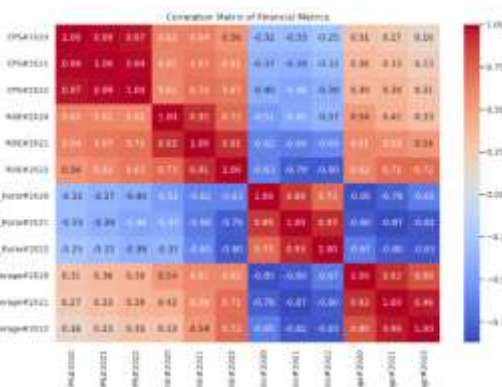

Fig. 2: Relevant difference judgment matrix

4.2 Analysis of Consistent Trend Tests of Financial Business Performance of Rotating Components in Years

The interconnection between banks is one of the main ways to realize the risk contagion channel and the inter-bank network is the most intuitive manifestation of the inter-bank connection. Traditional complex networks mainly include two categories: regular and random networks, while completely regular and random networks are not standard in practical applications. The construction of scale-free networks follows two mechanisms: one is the growth mechanism, i.e., new nodes join the

network sequentially, which makes the network size increase; the other is that, on this basis, the newly joined nodes tend to establish connections with high-value nodes. The interbank lending network is a critical link in the study of risk contagion and systemic risk among banks, and analyzing its structural characteristics is the key to in-depth exploring the risk transmission path and systemic risk of the interbank lending network. The power law index of out-degree value shows an overall increasing trend. The power law index of in-degree value shows an overall decreasing trend, indicating that the out-degree value of high out-degree/in-degree banks accounts for a decreasing proportion of the overall degree value.

In contrast, the in-degree value accounts for a higher proportion of the overall degree value, which suggests that China's large banks are gradually fading out their role as capital outflows in the interbank market and gradually strengthening their role as capital inflows. At the same time, meeting the requirements of aggregate data, the author focuses on the collection of regional characteristic data, classify and collect the data within and outside the region, especially the assets, liabilities, and other related indexes within the financial system, and make a detailed portrayal of the transaction links between systemically essential banks and various financial institutions within the region, to portray better the flow and application of funds of the banks in the inter-financial institutions. Thus, the entire transaction structure of banks in the financial system is better portrayed, and the association and dependence of banks in the financial system are comprehensively reflected. When the liquidity supply side suffers an external asset shock, the liquidity contraction due to asset losses will make it reduce its short-term funding support to debtor banks through the interbank network, which in turn will make its debtor banks similarly fall into the plight of illiquidity, leading to the failure of more banks in the entire banking system, and causing a more severe impact on the systemic risk, as shown in Fig. 3 of the Consistency of Trends in Financial Operating Performance Test (I), which shows that.
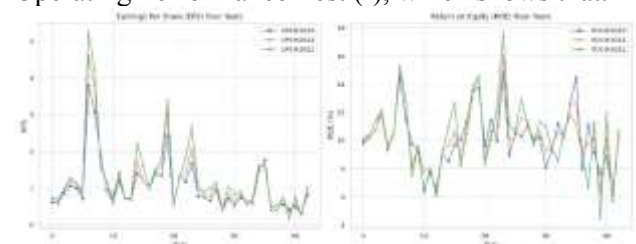

Fig. 3: Consistent trend test for financial business performance (I)

From the point of view of returns, it is not the case that higher capital adequacy ratios are better because lower capital adequacy ratios imply less capital support and higher financing costs between systemically important and non-systemically essential banks. Therefore, financial banks have an incentive to lower their capital adequacy ratios. However, lower capital adequacy ratios can reduce the ability to control risk and thus test a bank's creditworthiness. The higher the capital ratios of a bank that is important in the overall financial system, the more resilient it is against defaulted assets and the less capital risk it takes. If the increase in capital adequacy is not due to the bank's risk, an increase in capital adequacy will decrease the ROE. Non-performing loans are abnormal or problematic loans. A loan agreement in which the borrower cannot repay the principal and interest on the original commercial bank loan on time. Although local government financing is manageable, potential risks are still monitored. The systemic financial risk triggered by stock futures trading will be transmitted to other markets through other channels, such as insurance and securities, in addition to the direct effect on commercial banks. The impact of other financial sectors on commercial banks is mainly through more than indirect effects on commercial banks.

