

# A Review of Research on Financial Agglomeration in China Based on CiteSpace Visualization Method

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**Abstract:** To analyze the development trend and cutting-edge hotspots of financial agglomeration research in China, this article uses CiteSpace literature analysis software and visualization analysis methods, based on 442 bibliographic data from core journals of financial agglomeration on CNKI from 2003 to 2023. From the perspective of research institution cooperation network, keyword co-occurrence, keyword timeline, and visual knowledge graph of mutation detection, this article conducts quantitative analysis on existing research results in the field of financial agglomeration. The key words and evolution map of financial agglomeration show that "technological innovation" and "economic growth" are still future research hotspots. The sudden change in financial agglomeration words shows that words such as "agglomeration" and "financial resources" have the longest duration of popularity, and future research will gradually expand towards intermediary effects, economic resilience, income inequality, rural economy, and rural revitalization.

**Keywords:** Financial agglomeration, CiteSpace, Knowledge graph, Literature analysis

## 1. Introduction

Finance is the core of modern economic development. With the rapid development of China's economy, the financial landscape of our country is also constantly evolving and changing. Financial agglomeration has gradually become a major trend, and the three major financial centers in China, mainly Beijing, Shanghai, and Shenzhen, have been formed. The 12th "China Financial Index Report" released by the China (Shenzhen) Institute of Comprehensive Development shows that China's financial market resources are highly concentrated. In 2020, the added value of the financial industry in 31 financial centers accounted for 57.7% of the total added value of the national financial industry. Financial agglomeration has been widely studied by experts and scholars due to its characteristic advantages such as value appreciation effect and industrial agglomeration effect. Early research mainly focused on the theoretical level, including definitions, measurement methods, and basic characteristics; In recent years, research has mainly focused on the impact of financial agglomeration on the economy, innovation, and other aspects. According to the statistical analysis of the number of publications, it can be found that scholars have achieved rich research results in the issue of financial agglomeration. According to data from China National Knowledge Infrastructure (CNKI), starting from the first paper on the topic of financial agglomeration published in Shanghai Finance in 2003, as of the end of 2023, CNKI's database has included 2616 related papers, including 442 core journals. This article will use CiteSpace software to conduct visual research on published papers included in the China National Knowledge Infrastructure (CNKI) from 2003 to 2023. The aim is to systematically review research literature on financial agglomeration to help scholars better understand the research hotspots and development trends in this field, and provide a basis for further exploring the depth and breadth of financial agglomeration development.

## 2. Research methods and data sources

The literature search for this article is sourced from China National Knowledge Infrastructure (CNKI) on December 31, 2023. We select "Academic Journals" on the homepage of CNKI, then select "Advanced Search" and set the search topic to "Financial Agglomeration"; According to the earliest appearance of financial agglomeration research literature, the confirmed time span is from 2003 to 2023. Preliminary 2616 search records were obtained, including 442 core journals, 27 featured journals, and 1004 degree theses. There are two main research methods used in this article: firstly, statistical

analysis of the publication volume of relevant literature and the information of publishing institutions to reveal the macro trends in China's financial agglomeration research; The second is to use visualization tools to analyze 442 core journal papers, mainly including keyword co-occurrence, timeline chart, and mutation word recognition

### 3. Current Status of Domestic Financial Agglomeration Research

#### 3.1. Statistics and comparison of publication volume

Since the 21st century, with the increasingly obvious phenomenon of financial agglomeration in China, research on the impact of financial agglomeration on the growth of the real economy has attracted high attention from domestic experts and scholars. As shown in Figure 1, the number of literature on financial agglomeration increased from 2 in 2003 to 268 in 2022, and the number of core journals increased from 1 in 2003 to 44 in 2022; Although the number of publications in 2023 has decreased, the overall number of literature on financial agglomeration has shown an upward trend over the past 20 years. On the one hand, it indicates a strong demand for financial support, and on the other hand, it also represents the increasing attention of scholars on how financial agglomeration affects the economy, technological innovation, and other fields.

