

# The Study on the Financial Industry Aggregation and the Regional Economic Growth

## Empirical Analysis of Zhongyuan Urban Agglomeration

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**Abstract**—Zhongyuan urban agglomeration was incorporated into the new-type urbanization state plan in 2014, which will promote the rise of central China and lead the important growth pole of economic development in the Midwest. Taking financial industry agglomeration and economic characteristics of Zhongyuan urban agglomeration into account, this paper selects the relevant data from 1996 to 2013 of Zhongyuan urban agglomeration, and uses the methods of location entropy and granger causality test to find the relationship between financial industry agglomeration and regional economic growth. The results show that financial industry agglomeration has a positive effect on the overall economic growth of Zhongyuan urban agglomeration. According to the empirical results in the development status of Zhongyuan urban agglomeration, this paper put forward some advises, such as developing small and medium-sized financial institutions and internet financial institutions, playing the government of regional planning and guiding role and construction of financial background service center, accelerating the speed of Zhongyuan urban agglomeration of financial industry agglomeration, and promoting the sustainable development of regional economy.

**Keywords**—financial industry agglomeration; regional economic growth; zhongyuan urban agglomeration; location entropy

### I. INTRODUCTION

Finance is considered to be the core of modern market economy, it plays an important role in promoting regional economic growth. With the acceleration of the process of financial globalization and the high concentration of international financial center and the attention of the various countries to the financial industry, financial industry agglomeration has become one of hot topics of academic circles. This paper is to study the relationship between financial industry agglomeration and economic growth of Zhongyuan urban agglomeration by taking the financial industry agglomeration and economic characteristics of Zhongyuan urban agglomeration into account. It is believed that financial industry agglomeration has an important

significance on the economic development of the underdeveloped central and western regions. At the same time, and it is helpful to the Zhongyuan urban agglomeration Economic Development and the rise of central China.

### II. ZHONGYUAN URBAN PRESENT SITUATION ANALYSIS OF AGGLOMERATION ECONOMY AND FINANCIAL INDUSTRY DEVELOPMENT

#### A. Present situation of economic development of Zhongyuan urban agglomeration

Zhongyuan urban agglomeration has broad and core concept. The broad Zhongyuan urban agglomeration includes 18 provincial cities in Henan Province. But the core is regarded Zhengzhou and Luoyang as the center, including Kaifeng, Pingdingshan, Xinxiang, Jiaozuo, Xuchang, Luohe and Jiyuan of 9 cities. From in the near term, the core area which is located in an hour and a half circle, is integrated easily, so the research is mainly around the core area. The core area is 5.87 ten thousand square kilometers, which is accounting for 35.3% of all province's land area, total population of 44.387 million people, and accounting for 47.16% of the province's population, including 14 county-level cities, 33 countries, and 340 towns.

With Zhongyuan urban agglomeration strategy, the economy excepted of the 2009 GDP growth rate of 6.66%, has maintained rapid growth from 2003 to now. From fig.1, the GDP gross of Zhongyuan urban agglomeration keeps rising trend in the past 20 years, as of 2013, the GDP of Zhongyuan urban agglomeration was 1896.152 billion Yuan, which has an increase of 9.29% over the previous year, accounting for 58.97% of Henan province. Among the GDP the first industrial added value 149.822 billion Yuan is year-on-year rises of 7.96%; the second industrial added value of 1116.292 billion Yuan is year-on-year rises of 7.66%; the third industrial added value of 6300.037 billion Yuan is year-on-year rises of 12.46%. At the same time, the data shows that the average annual increase of 13.95% of Zhongyuan urban agglomeration in nearly 5 years which is 1.66% higher than the average level of 12.29% in the Henan province and is about 1.34 percentage points higher than the average level

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of 12.61% of the whole nation. The first, second or third industry including per capita GDP growth have also similar situation “Table I”, it concludes Zhongyuan urban agglomeration developed rapidly.

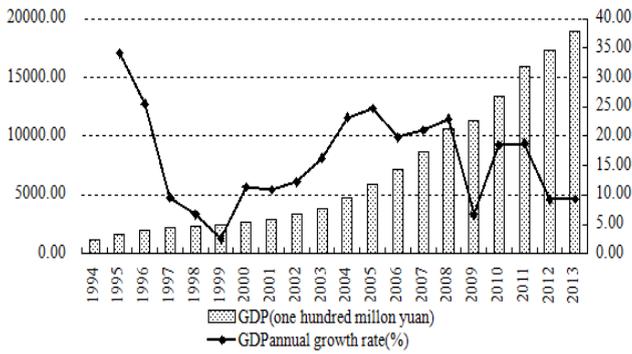


Fig. 1. GDP and GDP annual growth rate of Zhongyuan urban agglomeration

TABLE I. ANNUAL ECONOMIC GROWTH OF ZHONGYUAN URBAN AGGLOMERATION IN 2008-2013

Unit: %

Regional	GDP	Primary Industry	Second Industry	Third Industry	Per Capita GDP
Zhongyuan urban agglomeration	13.95	10.98	13.56	15.50	12.40
Henan Province	12.29	8.83	11.66	15.08	12.24
countrywide	12.61	11.07	10.88	14.82	12.07

