Study on the influence of financial agglomeration and economic growth in Shaanxi province

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Keywords: Financial aggregation, Location quotient, Economic development.

Abstract: With the continuous development of financial industry, it gradually forms financial agglomeration due to unbalanced spatial distribution. This study takes financial agglomeration as the research perspective, on the basis of revealing the mechanism of coordination and interaction between financial agglomeration and economic development, constructs the comprehensive evaluation index system of financial agglomeration and economic development, and empirically analyzes the promotion effect of financial agglomeration on economic development in Shaanxi province. Based on the time series data of banking, insurance and securities industry in Shaanxi province from 2009 to 2018, this paper uses the location quotient to describe the agglomeration level of financial industry in Shaanxi province. Through location quotient analysis, stationarity test, co-integration test, Granger causality test and regression analysis, an empirical analysis is conducted on the relationship between financial agglomeration and economic growth in Shaanxi province. In this way, the financing efficiency of enterprises can be improved, the industrial structure of Shaanxi province can be optimized, and the economy of Shaanxi province can be developed rapidly and harmoniously.

1. Introduction

At present, China's economy has entered the "new normal" stage. If we look at the development law of different global economies, China's economy has been in the "speed shift" period after rapid growth. The slowdown of economic growth is not only the concrete manifestation of the transformation of economic development model, but also the inevitable process of the transformation from factor-driven and investment-driven to innovation-driven. At the same time, it is also a higher starting point for the new growth model. Financial agglomeration and economic development are interdependent and mutually reinforcing. The acceleration of economic development will generate higher demand for financial agglomeration level, and the improvement of financial agglomeration level can also promote the efficient development of economy. Many studies have shown that financial industry agglomeration can improve the efficiency of resource allocation and reduce transaction costs, and its effects can form a mechanism to promote regional economic growth.

Due to the difference between the regional distribution of financial resources and the level of economic development, the relationship between the level of financial agglomeration and the level of economic development is a process of unbalanced, continuous adjustment and tending to harmony. Especially in China, financial agglomeration has these very significant regional differences. The economic and financial level in the Middle West regions is relatively low, and the financial agglomeration effect is not obvious. Shaanxi province, as a large western province, has made great progress in economic and financial development. This paper will study and verify the coupling and coordinated development of financial agglomeration and economic development in Shaanxi province under the driving role of financial agglomeration, so as to provide corresponding policy suggestions for effectively promoting of the economic development.

2. Review of the literature

The concept of financial agglomeration was first proposed by economist Kindleberger CP. He

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considered financial agglomeration can coordinate investment and savings among individuals, promote capital transfer, attract capital influx, and form the “heart” of regional economy. In order to reduce transaction costs, financial institutions have a need to concentrate in an appropriate geographical location, which not only promotes the financial industry to obtain economies of scale, but also effectively promotes the iterative optimization of regional economic development and industrial structure.

Financial agglomeration is an inevitable and important stage of financial development. It is difficult to separate the research on the relationship between financial agglomeration and economic development from the research on financial development. As early as in the 1990s, Goldsmith (1990) pointed out that financial development and economic development characterized by the change of industrial structure are mutually causal, and the change of industrial structure is a manifestation of the macro effect of financial agglomeration. Park (2005) studied the economies of scale effect of financial agglomeration will have an important impact on economic growth; Levine (2009)’study based on a large number of theoretical and empirical studies, proves that there is a strong positive correlation between the long-term economic development and finance, and points out that the regional economic development cannot be understood if the cross-regional flow of financial resources cannot be fully understood; Vuthipapadorn (2000) took ten Asian countries as objects of study, it is believed that the investment amount of most countries from 1950 to 2000 will increase with the financial development, but the investment increase may not necessarily promote the financial development, which can be regarded as the study on the agglomeration effect from the perspective of financial scale agglomeration. Gehrig (2010) found that regional financial activities coexist with the characteristics of spatial agglomeration and spatial dependence dispersion in adjacent areas. Al-Tammam(2011) studied through the study of Saudi Arabia, Kuwait and Oman, and the empirical study of the relationship between financial development and economic development, the results are not uniform, and the relationship between financial development and economic development cannot be determined. Apergis and Filippidis (2015) divided the countries into the OECD countries group and developing countries group, and the comparative study shows that financial development can indeed promote economic growth, especially in developing countries, financial agglomeration will strengthen this effect.

