

The Impact of Financial Agglomeration on Regional Innovation and Entrepreneurship Activity: "Catalyst" or "Inhibitor"

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Abstract: One crucial way to address the employment paradox and the lack of innovation is to boost regional innovation and entrepreneurship, and stimulate the internal power of high-quality development. This study examines the multifaceted impacts of financial agglomeration on innovation and entrepreneurship activity from the standpoint of upgrading industrial structure, employing province panel data from China from 2011 to 2020. Financial agglomeration is measured using the location entropy index, while innovation and entrepreneurship activity is computed utilizing the entropy weight technique. Using fixed, intermediary, and threshold impact models, the direct transmission mechanism, indirect influence mechanism, and nonlinear effect of financial agglomeration on innovation and entrepreneurship activity are investigated. The outcomes that follow are the results: First, financial agglomeration acts as a "catalyst" in the process of innovation and entrepreneurship, that is, it has a direct driving effect, and presents a gradient distribution of "East > Midwest"; Secondly, financial agglomeration has an indirect transmission effect on innovation and entrepreneurship activity through the "structural effect" in which industrial structure is advanced as an intermediate variable; Finally, as financial agglomeration crosses the threshold value, It first exhibits the characteristic of a somewhat growing threshold impact before progressively strengthening its influence on innovation and entrepreneurship activities. In an effort to encourage financial agglomeration and improve the capacity for innovation and entrepreneurship, this paper offers some relevant references.

Keywords: Financial Agglomeration;

**Innovation and Entrepreneurship Activity;
Fixed Effect; Intermediate Effect;
Threshold Effect**

1. Introduction

China's investment in science and technology innovation has been steadily rising under the direction of the innovation-driven development plan, and its science and technology indicators have steadily improved. China has the most scientific researchers worldwide and is positioned 12th in the world according to the Global Innovation Index 2023 Report, and ranks first in the number of international patent applications. However, China's academic and technology accomplishments have a conversion rate of just 10%, which is far less than the 40% of Western nations. Investment in basic research accounts for only 5.2% of total R&D investment, with a serious shortage of original innovation capacity and a lack of disruptive innovation^[1]. Problems such as "high quantity and low quality", "lack of scientific research results" and "lack of innovation" are common^[2], which seriously restrict the process of building China into an innovation-oriented country. For the purpose to accomplish this, China has developed venues for innovation and entrepreneurship by promoting "mass entrepreneurship and innovation" and set strategic strategies, and optimized the innovation and entrepreneurship ecosystem, with a view to continuously enhancing the regional innovation and entrepreneurship (hereinafter referred to as *Activation*), stimulating the vitality of innovation and entrepreneurship in the whole society, and addressing the problem of "persistent employment problems and more prominent structural problems" in China's current job market, to tap the internal driving force of high-quality innovation and entrepreneurship. As the global economy moves toward

integration and the financial sector moves toward globalization, the volume of financial capital continues to grow, and financial resources play an increasingly significant role in promoting regional economic development [3]. Urban agglomerations are the main spatial forms that carry development factors, and financial agglomeration (hereinafter referred to as *Agglomeration*) is an important support for regional coordinated development [4]. *Agglomeration* can not only directly affect the real economy, but also help optimize the industrial structure, balance the real industry's inventory and demand during the production manipulate, and serve as a key catalyst for the superior growth of China's genuine economy [5]. Consequently, the topic's significance has changed to include initiatives to enhance the new engine of economic growth, investigate new production factors, and encourage the deep integration of *Agglomeration* and the real economy. While innovation and entrepreneurship activities tend to form agglomeration, *Agglomeration* accelerates technological innovation, improves production efficiency and product quality, drives industrial transformation and upgrading, and forms a good atmosphere for innovation and entrepreneurship [6]. Therefore, *Agglomeration* is considered to be a key force to improve *Activation*. Therefore, this paper mainly considers the following questions: Can *Agglomeration* improve *Activation*? What is the influence mechanism between the two? Further, based on the significant provincial heterogeneity in China, does the influence of *Agglomeration* on *Activation* present unique characteristics? In this paper, *Agglomeration*, industrial structure upgrading (hereinafter referred to as *Structure*) and *Activation* is a component of the same framework to investigate how *Agglomeration* affects *Activation*, so as to formulate targeted development policies, which have certain theoretical and practical value for improving China's innovation and entrepreneurship ability and international competitiveness, and help enrich the theoretical research on *Activation*. And provide useful reference for relevant policy formulation.

This is how the remainder of the paper is structured: The second section organizes the

pertinent *Agglomeration* research., the influence of *Agglomeration* on *Activation* and the activity of innovation and entrepreneurship; The paper's conceptual analysis and research hypotheses are expounded upon in the third section; The model's architecture, related variable measurement, data source, and descriptive statistics are all introduced in the fourth section. The empirical test and thorough examination of the findings are continued in the fifth section; Finally, We receive a summary of the research, management insights, and potential futures.