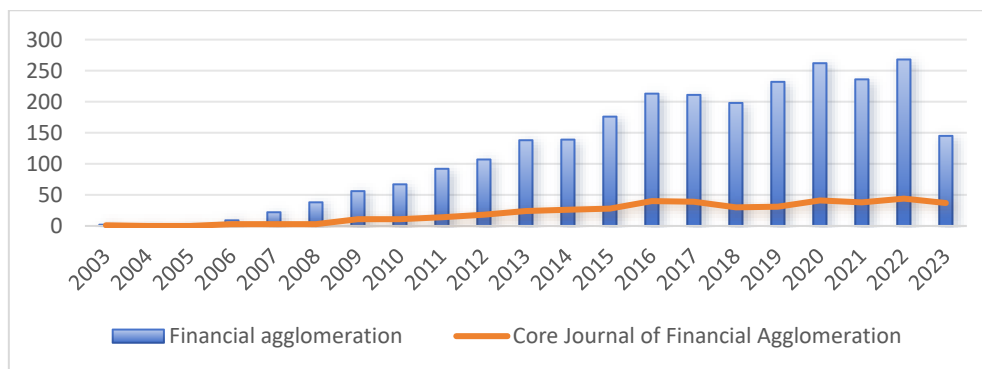


Figure 1: Number of literature studies on financial agglomeration from 2003 to 2023

#### 3.2. Number of publications by research institutions and current status of collaborative networks

Analyzing the visualization graph of research institutions helps to grasp the distribution characteristics of the main research forces in the field of financial agglomeration. In order to better demonstrate the cooperation of research institutions, this article sets the time slice to 2. Research has found that the field of financial agglomeration has formed a cooperative network centered around Jiangxi universities such as Nanchang University, East China Jiaotong University, and Nanchang University of Aeronautics and Astronautics. There is also a cooperative relationship between Nanjing University and Anhui University of Finance and Economics. Overall, research on financial agglomeration mainly focuses on the economics and finance colleges of various universities, and the trend of cross regional and cross institutional cooperation among research institutions is preliminarily emerging. Further exploration of the publication volume of various institutions reveals that Nanchang University is the research institution with the highest publication volume, publishing a total of 8 core journals; Nankai University, Nanjing University, Southwest University of Finance and Economics, Northeast Normal University, Southeast University, and Southwest University of Political Science and Law have relatively high publication volume. This indicates that these institutions attach great importance to the study of financial agglomeration phenomena, and their research results have played an important role in promoting the research and development of financial agglomeration phenomena in China.

### 4. Analysis of Domestic Financial Agglomeration Research Hotspots and Evolutionary Trends

#### 4.1. Analysis of Domestic Financial Agglomeration Research Hotspots and Evolutionary Trends

Scholars often use co word analysis methods to explore research hotspots and trends in a certain research field. Keywords are highly condensed research content in an article, and analyzing

high-frequency keywords helps us grasp the main research directions in the field of financial agglomeration. Therefore, in this section, CiteSpace was used to analyze the frequency and centralization of keywords in 442 core journals, and high-frequency hot topics in the field of financial agglomeration research were obtained as shown in Table 1. Table 1 lists the top ten hot keywords with the highest frequency of occurrence (272 times), with keywords such as economic growth, financial development, and regional economy ranking higher. These keywords are hot topics in academic research on the phenomenon of financial agglomeration. In addition, a mediating centrality greater than 0.1 is considered high mediating centrality, which connects different research fields and may collide to generate new research hotspots<sup>[1]</sup>. Therefore, all hot keywords with intermediary centrality greater than 0.1, such as "financial agglomeration", "financial center", "financial resources", are worthy of close attention by researchers.