Domestic studies on financial agglomeration and economic development mainly have two perspectives. One is to analyze the relationship between financial industry agglomeration and regional economic development. Teng chunqiang (2009) believes that in the process of economic development, financial clusters provide lasting competitive impetus; Lin jiangpeng and huang yongming (2010) analyzed the general mechanism of financial agglomeration which promoting economic development; Chen wenfeng and ping ying (2014) studied the relationship between financial agglomeration and economic development in Shanghai from 2004 to 2013, and found that there was a long-term equilibrium relationship between the two, and financial agglomeration was the granger cause of economic development; Li jingxia, li Lin and ding yi (2014) also proved that there is a significant positive relationship between financial agglomeration and economic development; Sun weifeng and huang jieyu (2015) pointed out that financial industry agglomeration is one of the reasons leading to the gap in terms of regional economic development. Liu shuai and Li haifeng (2015) made an empirical analysis of dynamic panel data of provinces and cities in western China, and the results showed that banking, insurance and practical foreign capital agglomeration had a significant positive impact on economic development in western China, while securities industry agglomeration had a negative impact; Luo zifan (2016) used entropy weight method and coupling model to evaluate the coupling coordination relationship between financial agglomeration and economic development in six provinces and one city of east China from 2006 to 2015; He yiqing (2017) et al. analyzed the coupling coordination degree between financial agglomeration and economic development in six provincial capital cities in central China from 2007 to 2016, and concluded that there were great differences in the coupling coordination degree between financial agglomeration and economic development; Wang gaojie and wang liyun (2017) used APH-EVM combined weighting method to evaluate the coordination degree of financial and

regional economy coupling in bohai rim region from 2007 to 2016.

From the existing literature, the domestic and foreign related research are focus on financial development, the study between financial agglomeration and the relationship of the economic development, in recent years, begin to pay close attention to domestic financial agglomeration can promote economic development. However, foreign scholars pay more attention to whether financial prosperity can promote economic development, and few studies focus on the coordination between financial agglomeration and economic development. Few literatures that study the coordination between financial agglomeration and regional economic development fail to explain the mechanism of coordinated development between financial agglomeration and economy. In the empirical process, the evaluation of financial agglomeration level is equivalent to that of financial development level, the process and result of financial agglomeration are not reflected. In addition, existing researches only focus on the developed or relatively developed eastern and central regions, and lack of in-depth researches on the underdeveloped western regions with rapid economic growth to discuss the due role of finance in its economic development.

3. The mechanism of financial agglomeration on economic growth

3.1 External Scale Economies Effect

External economies of scale come from the expansion of industrial scale caused by the increase of the number of enterprises in the industry. The external economies of scale brought by financial agglomeration to economic growth are mainly manifested as follows: Because the phenomenon of financial agglomeration improves the efficiency of capital use, it provides more convenient financing and investment system for the development of the real industry in the region, and allows various real industries to enjoy financial sharing. The external economies of scale produced by financial agglomeration can not only increase the returns of financial industry and its affiliated industries, but also encourage the region to attract other industries to join, thus driving the economic growth of the whole region.

3.2 knowledge spillover effect

Financial agglomeration creates favorable conditions for the dissemination of knowledge. The financial agglomeration area has a large number of finance-related industries and high-end financial talents, and the information exchange is also very convenient, accelerating the spillover of knowledge. The mechanism of knowledge spillover can be divided into three parts. First, competition and cooperation among relevant enterprises. There are a large number of financial and finance-related enterprises in the cluster area, and the competition pressure between enterprises is very high. Due to various reasons such as space limitation and trust problems, enterprises continuously acquire knowledge through joint construction and enterprise acquisition, forming knowledge sharing and reducing enterprise operating costs. Second, knowledge sharing is transmitted through informal ways such as the Internet. Enterprises and individuals in the region acquire knowledge through mutual exchange of personnel. Knowledge, technology and experience in the region are further integrated and exchanged with local cultural characteristics through various means of personnel exchange, gradually forming a spillover effect. Thirdly, the flow of talents promotes the overflow of knowledge. With the gradual improvement of the degree of financial agglomeration and the intensification of competition among enterprises, the flow of talents has become one of the important ways of knowledge overflow. Financial talents continue to flow in the agglomeration center or spread to surrounding cities due to salary, career prospect and other reasons, which makes financial related knowledge, experience and methods constantly exchanged and Shared within the region, thus promoting inter-regional financial development.