2. Literature Review

2.1 Relevant Research on *Agglomeration*

The connotation and extension of the financial industry are constantly expanding, but the research on *Agglomeration* is still in its infancy. The relevant research mainly includes variable measurement and influence effect. In terms of variable measurement, the existing research mainly includes two approaches: single index measurement and comprehensive evaluation system. On the one hand, the most widely used single index comprises the Herfindahl index, industry concentration, geographical Gini coefficient, geographical entropy index, etc. Since the fact that the place-based heterogeneity index can more accurately remove the impact of scale factors and represent the spatial distribution features of financial components, it is the most widely used. However, the selection of basic indicators in practice is different [7-8]. On the other hand, the comprehensive evaluation system tends to choose multiple indicators that can reflect the status of *Agglomeration* to establish the index system and determine the overall index of *Agglomeration* level through factor analysis, principal component analysis and entropy method [9-10]. In terms of influence effect, first, economic effect: some scholars believe that *Agglomeration* contributes significantly to economic growth [11], and urban economic growth can be promoted by optimizing industrial structure, enhancing technological innovation, and promoting energy conservation and emission reduction [12-14]. Second, structural effect: *Agglomeration* has the ability to effectively boost the capital marketplace's resource

allocation efficiency, direct funds to enter the market smoothly and efficiently, and enhance the industrial structure ^[15]. Third, environmental effect: Applying the dynamic spatial Durbin model, Li et al. (2021) sorted out sorted out the financial element agglomeration's conservation of energy and emission-reducing effects, and found that financial agglomeration showed an obvious inverse N-shaped curve relationship for carbon emissions in both local and surrounding areas ^[16].

2.2 Relevant research on *Activation*

Innovation and entrepreneurship activities can provide new development impetus and growth point for regional economy and enhance regional economic strength and comprehensive competitiveness. An important indicator to characterize *Activation* is the degree of innovation and entrepreneurship activity. Existing studies mainly include two aspects: innovation activity and entrepreneurship activity.

Innovation activity level. At the micro level, Under the effect of innovation activity, the internet-based economy propels the modernization and transformation of manufacturing enterprise, and promoting innovation activity is a key way for the digital economy to support these developments ^[17]. In the medium perspective, digital inclusive finance will significantly promote innovation activity in the region, and the impact on different types of innovation activity is different ^[18]. On a macro level, the policy environment of local governments will weaken the financial support for innovation activities with strong spillover effect, which will restrict the improvement of regional innovation activity ^[19]. As for the measurement of innovation activity, human capital, technical capital and financial capital related to R&D are usually used as indicators. According to academics, the ratio of R&D staff to total employment in society serves as a proxy for talent aggregation ^[20]. In terms of the measurement of enterprise innovation activity, according to academics, the proportion of R&D staff to total employment in society serves as a proxy for talent aggregation. ^[17]. Hu et al. gauge an organization's inventive technological activity directly by looking at its patent count.

Entrepreneurial activity level. The research on entrepreneurial activity mainly focuses on the influencing factors and measurement methods of entrepreneurial activity. The influencing factors of entrepreneurial activity are mainly carried out from the following two aspects: In the context of the "mass entrepreneurship" policy, the degree of group entrepreneurial activity, high-tech talents are an important force to promote entrepreneurial activities. Using a qualitative comparative analysis of fuzzy sets, Cui and Wu (2021) investigated how the scientific and technological environment affected the entrepreneurial endeavors of academic and technological advances personnel and discovered a practical strategy to increase such activity ^[21]. College students, as the reserve force of high-tech talents, are of great importance to the study of their entrepreneurial intention. Female groups can bring new opportunities and vitality in entrepreneurship. Cheng and Luo et al. (2021) based on the fsQCA method from the perspective of configuration, explored the causal complex mechanism of the entrepreneurial ecosystem driving the high entrepreneurial activity of women, and drew five types of entrepreneurial ecosystems that produce the high entrepreneurial activity of women ^[22]. On the other hand, In contrast, entrepreneurial activity occurs at the national, provincial, and local levels. Naude et al. (2020) proposed that the national culture of modernism emphasizes the spirit of contract and performance orientation, which is conducive to the formation of entrepreneurial teams across personal relationships and the gathering of high knowledge and technical talents to carry out technology-intensive business. Compared with "survival" entrepreneurial activities, "opportunity" entrepreneurial activities with high expectation and innovation can promote the improvement of happiness ^[23]. Scholars introduced the free entrepreneur Model of vertical connection (FEVL) and revealed the influence and mechanism of floating population on entrepreneurial activity in cities through the theoretical model ^[24].

In summary, the research results of scholars provide reference for this paper, but there are still the following improvements in the research on *Agglomeration* and *Activation* : First, *Agglomeration* is

considered to be an innovative cluster based on digital development, but there is an extremely lack of analysis and exploration of the effect of *Agglomeration* on *Activation*; Second, most scholars separate innovation activity and entrepreneurial activity for comprehensive and in-depth research, but few scholars integrate the two into the same framework for effect or impact research; Third, one of the few investigations now available on the relationship between innovation, entrepreneurship, and industrial agglomeration, no scholars have investigated the internal transmission mechanism of *Agglomeration* on innovation and entrepreneurship from the perspective of *Structure*. Fourthly, the complex nonlinear relationship between *Agglomeration* and *Activation* needs to be discussed.