*Table 1: High frequency hot keywords in the field of financial agglomeration research from 2002 to 2023*

Number	Keyword	Word frequency	Intermediary centrality
1	Financial agglomeration	272	1.26
2	Economic growth	31	0.06
3	Financial development	16	0.03
4	Regional economies	15	0.01
5	Financial center	14	0.10
6	Location entropy	14	0.00
7	Mediating effect	12	0.01
8	Overflow effect	11	0.04
9	Financial resources	9	0.13
10	Industrial agglomeration	9	0.04

This article utilizes a keyword co-occurrence graph drawn by CiteSpace, which includes 248 nodes and 431 lines. By combining the co-occurrence graph of keywords, it can be found that the nodes of financial agglomeration are the largest, representing the highest frequency of mention in existing research literature. Hot keywords such as regional economy, economic growth, and technological innovation have emerged around financial agglomeration. Further keywords such as industrial agglomeration, regional innovation, spatial spillover, and ecological efficiency have emerged around these keywords. At present, most scholars explore the impact of financial agglomeration phenomenon from several research directions, such as economic growth, regional economy, technological innovation, and technological innovation. Currently, there are two hot research topics among domestic experts and scholars on the phenomenon of financial agglomeration:

#### **4.1.1. Financial agglomeration and economic growth**

The relationship between financial agglomeration and economic growth has been a topic of early attention in the field of financial agglomeration in China, and it is also the most abundant and in-depth research result. Financial agglomeration plays a crucial role in promoting economic growth<sup>[2]</sup>, and its underlying mechanism is mainly reflected in the agglomeration effect, diffusion effect, and basic function of finance<sup>[3]</sup>. In terms of empirical testing, some scholars have tested the impact of financial agglomeration on regional economic growth based on inter provincial data, and found that financial agglomeration has a significant promoting effect on China's economic growth<sup>[4]</sup>. Subsequently, the domestic academic community sparked a wave of empirical testing of the impact of financial agglomeration on economic growth<sup>[5]</sup>. Scholars have taken different regions across the country<sup>[6]</sup>, such as the Beijing Tianjin Hebei region<sup>[7,8]</sup>, the Yangtze River Delta economic circle<sup>[9,10]</sup>, and the Yangtze River economic belt<sup>[11,12]</sup>, as research objects, to confirm the positive incentive effect of financial agglomeration on economic growth. Gou Xiaolan's research found that the higher the degree of regional financial agglomeration, the stronger the promoting effect of financial agglomeration on economic growth<sup>[13]</sup>. The level of financial agglomeration in the eastern region of China is higher than that in the central and western regions, so the promoting effect of financial agglomeration on economic growth decreases gradually from the eastern region of China to the central and western regions. Since the 21st century, the rise of spatial economics has provided a new perspective for domestic and foreign scholars to study, and more scholars have begun to focus on the spatial spillover effects of financial agglomeration on economic growth. Ding Yi analyzed the Yangtze River Delta region and found that Shanghai's financial agglomeration not only promoted economic growth in the region, but also had a positive impact on the economic development of the entire Yangtze River Delta region<sup>[14]</sup>. More broadly, Wu Maoguo used provincial data as a sample and constructed a spatial panel model to reveal the impact of financial agglomeration on economic growth both inside and outside the region<sup>[15]</sup>. The

results indicate that financial agglomeration can not only promote economic growth in the province, but also have a positive economic impact on neighboring provinces. In addition, Xia Xia Yang used panel data from 30 provinces in China as the research object and found that the financial agglomeration of the banking industry has the most significant economic spillover effect, while the agglomeration of the insurance and securities industries has a relatively insignificant impact on economic growth<sup>[16]</sup>. This series of studies highlights the significant heterogeneity of spatial spillover effects of financial agglomeration, depending on regional characteristics and types of financial sub industries.