3.3 Catalytic effect of innovation

Innovation is the primary driving force for development and an important source of economic growth. Financial agglomeration can reduce the cost of obtaining effective information for

finance-related enterprises, improve productivity, promote information exchange among institutions, increase the added value of products, improve the allocation efficiency of financial resources, and finally achieve the optimization and upgrading of the whole industry. Faced with various risks in the process of industrial upgrading, financial institutions continue to bring forth new products, which not only further improve the level of financial agglomeration, but also optimize the financial structure and promote financial agglomeration.

4. An empirical analysis of the coordination between financial agglomeration and economic growth in Shaanxi province

4.1 Measurement of financial agglomeration

4.1.1 Macroeconomic level

There are many ways to measure industrial agglomeration in foreign literature. This paper mainly uses location quotient to measure the degree of agglomeration. Location quotient is based on the Gini coefficient, it is an indicator to measure the degree of specialization of an industry in a certain area. The expression formula is:

$$\mathrm{LQ} = \frac{P_{\mathrm{ij}} / P_j}{P_i / \mathrm{P}} \quad (1)$$

LQ is the location quotient of i industry in j area, P_{ij} is the production value of i industry in j area, P_j total value of out-put in j area, P_i is the production value of national industry i, p is the total national GDP. If the location quotient is greater than 1, it is considered that this region has a high degree of industrial agglomeration and has certain advantages in the whole country. If the location quotient is less than 1, it indicates that this region has a low industrial agglomeration degree and is at a disadvantage nationwide. The location quotient method is a simple and effective method to study the degree of industrial agglomeration.

4.1.2 Financial industry level

The comprehensive agglomeration of banking industry, securities industry and insurance industry is an important index to measure financial agglomeration in Shaanxi province. Based on the availability of data and the representativeness of index selection, this paper comprehensively selects the location quotient of banking industry, securities industry and insurance industry to measure the financial industry agglomeration in Shaanxi province. Among them, the location quotient of the banking industry is measured by the location entropy of deposits and loans in different regions, the details are shown in equation (2).

$$\mathrm{LQ}_{BANK} = \frac{D_{\mathrm{i}} / G_i}{D / \mathrm{G}} (2)$$

In the above equation, D_{i} represents the deposit and loan balance of Shaanxi province in the i year, G_i represents the gross domestic product of Shaanxi province in the i year, D represents the deposit and loan balance of the whole country, and G represents the gross domestic product of the whole country. In equation (2), the agglomeration of deposit and loan balances quantitatively replaces the agglomeration of the banking industry, which can better reflect the agglomeration of the banking industry to a certain extent.

When analyzing the agglomeration of the securities industry, this paper also measures the location quotient of the securities industry, which is measured by the location entropy of the number of securities companies in each region. The formula is shown in formula (3):

$$\mathrm{LQ}_{SECURITY} = \frac{C_{\mathrm{i}} / S_i}{C / \mathrm{S}} (3)$$

$LQ_{SECURITY}$ in the above equation represents the agglomeration status of the securities industry. Where Ci is the number of listed companies in the i year of Shaanxi province, Si is the land area in the i year of Shaanxi province, C is the number of listed companies in the whole country, and S is the total area of the whole country. The location quotient of listed companies can reflect the agglomeration of securities industry to some extent.

When measuring the insurance industry agglomeration in Shaanxi province through the insurance location quotient, the premium income of Shaanxi province is adopted for corresponding substitution, and the agglomeration degree of the insurance industry is measured by the agglomeration degree and trend of premium income, as shown in formula (4):

$$LQ_{INSURANCE} = \frac{P_i / G_i}{P / G} \tag{4}$$

$LQ_{INSURANCE}$ in the above equation represents the degree of financial industry agglomeration, p_i represents the premium income of Shaanxi province in the i year, G_i represents the gross domestic product of Shaanxi province in the i year, P represents the overall premium income of the whole country in that year, and G represents the gross domestic product of the whole country in that year. Premium income is one of the important indicators to measure the development of the insurance industry. Therefore, this paper objectively measures the agglomeration degree of the insurance industry by selecting the agglomeration status of premium income in formula (4).