This paper is committed to studying the multidimensional effects of *Agglomeration* on *Activation*. This paper's potential minor achievements include: First, understanding *Activation* influences *Activation* and its mechanism are systematically analyzed, and the research field of *Agglomeration* innovation effect is expanded. Secondly, the regional entropy index is used to measure *Agglomeration*, and *Activation* is comprehensively measured from the two aspects of innovation and entrepreneurship activity, so as to improve the reliability of the research conclusions. Thirdly, focusing on *Structure*, this paper explores the complex principle of *Agglomeration* affecting *Activation*. Finally, this study further examines the nonlinear impacts of *Agglomeration* and *Activation* based on the features of regional diversity with the aim to provide some theoretical and practical insights for bolstering *Agglomeration* development, improving the *Activation*, and developing into an innovation-oriented country.

3. Theoretical Analysis and Research Hypothesis

3.1 Direct Conduction Mechanism and Research Hypothesis

On the one hand, *Agglomeration* reduces transaction costs and improves resource allocation efficiency by concentrating key

financial elements such as capital, talent and information, thus enhancing the scale effect of financial business activities and making the financial market more active and perfect. This agglomeration effect helps enterprises to obtain capital and resources, and promotes the development of innovation and entrepreneurship. Within the *Agglomeration* area, financial product innovation and service optimization are encouraged by financial organizations' tight collaboration and rivalry, and provide enterprises with more abundant and convenient financing channels. Meanwhile, a lot of financial experts are drawn to *Agglomeration*, which can provide professional financial advice and solutions for enterprises, help enterprises grasp market opportunities, realize innovative development and carry out entrepreneurial activities [25]. *Agglomeration*, however, can also offer the required financial assistance for entrepreneurs and innovative projects through its diversified financial services and support. Financial institutions not only provide traditional loan and financing services, but also provide financial support for innovative projects by setting up venture capital and venture capital funds. In addition, financial institutions provide a range of value-added services to help entrepreneurs and innovative projects solve various problems encountered in the development process. The provision of professional knowledge and network resources within the *Agglomeration* area provides valuable learning and exchange opportunities for entrepreneurs and innovative projects, which helps to obtain industry dynamics, expand business cooperation, and enhance the *Activation*.

Research hypothesis 1: *Agglomeration* can directly enhance *Activation*.

3.2 Indirect Transmission Mechanism and Research Hypothesis

In terms of the relationship between *Agglomeration* and the *Structure*: First, based on the knowledge spillover effect, enterprises and institutions in the *Agglomeration* area intensively interact, promoting the spread and spillover of knowledge. As the center of information exchange, financial institutions can accelerate the spread of new technologies and new management methods, and promote the

technology upgrading and management optimization of the entire industry^[26]. Second, *Agglomeration* attracts a large amount of capital, which is in need of seeking investment opportunities with high returns. Financial institutions allocate capital to industries with development potential and high added value through professional assessment and risk management, thus pushing the industrial structure to a more advanced and efficient direction. Third, institutions within the *Agglomeration* area tend to support innovative projects and high-tech enterprises, bringing higher returns^[27]. The financial support provided by financial institutions can help these enterprises carry out technology research and development and market promotion, thereby supporting the manufacturing structure's metamorphosis into a knowledge-and technology-intensive one and achieving the structure's development.

In terms of the relationship between the *Structure* and the *Activation*: First, the *Structure* means that the industry is developing in the direction of higher technology and higher added value, which will generate the demand for new technologies. Businesses boost research and development spending and encourage technological innovation to satisfy these demands, and thus enhance the *Activation*. Second, the *Structure* has promoted the refinement and specialization of the industrial chain, and enterprises have formed closer cooperative relations. Such industrial chain synergies contribute to resource sharing and risk sharing, and provide more cooperation opportunities and platforms for innovation and entrepreneurship^[28]. Finally, the *Structure* attracts more capital investment, leading to the search for investment opportunities with high growth potential, but also provides greater market opportunities for innovative products and services, incentivizing enterprises and entrepreneurs to innovate, and driving the overall increase in *Activation*.

Research hypothesis 2: The *Structure* has an intermediary effect on the improvement of *Activation of Agglomeration*.

3.3 Nonlinear Transmission Mechanism and Research Hypothesis

Given China's uneven regional banking sector and innovation quality, *Agglomeration*'s

effects on *Activation* is probably going to vary by province and region. In regions with a low level of *Agglomeration*, there are relatively few financial institutions and capital, which makes it difficult for entrepreneurs and innovation projects to obtain sufficient financial support. Due to the scarcity of financial resources, borrowing costs may be higher, increasing the operating costs of entrepreneurial and innovative projects and reducing the enthusiasm of entrepreneurs^[29]. At the same time, *Agglomeration* involves not only capital, but also the dissemination of information and knowledge. In regions with a low level of *Agglomeration*, the dissemination of information and knowledge may be limited, which is not conducive to the inspiration and knowledge update of *Activation*, resulting in a slow increase in the *Agglomeration*. In the regions with high financial agglomeration level, attracting abundant capital is conducive to the integration of resources and the continuous improvement of business models, and constantly exploring innovative, top-notch and cutting-edge innovation and entrepreneurship methods, so as to improve the competitiveness of the region in the innovation and entrepreneurship market and improve the *Activation* to a greater extent^[30]. In general, regions with a low concentration of *Agglomeration* may face a variety of constraints, while regions with an elevated concentration of *Agglomeration* can provide more favorable conditions and environment for innovation and entrepreneurship.