#### **4.1.2. Financial Agglomeration and Innovation**

Domestic scholars mainly focus on exploring financial agglomeration and innovation in terms of technological innovation and technological innovation. Among them, technological innovation emphasizes more on innovative activities carried out by enterprises for the purpose of obtaining commercial profits, while technological innovation belongs to the category of pure science and technology, which is fundamentally different from technological innovation. Scholars have conducted research and analysis from different perspectives on the impact of financial agglomeration on technological innovation. Lin Xiaoling's research shows that the promoting effect of financial agglomeration in developed countries on technological innovation is much greater than that in developing countries<sup>[17]</sup>. Xiu Guoyi pointed out that the impact of financial agglomeration on technological innovation has a non-linear effect. In addition<sup>[18]</sup>, among different types of financial industry clusters, the banking industry cluster has been proven to have the most significant promoting effect on technological innovation<sup>[19]</sup>. From the perspective of regional differences and spatial impact, Zhang Tiandi's research found that financial agglomeration has a negative spillover effect on technological innovation; From an industry perspective, the banking and securities industries have a positive spatial spillover effect on technological innovation, while the insurance industry has a negative spatial spillover effect on technological innovation<sup>[20]</sup>. Wei Xuehui and Wang Yong<sup>[21]</sup> also analyzed the spatial spillover effects of financial support for technological innovation, and their research conclusions differ. Overall, the impact of financial agglomeration on technological innovation is influenced by multiple factors such as the level of national development and the characteristics of the financial industry<sup>[22]</sup>. Yang Zhiqun's empirical analysis results confirm that financial agglomeration promotes the development of enterprise technological innovation by improving the level of financial development within the region<sup>[23]</sup>. Scholars have also explored the nonlinear impact of financial agglomeration on technological innovation based on panel data from 30 provinces in China. The study found that when the degree of financial agglomeration is low, its driving effect on technological innovation is more significant; As the degree of financial agglomeration increases, its driving effect on technological innovation shows a gradually decreasing trend<sup>[24]</sup>.

#### **4.2. Analysis of Research Evolution Path Based on Timeline Graph**

The horizontal axis of the keyword timeline represents time, and the vertical axis represents clustering. Through this graph, we can track the year when the research hotspot first appeared, reveal the relationships between nodes, and the evolution trend of keywords over time. Based on the keyword timeline obtained from this study, it can be found that financial agglomeration first appeared in 2006. After 2010, the distribution of keywords in the field of financial agglomeration began to be dense, and the connections between hot keywords were also relatively dense. The period from 2003 to 2010 was the initial stage of development in China's financial agglomeration field. At this point, scholars have begun to pay attention to the impact of financial agglomeration on the economy, and some preliminary empirical studies have emerged. In this stage of research, the focus is mainly on economics and finance, with the main hot keywords being financial centers, regional economies, financial resources, and location entropy. The distribution of hot keywords is relatively concentrated; The period from 2010 to 2020 marks the deepening development stage of China's financial agglomeration field. At this point, scholars are gradually delving deeper into the theoretical framework of financial agglomeration and conducting more systematic and profound empirical analysis. A series of mature theoretical models have been formed in academia regarding the impact of financial agglomeration on economic development, innovative development, and industrial structure. Although the hot topics of research still focus on financial agglomeration, new keywords have emerged, such as local finance, urban agglomeration, industrial structure upgrading, spatial econometrics, intermediary effects, technological innovation, technological innovation, institutional environment, ecological effects, and spillover effects. From 2020 to present, it has been a stage of diversified development in China's financial agglomeration field. The main keywords in this stage include green technology innovation, green economy, economic resilience, agricultural enterprises, carbon emissions, and consumption upgrading, with a prominent

problem orientation. This indicates that with the continuous deepening of research on financial agglomeration, scholars are not only deepening their theoretical research, but also paying more attention to the changes in China's national conditions, policy directions, and the resolution of practical problems. The research on the impact of financial agglomeration on green economy, green technology innovation, and economic resilience is receiving increasing attention from scholars.

#### 4.3. Frontier analysis of new subject mutation words

By using burst word detection, we can observe the evolution trend of research in the field of financial agglomeration, and review the time span from the beginning to the end of some important keywords becoming research hotspots. We can even predict which keywords can exhibit explosive trends in future development. Therefore, this section analyzed the mutation of financial agglomeration keywords and identified the top 15 mutation words with mutation intensity, as shown in Figure 2.