4.2 Measurement of financial industry cluster in Shaanxi province

4.2.1 Macroeconomic level

In this paper, the added value of the financial industry is selected as the indicator to analyze the degree of financial industry agglomeration in Shaanxi province, and the GDP of Shaanxi province is used as the indicator to analyze the level of economic growth. The expression formula of the location quotient of the financial industry in Shaanxi province is as follows:

$$F = \frac{z_i / e_i}{Z / E} \tag{5}$$

Where z_i represents the added value of the financial industry in Shaanxi, e_i represents the GDP of Shaanxi, Z represents the added value of the national financial industry, E represents the national GDP, and F represents the regional location quotient of the financial industry in Shaanxi.

Based on the data sources such as China statistical yearbook and Shaanxi statistical yearbook, this paper selects and sorts out the relevant economic and financial data of Shaanxi province, and calculates the location entropy index of the financial industry in Shaanxi province from 2009 to 2018. The calculation results are shown in figure 1:

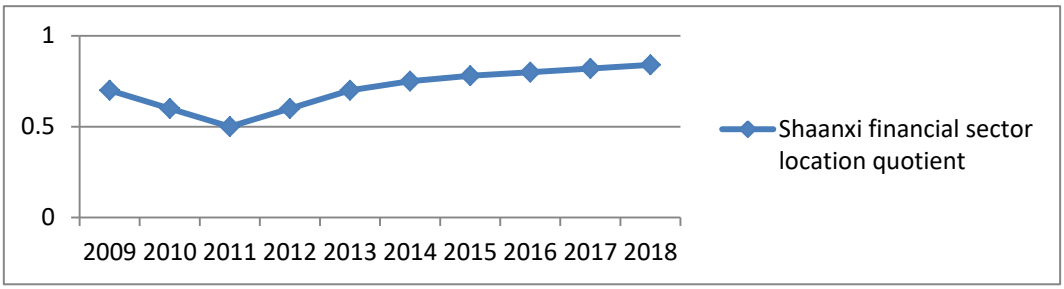

Figure 1 financial industry agglomeration capacity chart of Shaanxi from 2009 to 2018

It can be seen from the figure that the location quotient of financial industry in Shaanxi has a steady rise. After reaching the bottom in 2011, the index rises and the agglomeration effect gradually emerges.

4.2.2 Financial industry level

This paper chooses 2009-2018 as the time interval to analyze the financial industry agglomeration level in Shaanxi province. According to China economic statistical yearbook and China financial statistical yearbook, the economic and financial data of Shaanxi province from 2009 to 2018 are selected and sorted, and the balance of deposits and loans in the banking industry, number of listed companies in the securities industry and insurance premium income are selected as the main analysis and calculation indexes, the cluster location quotient of Shaanxi banking, securities and insurance industry is calculated. Through the horizontal comparison of the calculation results of financial cluster location entropy index in different years and the comparison of the longitudinal dynamic growth and change of time, the degree and status of financial industry cluster in Shaanxi province are analyzed.

Table 1 location quotient of banking, insurance and securities industry in Shaanxi province

Year	Location quotient of Banking LQ_{BANK}	Location quotient of Securities Industry $LQ_{SECURITY}$	Location quotient of Insurance Industry $LQ_{INSURANCE}$
2009	0.74	0.32	0.84
2010	0.75	0.68	0.83
2011	0.78	0.68	0.87
2012	0.79	0.52	0.85
2013	0.82	0.39	0.87
2014	0.84	0.99	0.86
2015	0.86	0.92	0.86
2016	0.83	0.84	0.84
2017	0.86	0.96	0.85
2018	0.88	0.85	0.86

According to table 1, the location quotient of banking, insurance and securities industries in Shaanxi province is all less than 1, that is, LQ < 1. Among them, the banking industry agglomeration level in Shaanxi province shows a general growth trend, indicating that the banking industry in Shaanxi province has maintained a good development trend, formed a certain scale, reached a certain level of agglomeration, and is gradually evolving to a balanced development mode. Meanwhile, the location entropy of Shaanxi securities industry fluctuates up and down during this period. In addition, although the insurance industry in Shaanxi province has been on the rise in recent years, the regional entropy of the securities industry has been around 0.8, not reaching the national average level.