Research hypothesis 3: *Agglomeration* can produce nonlinear effects on *Activation* under its own threshold constraints.

4. Research Design

4.1. Model Construction

This study examines the direct, indirect, and non-linear effects of *Agglomeration* on the *Activation* process using the fixed effect model, the intermediate effect model, and the threshold effect model in order to test the three hypotheses put forth in this work.

4.1.1 Fixed effect model

$$Activation_{it} = \alpha_0 + \alpha_1 Agglomeration_{it} + \alpha_n X_{it} + \lambda_i + \varepsilon_{it} \quad (1)$$

Where, i and t are provinces and years respectively, $Activation_{it}$ representing *Activation*, the core variable of this paper, the *Agglomeration*, and the control variable in the model, including the level of urbanization (hereinafter referred to as *Urbanization*), the level of informatization (hereinafter referred to as *Informatization*), the degree of unemployment (hereinafter referred to as *Unemployment*) and the GDP (hereinafter referred to as *Production*). Furthermore, the point of intersection component in equation (1) is denoted by α_0 , the intangible particular fixed effect is represented by λ_i , and the random disturbance term by ε_{it} .

4.1.2 Intermediary effect model

Additionally, the indirect influence mechanism of *Agglomeration* on *Activation* is investigated in this research utilizing the intermediary effect model, which is established in the following manner:

$$\begin{aligned} Structure_{it} &= \beta_0 + \beta_1 Agglomeration_{it} + \beta_n X_{it} + \lambda_i + \varepsilon_{it} \\ Activation_{it} &= \omega_0 + \omega_1 Agglomeration_{it} + \omega_2 Structure_{it} + \omega_n X_{it} + \lambda_i + \varepsilon_{it} \end{aligned}$$

Where, $Structure_{it}$ denotes the intermediary variable, that is, the *Structure*, and β_0 and ω_0 is the intercept term, β_1 、 ω_1 and ω_2 is the parameter to be estimated, and β_n and ω_n is the parameter vector to be approximated. Equation (1) is identical for the remaining parameters.

4.1.3 Threshold effect model

Furthermore, the threshold effect between *Agglomeration* and *Activation* is examined in this paper employing a panel threshold regression model. This approach can precisely determine the threshold value and assess the importance of endogenous "threshold characteristics" as an econometric model for nonlinear relationship testing. The following is the creation of a multiple threshold model.

$$Activation_{it} = \mu_i + \theta_1 Agglomeration_{it} \cdot I(Agglomeration_{it} \leq \gamma) + \theta_2 Agglomeration_{it} \cdot I(Agglomeration_{it} > \gamma) + \theta_n X_{it} + \varepsilon_{it} \quad (4)$$

Where, $Agglomeration_{it}$ represents the core explanatory variable and threshold variable of this paper, γ is the value that defines the threshold, $I(\bullet)$ is the diagnostic operation. When the appropriate criteria are met, the value is 1, alternatively is 0. The other parameters are identical as in equation (1).

4.2. Measurement of Variables

4.2.1 Explained variables

As for the measurement of innovation and entrepreneurship activity index, a common standard for the existing research has not been established among the academic community. The present piece examines the level of *Activation* into creativity and entrepreneurial activity predicated on other scholarly investigations. In the national economic life, entrepreneurial activities generally focus on new enterprises and individual employment; While innovation activities pay more attention to the input, output and technology promotion of innovation^[31], because the two are essentially different, there is no unified research on the characteristics of the two. This essay mostly addresses the research of *Activation* by Lv et al. (2022)^[32] and Li (2021)^[31], and constructs the following regional *Activation* index with comprehensive consideration of scientificity, dynamics and rationality, which is shown in Table 1.

This paper mainly selects three dimensions: outcome output, factor input and technological development, and uses entropy weight method to characterize innovation activity. Outcome output, in particular, refers to patent output. The higher the citation times of a patent, the more solid the scientific basic knowledge contained in it, the greater the contribution potential to social and economic benefits, and the higher the quality of the innovation results obtained^[33]. The structure of academic and technological human resources, as well as the level of support and intensity of technological and scientific advancement, are the primary indicators of factor input. Technological development, as the name implies, represents the transaction of technology. Whether the technology is valuable is determined by the strength of technology realization ability and the liquidity of technology put on the market, which reflects the innovation and entrepreneurship ability of the region. As for entrepreneurial activity, it is further decomposed into enterprise entrepreneurship and individual entrepreneurship. The number of new start-ups is used to characterize macroeconomic development, while the number of new private enterprises can reflect the state of social capital entering the real economy. Individual entrepreneurship reflects the changes of individual entrepreneurship and the major entrepreneurial tendencies of the

labor force from the perspective of the population structure of the whole society.