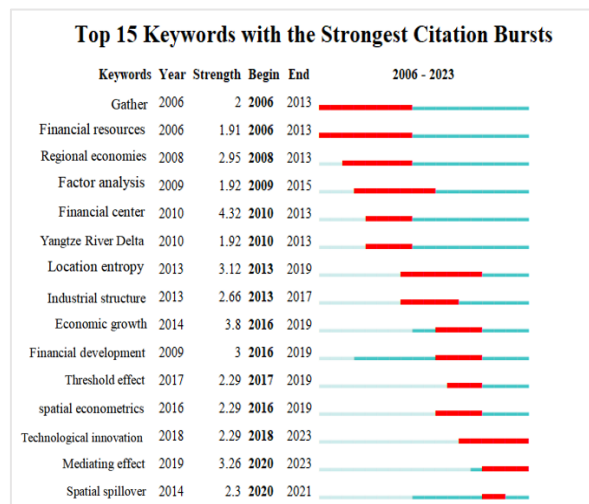


Figure 2: 15 major mutation words in financial agglomeration research from 2006 to 2023

From the perspective of emergence intensity, the financial center (4.32) has the highest intensity, while the increase in income for farmers (1.91) has the lowest intensity. The emergence of strong mutation intensity words such as regional economy, location entropy, financial development, and intermediary effects represents the high attention of many domestic experts and scholars in these fields, forming a highly influential frontier hotspot. From the perspective of emergence time, agglomeration and financial resources are the keywords with the longest emergence time, both lasting for 7 years, indicating that they are still research hotspots in the future. In recent years, with the rapid development of science and technology, research on technological innovation in the field of financial agglomeration has been ongoing from 2018 to 2023, and may still be a hot topic in academic research in the future; The research on intermediary effects began in 2020 and continued until 2023, indicating that the intermediary effect test based on the perspective of financial agglomeration has a continuing explosive trend in future development.

## 5. Conclusion and Outlook

### 5.1. Research conclusion

This article uses CiteSpace bibliometric software to draw a series of knowledge graphs in the field of financial agglomeration, including keyword co-occurrence graphs. It deeply explores and summarizes the current research status and hot topics of domestic scholars in this field. The following are the main research conclusions of this article:

Firstly, the number of research literature is gradually increasing, and the collaborative network of research institutions is relatively dispersed. The number of relevant literature in the field of financial agglomeration showed an overall upward trend from 2003 to 2023, reaching its peak in 2022. The network of financial agglomeration research institutions is relatively scattered, forming a cooperative network centered around Jiangxi universities such as Nanchang University and Nanchang Aviation University. However, the cooperation between research institutions across regions and universities

needs to be strengthened. Secondly, keywords with high frequency and centrality are "financial agglomeration", "financial resources", "financial center", etc., which deserve close attention from researchers; With the continuous deepening of research on financial agglomeration, scholars are increasingly concerned about the new changes in China's national conditions, new policy directions, and the resolution of practical problems. Currently, research on the impact of financial agglomeration on green economy, green technology innovation, and economic resilience has gradually attracted high attention from governments and academia. Thirdly, the cutting-edge hot words include "technological innovation", "intermediary effect", "financial resources", etc. The research on these hot words still has a continuing explosive trend in future development.

## 5.2. Outlook

So far, domestic experts and scholars have made significant progress in the study of financial agglomeration. Scholars have formed pioneering research results in the definition, measurement methods, and impact of financial agglomeration on economic growth and innovation. Of course, the current research is not yet rich enough and there are some shortcomings that need to be further explored and improved by scholars:

Firstly, since 2006, the phenomenon of financial agglomeration has been widely studied by experts and scholars in China. Early literature mostly used single indicators such as location entropy and spatial Gini coefficient to measure the level of financial agglomeration. However, these single indicators have shortcomings such as inability to estimate the absolute scale of agglomeration and measure the degree of agglomeration in a specific region, making it difficult to accurately reflect the actual level of financial agglomeration. Therefore, experts and scholars have begun to construct a multi indicator system to measure the level of agglomeration. How to build a unified and standardized multi indicator financial agglomeration evaluation system has become a top priority in future research in the field of financial agglomeration. Secondly, current domestic literature research has shown significant heterogeneity in the impact of financial agglomeration on economic growth and innovation, and based on the perspective of spatial economics, the spatial spillover effects of financial agglomeration have been explored. However, there is still controversy over the heterogeneity and spatial spillover effects of different financial industry clusters on economic growth and innovation. In the future, it is necessary to further refine the internal mechanism analysis of financial industry cluster on the fields of economy and innovation, and continue to pay attention to the current research status.

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