Assessment of the structure and effectiveness of bank capital utilization. By collecting the information of essential counterparties in the capital utilization of central banks, the author evaluates the risk exposure between subjects, the maturity mismatch structure of capital flows, and the efficiency and safety of capital utilization to improve banks' operation and management ability and competitiveness. On this basis, a monitoring mechanism is constructed based on the trend of banks' cross-market and cross-industry capital flows, their correlation characteristics, and risk contagion paths. The main control variables are gradually introduced into the model, in which those variables that test the variables and help to reduce the model setting errors are also kept. Then, each of these variables is introduced into the explanatory variables, the model's parameters are analyzed, the optimal model is selected, and the financial business performance consistency trend test (II), as shown in Fig. 4.

In this analysis, Mann-Kendall and Spearman's rho tests were used to evaluate trends in financial performance metrics over time. The Mann-Kendall test is a non-parametric method for trend detection that evaluates the statistical significance of monotonic trends in time series data. Spearman's rho

is a non-parametric measure of rank correlation that can indicate how well the relationship between two variables can be described using a monotonic function. Both tests were performed at the 5% significance level to identify consistent trends across various profitability, asset quality, and liquidity metrics for banks over the period studied. The results provide evidence for trends in the financial soundness of the banking sector.
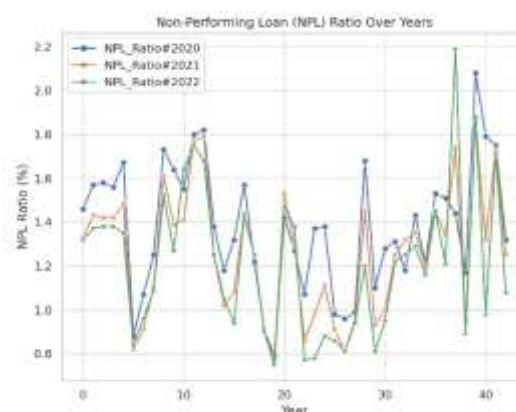

Fig. 4: Consistent trend test for financial business performance (II)

4.3 Comparative Analysis based on Asymmetric Characterization of Systemic and Non-Systemic Importance Performance

Determining the regulatory capital requirements faced by each banking system according to its level of importance enables the smooth functioning of the financial system while ensuring the sound operation of individual banks. In this context, the degree of importance of each commercial banking system is directly related to the capital regulation it faces, which in turn affects the need for capital and thus leads to capital adjustments. By examining the interaction term of the capital ratio gap, where the amount of change is regressed only on the value of the gap, the values reflect the rate of adjustment of the three capital ratios, with both regulatory capital ratios adjusting faster than the rate of adjustment of leverage. Systemically important banks are subject to more significant constraints than systemically essential banks in general, which can increase the cost of adjusting their capital structure, affecting the adjustment of funding. In the negative leverage gap, the positive gap in core capital adequacy, and the asset class index, a more significant negative leverage gap is associated with a more extensive asset class index; conversely, it is slower when the negative leverage gap is more extensive. However, the negative core capital ratio gap increases when

risk-weighted growth accelerates, suggesting that the more influential banks hold riskier assets when regulatory capital levels increase. The composition of liabilities includes the growth rates of total, long-term, and short-term liabilities. In both cases, the higher the level of undercapitalization for a systemically important bank, the slower the growth rate of its liabilities, the more overcapitalized it will be, and the higher the growth rate of its liabilities. Based on the comparative analysis of the asymmetric characteristics of systemic and non-systemic importance performance (I), as shown in Fig. 5.
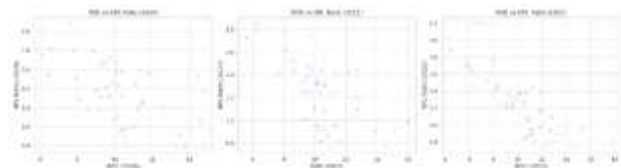

Fig. 5: Comparative analysis based on asymmetric characterization of systemic and non-systemic importance performance (I)

The leverage adjustment rate for financial banks is lower than the statutory capitalization, and the adjustment rate for all three capitalization categories is slower than that for non-systemically important banks; therefore, the equity versus asset approach is used more often for systemically important banks and the asset versus liability approach is used more often for non-systemically essential banks in the capital regulation. The adjustment rate of all three capital adequacy ratios is slower than that of non-systemically important banks; therefore, the equity vs asset approach is used for systemically important banks, and the asset vs liability approach is used for systemically essential banks in capital regulation. The slowdown in the growth rate of total assets/total liabilities is mainly due to the simultaneous decline in the loan balance and the weighted growth of risky assets, while the decline in the growth rate of long-term liabilities is due to the slowdown in the growth of long-term liabilities. Since banks account for a substantial proportion of the overall system, each of their changes can significantly impact the macroeconomy, and therefore, to ensure their stability and control their risk weights, financial banks also actively adjust their risky assets. Therefore, strengthening the management of risky assets is an effective way to improve the regulatory capital ratio. Based on maintaining specific asset and debt adjustment ratios, they should appropriately increase the proportion of equity capital and develop capital adjustment tools in line with their characteristics to improve the quality of

their funds. On this basis, the change and growth of capital ratios have slowed, suggesting that banks will spontaneously reduce their capital ratios to appropriate target ratios in the context of regulating overcapitalization. Based on the comparative analysis of asymmetric characteristics of systemic and non-systemic importance performance (II), as shown in Fig. 6.