4.2.2 Core explanatory variables and threshold variables

The location-based enthalpy coefficients, which measures the degree of concentration of a sector in a tiny region compared to that in an extensive region, is the ratio of the industry's share in a tiny region to its share in an extensive region. The ratio of a small region's

financial industry share to a large region's can be reflected in the geographical location of the heterogeneity index of the financial industry, which can also show how concentrated the financial industry is in a certain area. Therefore, this research refers to Song and Ge (2022) ^[34] and the method for estimating the location entropy coefficient within the financial industry is that following:

Table 1. Evaluation index system of *Activation*

Secondary indicators	Tertiary indicators	Method of calculation
Innovation activity	Capital investment	Intensity of R&D expenditure
		The proportion of government funds in total internal R&D expenditure
	Talent investment	R&D full-time equivalent per capita in enterprises above designated size
		The proportion of R&D personnel in the total labor force
	Trade in technology	Technology transactions as a share of GDP
		Technology market as a share of regional contract value of technology inflow in GDP
Entrepreneurial activity	Patent output	Number of patent applications per 10,000 people
		The number of patent applications by enterprises above designated size engaged in R&D activities
	Business start-up	Number of new businesses per 10,000 people
		Number of new private businesses per 10,000 people
	Self-employment	Self-employed as a percentage of total population (%)
		Self-employed as a percentage of total labor force (%)

$$Agglomeration_{it} = \frac{E_{ij}/E_i}{E_{kj}/E_k}$$

Where, E_{ij} is the gross product of i regional financial industry; E_i is the gross domestic product (GDP) of the region i ; E_{kj} is the gross domestic product of the national financial industry; E_k refers to the national gross domestic product (GDP). The more location entropy there is, the greater *Agglomeration* there is.

4.2.3 Core explanatory variables and threshold variables

As per the conceptual framework presented above, the renovation of industrialized 11 structure is chosen as the empirical research's intermediate variables in this paper. This study employs the ratio of the tertiary industry's output value to the secondary industry's output value to indicate the upgrading of industrial structure. It does this by referencing the practice of Shen and Li (2020) ^[35]. More significant values correspond to higher levels of corporate structure.

4.2.4 Control variables

Activation is a complicated and deliberate

project. In contrast to the primary descriptive variable of *Agglomeration*, this paper selects *Urbanization*, *Informatization*, *Unemployment* and *Production* as control variables by referring to Di et al. (2022) and Liu and Hu scholars (2010) for reference of existing studies ^[36-37]. ① *Urbanization*. There is a high correlation between *Urbanization* and *Activation* in China, which is determined by the percentage of the population living in cities in this document. ② *Informatization*. *Informatization* is an important concern of the research on the *Activation*. This paper uses the total volume of posts and telecommunications services to measure. ③ *Unemployment*. This paper uses the urban registered unemployment rate to represent. ④ *Production*. *Production* is closely related to *Activation*. In order to show the corresponding relationship between variables and abbreviations more clearly, this paper combs the variable abbreviation table, as shown in Table 2.

4.3 Data Sources and Descriptive Statistics

30 Chinese provinces between 2011 and 2020 are chosen as samples of research for the purpose of this study. The data are removed because of 12 the glaring absence of data in Tibet, Taiwan, Macao, and Hong Kong. The National Bureau of Statistics' China Statistical Yearbook and other public resources provided the data. The important variables in this research underwent logarithmic processing to increase estimation precision and dependability while avoiding variability and multiple correlations. The linear interpolation method was used to fill in the missing data for a few geographical years.

Table 2. Variable Abbreviations Table

Categories	Variables	Abbreviations
Explained variable	Innovation and entrepreneurship activity	<i>Activation</i>
Explanatory variables and threshold variables	Financial agglomeration	<i>Agglomeration</i>

Table 3. Correlation Matrix and Descriptive Statistics of Each Variable

Variable	<i>Activation</i>	<i>Agglomeration</i>	<i>Urbanization</i>	<i>Informatization</i>	<i>Unemployment</i>	<i>Production</i>
<i>Activation</i>	1.000					
<i>Agglomeration</i>	0.748***	1.000				
<i>Urbanization</i>	0.608***	0.718***	1.000			
<i>Informatization</i>	0.014	-0.072	0.175***	1.000		
<i>Unemployment</i>	-0.444***	-0.308***	-0.185***	-0.097*	1.000	
<i>Production</i>	0.151***	0.016	0.342***	0.914***	-0.050	1.000
N	300	300	300	300	300	300
Mean	0.221	0.346	0.350	3.728	1.210	7.421
SD	2.265	0.442	0.122	0.917	0.637	0.856
Min	0.221	0.346	0.350	3.728	1.210	7.421
Max	16.411	2.786	0.960	8.266	4.610	11.615

5. Empirical Results and Analysis

5.1 Analysis of Benchmark Regression Results

This study concludes that the fixed effect model is the more sensible option following the results of the Hausman test. Models (1) through (3) provide the model calculate findings for the national, eastern, central, and western regions, respectively, while Table 4 presents the benchmark analysis results of the influence of *Agglomeration* on regional *Activation*. *Activation* is quite beneficial in improving *Agglomeration* overall, as shown by model (1)'s influence coefficient of *Agglomeration* on *Activation* of 0.791, which is fairly significant and supports research hypothesis 1 in the present study.