4.3 Empirical Analysis

4.3.1 Locational quotient analysis

By substituting the data of Shaanxi statistical yearbook and China finance yearbook into the formula of location entropy, the industrial level of Shaanxi banking, securities and insurance industry in the whole country can be obtained. The results show that, on the one hand, the location quotient value of banking, securities and insurance industry is close to each other, maintaining around 0.8. The average locational quotient of the insurance industry was the highest, reaching 0.853, while that of the securities industry was 0.715, lower than the national average. All these fully indicate that the financial industry agglomeration in Shaanxi province is still at a low level. Although Shaanxi province has been committed to optimizing the financial industry system, there is still a certain gap compared with developed regions, and the financial industry still needs to be further strengthened.

4.3.2 Stationarity Test

In order to ensure that the obtained results do not appear “pseudo-regression”, the stationarity

test of the original time series should be carried out. In the research process, in order not to change the nature and relationship of data, so that the obtained data can eliminate the heteroscedasticity problem, all variable data in this study are logarithm processed. They are denoted as Lnbank, LnInsurance, LnSecurity and LnG respectively. The test results are shown in table 2.

Table 2 ADF unit root test results

variate	ADF	critical value of 1%	critical value of 5%	critical value of 10%	Whether smooth
Lnbank	-1.897	-3.809	-3.021	-2.650	NO
LnInsurance	-1.544	-3.809	-3.021	-2.650	NO
LnSecurity	-2.108	-3.832	-3.030	-2.650	NO
LnG	-3.929	-3.887	-3.052	-2.667	YES
△LnBank	-3.870	-3.809	-3.021	-2.650	YES
△Lninsurance	-4.622	-3.809	-3.021	-2.650	YES
△LnSecurity	-3.823	-3.809	-3.021	-2.650	YES

It can be seen from table 2 that the ADF values of LnBank, LnInsurance and LnSecurity of the original sequence are all greater than the significance level critical values of 1% and 5%. Therefore, the original hypothesis is accepted by the variable and the unit root exists, which is a non-stationary sequence. Meanwhile, the ADF value of LnG is less than the critical value of significance level of 1% and 5%, which rejects the null hypothesis and indicates that the variable sequence is stable. The three non-stationary original sequences were first difference, and the critical values of the ADF values of the variables △LnBank, △LnInsurance and △LnSecurity were less than 1% and 5% significance levels, indicating that the first-order difference sequences were all stationary sequences. Therefore, △LnBank, △LnInsurance and △LnSecurity are all first-order single integer stable sequences, while LnG is the original sequence stable. As the single integer order of the four variables are all low, it indicates that the single integer order of the explained variable is lower than that of any one explanatory variable. Meanwhile, there are three explanatory variables whose single integral order is higher than that of the explained variable, so the co-integration test can be carried out to verify the existence of long-term equilibrium relationship.

4.3.3 Johansen co-integration test

The methods of co-integration test mainly include e-g two-step test and Johansen multiple co-integration test. The former is mainly applicable to two single-order integral variables, while the latter can be used for inter-variable test. Therefore, this study uses Johansen co-integration test to explore the co-integration relationship between financial agglomeration and economic growth in Shaanxi province. The test results are shown in table 3.

Table 3 Johansen co-integration test results

Cointegration vector number	characteristic root	trace statistic	critical value of 5%	Maximum characteristic root statistic	critical value of 5%
None*	0.897	75.773	57.856	50.265	27.584
1	0.728	45.509	39.797	34.712	23.132
2	0.510	10.797	15.495	14.265	16.265
3	0.050	0.765	3.841	0.8810	3.841

As can be seen from table 3, both trace test and maximum characteristic root test show that there is a long-term equilibrium relationship among the four variables, that is, at the significance level of 5%, the null hypothesis without co-integration relationship is rejected. Therefore, there is a long-term equilibrium relationship between variables, and there are two co-integration vectors.

4.3.4 Granger causality test

It can be seen from the co-integration test that there is a co-integration relationship among the

variables of the model. Therefore, Granger causality test is carried out for each variable in this paper to clarify the dynamic causality between variables and determine the independent variables in the model. In this paper, different information criteria of the model are integrated, and Granger test with a lag of two periods is selected. Granger causality test results among variables are shown in table 4.