Fig. 6: Comparative analysis based on asymmetric characterization of systemic and non-systemic importance performance (ii)

For systemically and non-systemically important banks, if their liquidity is too high, they will hold too many assets of lower risk, lower yield, easy liquidity, and other types, which may cause a decline in profitability if they are over-represented. The higher the index of a bank's systemic importance, the more significant the gap between its asset size, type of business, complexity, degree of affiliation, and service capacity compared to our systemically important banks. Nevertheless, some banks may be included in the former category in the long run because of the rapid growth of this category and the potential room for advancement that still exists. However, in the long run, some banks may be included in the former category because of this group of banks' rapid growth and potential to grow. In compressing the coefficients, samples from previous years are utilized as training samples, and the sparsity of the data for each year is analyzed to make the extracted information more realistic. The Kalman filter corrects the sparse structure of the signal by iterating to ensure that the signal is correct. On this basis, a forecasting method based on historical data is proposed. Therefore, the author considers this type of bank with systemically important potential. On this basis, the performance of our financial banks is evaluated by applying the improved effectiveness coefficient method. Financial banks utilize payment systems for cross-domain operations. A quadratic nonlinear relationship between the average return on assets, represented by profit, and risky indicators, such as capital adequacy and liquidity ratios, is found by measuring their risk and return. Based on the comparative analysis of asymmetric characteristics of systemically and non-systemically important performance (III), as shown in Fig. 7.
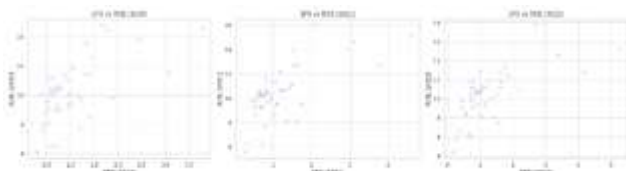
Fig. 7: Comparative analysis based on asymmetric characterization of systemic and non-systemic importance performance (iii)

5 Conclusion

The above comparative analysis of the operating indicators of systemically important banks and non-systemically important banks in the past three years shows that there is a significant difference in specific financial indicators between these two groups of banks. However, further analysis shows that there is no significant difference in overall operating performance and risk control level between the two groups. The reason may be that additional regulatory requirements only have a positive impact on risk control, while operational performance depends more on the market behavior of each banking institution itself. Based on this, regulatory authorities will continue to closely monitor the performance of systemically important banks and guide non-systemically important banks to strengthen their risk management practices in future direction recommendations. For systemically important banks: invest in technology and innovation to improve operational efficiency and maintain competitive advantage. For non-systemically important banks: focus on segmented markets, strengthen risk management practices, and explore opportunities for cooperation with systemically important banks. This study provides insights into the operational performance gap between systemically important banks and non-systemically important banks in China. Further research can delve into specific areas, such as the impact of digital transformation, the addition of financial technology, and the constantly changing regulatory environment.

References:
[1] Altunbaş, Y., Polizzi, S., Scannella, E., & Thornton, J. European Banking Union and bank risk disclosure: The effects of the Single Supervisory Mechanism. *Review of Quantitative Finance and Accounting*, Vol. 58(2), 2022, pp. 649–683. https://doi.org/10.1007/s11156-021-01005-z.

[2] Hall, R. E., & Reis, R., Maintaining Central Bank Financial Stability under New-Style Central Banking, *Working Paper*, 2015, pp. w21173. https://www.nber.org/papers/w21173.

[3] Sui, J., Liu, B., Li, Z., & Zhang, C., Monetary and Macroprudential Policies, Output, Prices, and Financial Stability, *International Review of Economics and Finance*, Vol.78, 2022, pp. 212-233. https://doi.org/10.1016/j.iref.2021.11.010.

[4] Oyewo, B. Enterprise risk management and sustainability of banks performance. *Journal of Accounting in Emerging Economies*, 12(2), 2022, pp. 318–344. https://doi.org/10.1108/JAEE-10-2020-0278.

[5] Li, T., Trinh, V. Q., & Elnahass, M., Drivers of Global Banking Stability in Times of Crisis: the Role of Corporate Social Responsibility, *British Journal of Management*, Vol.23, No.23, 2023, pp. 34-66. https://doi.org/10.1111/1467-8551.12631.