Mediating variables	The industrial structure is advanced	<i>Structure</i>
Control variables	Level of urbanization	<i>Urbanization</i>
	Informatization level	<i>Informatization</i>
	Degree of unemployment	<i>Unemployment</i>
	Gross domestic product	<i>Production</i>

The matrix of correlation coefficients between the variables utilized in this paper is shown in Table 3. The table demonstrates that the regression coefficient between *Agglomeration* and *Activation* is 0.748, suggesting that *Agglomeration* and *Activation* have a positive relationship. This finding also serves as preliminary evidence for the paper's conclusion. Furthermore, the correlation coefficients matrix's findings indicate that there is no large correlation between variables, which alleviates the concern of collinearity in the regression model to a certain extent, and further regression analysis can be carried out.

The geographical allocation of China's financial assets is characterized by heterogeneity and discontinuity. According to model (1) - Model (3), In line with Ding et al. [38], it can be inferred that the tendency of "East region > Central and western regions" is presented by the influence of *Agglomeration* on *Activation*. According to this paper, the primary causes are as follows: On the one hand, the economy of the eastern region is more advanced, more significant *Agglomeration* and more abundant resources, so it has greater advantages in promoting enterprise innovation and entrepreneurship, and can exert greater benefits on the *Activation*; On the other hand, account of the geographically isolated location and dispersed businesses, the relative lack of financial resources and weak

Agglomeration effect in the central and western regions, it is difficult to form an "economy of scale" to drive *Activation*.

Table 4. Benchmark Regression Results

	(1) Nationwide	(2) Eastern	(3) Midwest
<i>Agglomeration</i>	0.791*** (0.190)	1.295*** (0.391)	0.149*** (0.056)
<i>Urbanization</i>	-6.097*** (1.732)	-5.018 (3.688)	1.189** (0.544)
<i>Informatization</i>	-0.283 (0.198)	-0.880* (0.467)	-0.102* (0.054)
<i>Unemployment</i>	0.362*** (0.093)	0.971*** (0.270)	-0.002 (0.024)
<i>Production</i>	2.375*** (0.255)	3.894*** (0.531)	0.296*** (0.081)
Cons	-18.721*** (1.905)	-32.940*** (4.309)	-2.341*** (0.591)
N	300	110	190
R ²	0.377	0.574	0.419

Note: ***, **, * indicates the level of significance at 0.01, 0.05, 0.1, respectively; The standard error of robustness in parentheses (same as in the table below).

5.2 Analysis of Benchmark Regression Results

The test findings for the intermediate mechanism of *Agglomeration* impacting *Activation* are shown in Table 5. According to the influence coefficients and significance levels of core explanatory variables and intermediary variables in the model, it can be concluded that under the influence of *Structure*, *Agglomeration* exerts indirect effects on *Activation* to a certain extent, thus providing sufficient evidence for hypothesis 2 of this paper.

When the intermediate variable is the *Structure*, The greater the degree of *Agglomeration*, the greater the industrial structure, according to the coefficient of regression of 0.733, which has importance at

the 1% level. The regression model is then tested with vital explanation factors and intermediate variables added. The results show that the estimated coefficient of *Agglomeration* index on *Activation* index is 1.508 and is significant at the level of 1%. This shows that after introducing the intermediary variable of *Structure*, it has been proved that *Agglomeration* can effectively promote the *Structure* and drive the improvement of *Activation*. To sum up, *Agglomeration* can reveal favorable Marshall externalities^[39], transform industrial structure through rational allocation of resources and flow of production factors, and enable *Activation* with the "structural effect" of advanced industrial structure. Therefore, hypothesis 2 is valid.

Table 5. Mechanism test of *Agglomeration's* influence on *Activation*

	(4) <i>Structure</i>	(5) <i>Activation</i>
<i>Agglomeration</i>	0.733*** (0.092)	1.508*** (0.199)
<i>Urbanization</i>	1.441*** (0.360)	-3.236*** (0.725)
<i>Informatization</i>	0.242*** (0.075)	-1.822*** (0.150)
<i>Unemployment</i>	-0.311*** (0.043)	-0.267*** (0.092)
<i>Production</i>	-0.306*** (0.086)	2.276*** (0.172)
<i>Structure</i>		2.258*** (0.114)
Cons	2.092*** (0.399)	-10.820*** (0.085)
Sobel	Z=7.380	
Test	P=0.000	
Bootstrap	Z=3.780	
test1	P=0.000	
N	300	300
R ²	0.605	0.857

5.3 Analysis of Threshold Effect Results

The three sets of hypothesis tests that follow are conducted in accordance with the above-mentioned methodology, which tests

the plurality threshold model setting employing *Agglomeration* as the threshold variable: There are three possibilities: (1) there is no threshold; (2) there is a threshold; (3) There are two thresholds. Table 6 displays the

test results. After additional sampling by Bootstrap, the *Agglomeration* passed the significance test of the solitary threshold effect at the level of 1%, while the double threshold passed the test, verifying the research

hypothesis 3 provided in this study. The model contains a single threshold effect of *Agglomeration*, with an acceptable threshold of 1.9318, according to Hansen threshold theories ^[40].