Table 4 results of Granger causality test

null hypothesis	F-statistics	value p	conclusion
LnBank does not Granger Cause LnG	8.1240	0.0112	refuse
LnG does not Granger Cause LnBank	6.4560	0.0071	refuse
LnSecurity does not Granger Cause LnG	7.4772	0.0231	refuse
LnG does not Granger Cause LnSecurity	4.6478	0.0495	refuse
LnInsurance does not Granger Cause LnG	1.5707	0.2471	accept
LnG does not Granger Cause LnInsurance	3.3932	0.0286	refuse

As can be seen from the above table, there is a causal relationship between banking cluster and economic growth, that is, economic growth is the granger cause of banking cluster, and banking cluster is also promoting the development of local economy. Similarly, the securities industry also shows granger causality with economic growth. Since 0.0286 is less than 0.05, the null hypothesis is rejected, that is, regional economic growth is the granger cause of insurance industry agglomeration, and regional economic growth plays a certain role in promoting insurance industry agglomeration.

5. Conclusions and policy recommendations

5.1 Shaanxi's financial industry agglomeration level does not have obvious advantages, so the financial market system of Shaanxi should be improved

After the financial crisis in 2008, the emergence of bubble economy had different degrees of impact on the banking industry, securities industry and insurance industry, leading to sudden industrial agglomeration at different time points. At present, Shaanxi province has formed a banking, securities, insurance and other coexisting financial system. However, compared with the whole country and developed regions, the financial service industry still contributes less to the economy, and the banking and financial institutions are still “the only one”. In particular, the national banking and financial institutions still occupy the main position in Shaanxi finance, and the number of legal financial institutions is limited, and the number of inter-provincial development is even smaller. Therefore, Shaanxi should encourage the development of small and medium-sized institutions, such as rural Banks, foreign Banks and regional small and medium-sized commercial Banks, to build a multi-level financial system, realize complementary financial functions and meet diversified financial needs.

5.2 Shaanxi financial industry structure is not reasonable, should promote the healthy and coordinated development of financial industry

Financial structure refers to the distribution, existence, relative scale, mutual relation and coordination state of each component of the financial aggregate. Compared with some developed or fast developing provinces and cities in central and eastern China, the business development of small and medium-sized financial institutions in Shaanxi province is relatively slow. The internal structure of financial assets also needs to be improved, and financial development has not been converted into investment through a high proportion of savings. The income ratio in Shaanxi province has been above 1.5 in recent years, indicating its high saving capacity. Generally speaking, Shaanxi province is in a poor state of saving, and the fund can meet its own needs, and there is a large surplus of funds. Over the past decade, the ratio of loans to deposits in Shaanxi has been declining. The financial market is characterized by insufficient financing and unbalanced supply and demand structure. There is still great potential for indirect financing in Shaanxi province. The

Shaanxi provincial government should make regional financial planning according to the current situation of economic and financial agglomeration in various regions, and coordinate the development relationship between economy and regional finance. At the same time, according to the needs of different stages of economic development in different regions, different financial agglomeration modes are selected to formulate financial policies tailored to local conditions and create corresponding institutional environment, so as to attract financial institutions and avoid repeated waste of resources and low efficiency. Secondly, at present, financial institutions in Shaanxi province are relatively single and have a low degree of specialization, so in order to avoid vicious competition and repetitive work construction among financial enterprises. Local governments should take measures to guide financial enterprises to develop in a professional direction, promote the coordinated development of large and small financial enterprises, achieve functional differentiation of financial products, and promote the construction of financial centers and the agglomeration effect of financial industries.

5.3 Shaanxi financial industry scale strength is insufficient, should continue to build Shaanxi financial center

The financial agglomeration degree in Shaanxi is lower than the national level, and the benign relationship with economic development has not been established. If Shaanxi province wants to narrow the gap, it should build its own characteristic financial center and improve the coupling degree of financial agglomeration and economic development. Shaanxi province should start with developing its own regional advantages and take it as the center to develop financial industry, so as to form agglomeration effect. Especially in Shaanxi province, where the economy is in a stage of rapid development, many large-scale infrastructure projects are being carried out gradually. In this process, local investment accelerates the formation of industrial capital, and local financial risk transfer will promote the innovation of financial instruments, various forms of financial institutions have emerged to promote the concentration of corporate financial institutions and high-end links of financial products to financial centers. Government agencies can seize this opportunity to promote the construction of financial centers.

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