[6] Hanić, A., Jovanović, O., & Stevanović, S. Environmental disclosure practice in the Serbian banking sector. Management: *Journal of Contemporary Management Issues*, Vol. 26(2), 2021, pp. 115–144.

[7] Samuelsson, P., The Effects of Innovation Types and Customer Participation on Organizational Performance in Complex Services, *European Journal of Marketing*, Vol.57, No.13, 2023, pp. 27-55. https://doi.org/10.1108/EJM-11-2020-0810.

[8] Cincinelli, P., Pellini, E., & Urga, G., Systemic Risk in the Chinese Financial System: A Panel Granger Causality Analysis, *International Review of Financial Analysis*, Vol.82, No.25, 2022, pp. 45-77. https://doi.org/10.1016/j.irfa.2022.102179.

[9] Charles, A., & Sguotti, D., Sustainable Earnings: How Can Herd Behavior in Financial Accumulation Feed into a Resilient Economic System? *Sustainability*, 13, No.13, 2021, pp. 4757a. https://doi.org/10.3390/su13115776.

[10] Li, Y. The importance of non-systemically important Banks—A network-based analysis for china's banking system. *Fractal and Fractional*, Vol. 7(10), 2023, pp. 735. https://doi.org/10.3390/fractalfract7100735.

[11] Pang, D., Li, K., Wang, G., & Ajaz, T., The Asymmetric Effect of Green Investment, Natural Resources, and Growth on Financial Inclusion in China, *Resources Policy*, Vol.34, No.34, 2022, pp. 56-90.

https://doi.org/10.1016/j.resourpol.2022.102885.

[12] He, W., Liu, P., Lin, B., Zhou, H., & Chen, X., Green Finance Support for Development of Green Buildings in China: Effect, Mechanism, and Policy Implications, *Energy Policy*, Vol.165, 2022, pp. 112973. https://doi.org/10.1016/j.enpol.2022.112973.

[13] Garcia-Jorcano, L., & Sanchis-Marco, L., Systemic-systematic Risk in the Financial System: A Dynamic Ranking Based on Expected, *International Review of Economics and Finance*, Vol.75, No.75, 2021, pp. 68-89. https://doi.org/10.1016/j.iref.2021.04.001.

[14] Lannuzzi, A. Dell'Atti, S., D'Apolito, E., Galletta, S., Nomination Committee Characteristics and Exposure to Environmental, Social, and Governance (ESG) Controversies: Evidence from European Global Systemically Important Banks, *Corporate Governance: The International Journal of Business in Society*, Vol.23, No.6, 2023, pp. 1314-1338. https://doi.org/10.1108/CG-03-2022-0119.

[15] Gopalkrishnan, S., Mohanty, S. P., & Jaiwani, M.. Do efficiencies really matter? Analysing the housing finance sector and deriving insights through data envelopment analysis. *Cogent Economics & Finance*, Vol. 11(2), 2023, 2285158. https://doi.org/10.1080/23322039.2023.2285158.

[16] Iwanicz-Drozdowska, M., Rogowicz, K., Kurowski, Ł., & Smaga, P. Two decades of contagion effect on stock markets: Which events are more contagious? Journal of Financial Stability, Vol. 55, 2021, 100907. https://doi.org/10.1016/j.jfs.2021.100907.

[17] Luciana, B., & Helder, P., The Financial Aspects of Offshore Decommissioning and the Brazilian Regulatory System in the Light of the Transnational Legal Order, *The Journal of World Energy Law and Business*, Vol.6, 2022, pp. 6. https://doi.org/10.1093/jwelb/jwac021.

[18] Markoulis, S. Martzoukos, S., & Patsalidou, E., Global Systemically Important Banks Regulation: Blessing or Curse? *Global Finance Journal*, Vol.52, 2022, pp. 100580, [Online]. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3377937 (Accessed Date: July 8, 2024)..

[19] Chen, Z. & Xu, Y., Is Market Discipline on China's Systemically Important Banks Effective on Empirical Analysis of 9 Regulatory Events? *Economic Theory and Business Management*, Vol.8, 2017, pp. 60-74. https://doi.org/10.3969/j.issn.1000-596X.2017.08.005.

[20] Dibooglu, S., & Kapounek, S., The US Current Account, Sustainability, and the International Monetary System, *Economic Systems*, Vol.45, No.45, 2021, pp. 45-77. https://doi.org/10.1016/j.ecosys.2021.100875.

Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

Daodi Yao wrote the main manuscript.

Sources of Funding for Research Presented in a Scientific Article or Scientific Article Itself

Conflict of Interest

The authors have no conflicts of interest to declare that are relevant to the content of this article.