Table 6. Test Results of Threshold Effect

Threshold	F value	P value	Threshold value	BS number of times	Critical value		
					10%	5%	1%
Single threshold	412.62	0.000	1.9318	1000	19.494	23.229	37.484
Double threshold	-38.370	1.000		1000	18.411	28.397	45.430

Second, this study used the least square likelihood ratio statistic (LR) to determine the threshold for the purpose to more clearly view the estimated outcomes of the threshold and the associated 95% confidence interval. The *Agglomeration*'s own likelihood ratio function is plotted as the threshold in Figure 1. When the threshold values are 1.9318, the statistical test value for the likelihood ratio's LR is zero. Consequently, it is classified into two forms according to the threshold heterogeneity interval: low *Agglomeration* ($Agglomeration \leq 1.9318$) and high *Agglomeration* ($Agglomeration > 1.9318$).

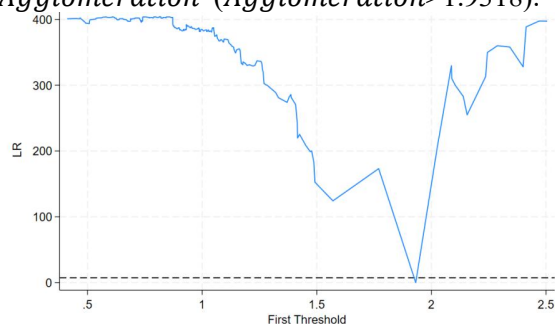


Figure 1. Likelihood ratio function Diagram of Threshold Variables: Financial Agglomeration

Table 7 displays the outcomes of the panel threshold regression. When *Agglomeration* itself is taken as the threshold, there is an obvious nonlinear relationship between it and the activity of *Activation*. When *Agglomeration* is less than 1.9318, the influence coefficient on *Activation* is 0.343, which passes the significance test at 1% level. When *Agglomeration* crosses the threshold value of 1.9318, the influence coefficient on regional *Activation* changes from 3.053, also passing the test at the 1% degree of significance. It shows that with the continuous improvement of the threshold level of *Agglomeration*, the coefficient of influence degree on the *Activation* gradually increases, showing a significant marginal increase.

The role of *Agglomeration* in promoting *Activation* is constrained by its own threshold. Higher *Agglomeration* level can play a "scale effect" and improve the positive driving role of *Activation*. Theoretically speaking, it reflects that the development of *Agglomeration* has a "critical scale" in driving *Activation*. Once the *Agglomeration* breaks through the critical scale, that is, the more robust the area financial industry's expansion, the interaction of innovation can be strengthened, the innovation efficiency of enterprises can be improved, and the *Activation* can be promoted ^[41]. Research hypothesis 3 is confirmed.

5.4 Robustness Check

Three techniques are used to conduct the robustness test in order to determine whether the results are reliable: delaying essential explanatory variables, raising control variables, and lowering control variables. Table 8 displays the experiment's outcomes. The model coefficient is essentially compatible with the study findings in this paper, confirming the robustness of the model results in this article. First, taking into account the duration delay of activation, this paper uses activation with a one-year lag as the new explanatory variable. Second, by employing the *Environment* control variable for testing, the coefficient resembles the research outcome, confirming the model results' resilience. Finally, This study performs a robustness evaluation by lowering the *Informatization* control variable in accordance with the robustness evaluation methodology put out by Sun and Deng (2022) ^[42], and carries out a regression analysis on *Agglomeration* and *Activation* after removing the informatization control variable. In line with the fundamental regression results, the study demonstrates that *Agglomeration* continues

to have a large beneficial impact on robustness of the findings in this paper.
Activation , demonstrating the great

Table 7. Results of Model Parameter Estimation

Parameter	Coef.	Std. Err	t	p> t	95% Conf. Interval	
<i>Urbanization</i>	-0.144	0.864	-0.17	0.868	-1.844	1.557
<i>Informatization</i>	-0.186	0.116	-1.59	0.112	-0.415	0.044
<i>Unemployment</i>	0.079	0.046	1.73	0.085	-0.011	0.170
<i>Production</i>	0.651	0.141	4.62	0.000	0.374	0.929
<i>Agglomeration</i> • I (<i>Agglomeration</i> ≤ γ)	0.343	0.097	3.52	0.001	0.151	0.534
<i>Agglomeration</i> • I (<i>Agglomeration</i> > γ)	3.053	0.101	30.38	0.000	2.855	3.251
Cons	-5.145	0.986	-5.22	0.000	-7.086	-3.204

Table 8. Robustness Test

	(6) <i>L.Activation</i>	(7) Increase variable	(8) Reduce variable
<i>Agglomeration</i>	0.702*** (0.185)	0.796** (0.189)	0.725*** (0.184)
<i>Urbanization</i>	-5.516*** (1.606)	-6.055*** (1.725)	-7.858*** (1.220)
<i>Informatization</i>	-0.122 (0.186)	-0.287*** (0.197)	
<i>Unemployment</i>	0.290*** (0.088)	0.370* (0.093)	0.353*** (0.093)
<i>Production</i>	2.042*** (0.256)	2.384*** (0.254)	2.127*** (0.188)
<i>Environment</i>		0.056* (0.032)	
Cons	-16.612*** (1.962)	-19.118*** (1.911)	-17.008*** (1.484)
N	270	300	300
R ²	0.357	0.385	0.373

6. Conclusions and Prospects

6.1 Research Summary

Utilizing panel data from 30 Chinese provinces from 2011 to 2020, this paper explains the influence of *Agglomeration* on *Activation* from three aspects: direct effect, indirect transmission effect and nonlinear effect. When measuring *Agglomeration* , It is described by the location entropy coefficient, and the *Activation* is computed using the entropy weight approach. In addition, This study examines the intricate relationship between *Agglomeration* and *Activation* utilizing panel fixed effect, intermediate effect, and threshold effect models. The following are the most significant findings:

- (1) According to the state of financial growth and resource inheritance, *Agglomeration* significantly enhances *Activation* activity, and presents the heterogeneity of "East > Midwest". *Agglomeration* is the "catalyst" to improve the *Activation*;
- (2) After the addition of intermediary variables, *Agglomeration* has an indirect impact on regional *Activation*, which is reflected in the indirect promotion of *Activation* through the

"structural effect" of the *Structure*;

- (3) *Agglomeration* has a significant non-linear threshold effect on *Activation* . With the increase of *Agglomeration* level, there is an inflection point between the two. When it is greater than the threshold value, "scale effect" will be produced, which will have a greater impact on *Agglomeration* , showing a marginal increasing effect.

6.2 Management Implications

- (1) The previous study found that the influence of *Agglomeration* on *Activation* presents a regional heterogeneity characteristic of "East > Central and western regions". Therefore, it is necessary to consider the disparity in the geographical development of *Agglomeration* and promote regional coordinated development. On the one hand, the initial technical endowment of the eastern region is relatively high. These areas ought to avoid conceit and rash actions, gradually encourage the financial sector to unite, and more effectively fulfill the function of boosting *Activation* . Nevertheless, in contrast to the eastern region, *Agglomeration* has a weaker impact on the *Activation* in the central and western regions.

The potential presented by the national expansion of the financial industry should be fully utilized by the central and western regions, aggressively bring in top talent and cutting-edge technologies, and take use of the benefits of *Activation*. It should reject the "one-size-fits-all" approach and support the growth of every region in the nation in addition to adhering to the "one-game chess" theory.

(2) The previous research finds that *Agglomeration* can indirectly enhance the *Activation* by improving the *Structure*. It should support the transition of high-consumption industries to significant-efficiency ones and the growth of supplementary sectors with significant value added, that is, the emerging service industry or the big data information industry, and form the foundation of enterprise agglomeration to support the development of new quality productivity. Relying on the advantages of *Agglomeration* such as resource sharing and collaborative innovation, aggressively grow the high-tech sectors, and adhere to the direction of marketization, industrialization and socialization. Comprehensively develop the service industry, and then fully use the pivotal function of *Agglomeration* in the *Activation*.

(3) Nevertheless, this analysis also reveals that, given the actual context of China's uneven regional economic development, there would be variations in the extent of *Activation* promoted by *Agglomeration*. Therefore, the development path of *Agglomeration* with regional characteristics should be explored determined by the actual circumstances in several Chinese locations. While taking inspiration from the excellent instances of *Activation* of financial agglomeration, in tandem with its unique features and real-world issues, it should create plans that address its current state of development, improve industrial linkages, coordination, and interworking across various geographic areas, follow centrally controlled growth, and take advantage of the "agglomeration effect" and "scale effect". Strengthen *Agglomeration* and integration, permit the driving function of "scale effect" to be fully utilized., and enable the sustainable improvement and high-quality development of *Activation*.

6.3 Future Prospects

Even while this research quantifies and examines the method by which *Agglomeration* affects *Activation*, and puts forward suggestions according to the actual situation, there continue to be certain restrictions: (1) The thirty Chinese provinces are used as study items in this paper. Future studies can attempt to delve deeper into the research level, utilize city microscopic data to conduct targeted research, examine the *Activation* of important cities, and provide more precise innovation and entrepreneurship guidance based on the traits of various industries; (2) Regarding varied measurement, this paper explores the mechanism of *Agglomeration* on *Activation*. To further understand the "black box" of *Agglomeration* on *Activation*, we can attempt to incorporate additional mediating or regulatory factors, like resource mismatch, in the subsequent study.

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