**B. Current situation of development of financial industry in Zhongyuan urban agglomeration**

With the rapid development of the economy of Zhongyuan urban agglomeration, financial industry also shows a rapid growth momentum. The data of Zhongyuan urban agglomeration of financial development scale is in continuous expansion from 2008 to 2013. It concludes: (1) In 2013, Zhongyuan urban agglomeration of financial sector

increased by 80.730 billion Yuan, an increase of 23.37%, accounting for 68.31% of the province's financial sector increased. Deposits balance of financial institutions is 2383.071 billion Yuan, and the loan balance is 1642.058 billion Yuan, each of which accounted for 63.39% and 69.84% of the province; (2) In 2013, Zhongyuan urban agglomeration of premium income reached 53.918 billion Yuan, the depth of insurance is 2.84%, and the insurance density is 1214.73 Yuan/person; (3) In 2013, Zhongyuan urban agglomeration securities trading volume is 1527.112 billion Yuan, accounting for 82.16% of the province's trading volume. As of now, there are 176 Securities branch structure, 178 small loan companies and 53 listing Corporation in the region. At the same time, Henan Province have 238 Securities branch structure, 296 small loan companies and 68 listing Corporation; (4) From “Table II”, financial industry development of Zhongyuan urban agglomeration is mainly concentrated in the provincial capital city of Zhengzhou, and the indicator of Zhengzhou is much higher than other cities. Especially, 78 futures business department has 69 in Zhengzhou because of Zhengzhou futures exchange. It can be said that Zhengzhou's financial advantage is very obvious as the central city of Zhongyuan urban agglomeration.

The total scale of the financial industry in the Zhongyuan urban agglomeration can be measured by the financial interrelation ratio (FIR), which is the ratio of the total amount of finance activities and economic activities in a certain period of time. Total financial activities are usually expressed by the total amount of financial assets, while the total economic activities are represented by GDP. This paper uses the ratio between Zhongyuan urban agglomeration of financial institutions to deposit and loan balances and the corresponding GDP. As can be seen from Figure 2, in general, with the economic development, the total financial assets of Zhongyuan urban agglomeration continued to grow, and the financial interrelation ratio maintained a growth trend, which indicates that the degree of agglomeration of financial resources is increasing year by year. Financial resources gradually flow into Zhongyuan urban agglomeration. The growth of regional financial assets was faster than the growth of GDP.

TABLE II. THE DEVELOPMENT OF 9 CENTRAL CITIES OF ZHONGYUAN URBAN AGGLOMERATION IN 2013

City	Deposit balance of financial institutions (100 million)	Financial institutions loan balance (100 million)	Premium income (yuan)	Securities trading volume (100 million)	Number of financial practitioners (100 million)
Zhengzhou	12450.50	9342.3	222.37	10132.35	5.14
Kaifeng	1134.27	699.42	32.72	441.43	0.58
Luoyang	3350.30	1966.00	70.81	1830.23	2.30
Pingdingshan	1666.20	1060.60	42.06	718.20	1.86
Xinxiang	1723.62	1037.76	52.28	759.19	1.26
Jiaozuo	1151.52	773.40	42.67	449.34	1.73
Xuchang	1410.50	999.20	42.76	585.25	0.69
Luohe	687.40	343.90	24.88	281.89	0.61
Jiyuan	256.40	198.00	8.64	73.24	0.2
Zhongyuan urban agglomeration	23830.71	16420.58	539.19	15271.12	14.37
Henan	37591.70	23511.41	916.52	18586.20	25.35

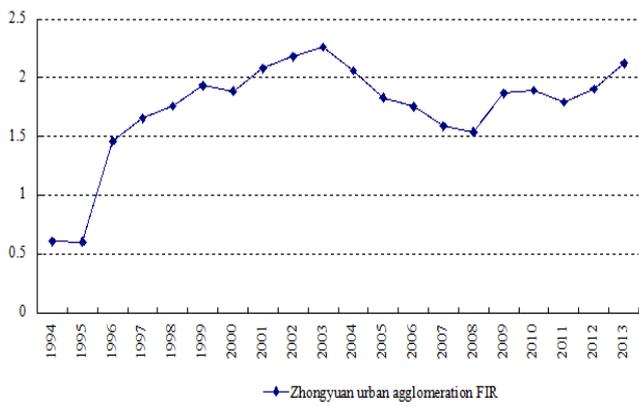


Fig. 2. financial interrelation ratio of Zhongyuan urban agglomeration in 1994-2013

### III. FINANCIAL INDUSTRY OF ZHONGYUAN URBAN AGGLOMERATION ANALYSIS

The location entropy is also called the local specialization index, which is used to measure the spatial distribution of a regional element, while the position and function of the region is in the high level. In order to study the agglomeration of financial industry in the Zhongyuan urban agglomeration, in this paper, the index will be divided into location entropy of banking industry, location entropy of securities industry and location entropy of insurance industry. The calculation formula is as follows:

$$LQ_b = \frac{B_c/G_c}{B/G} \quad LQ_i = \frac{I_c/G_c}{I/G} \quad LQ_s = \frac{S_c/G_c}{S/G}$$

Above the three formulas,  $LQ_b$ ,  $LQ_i$  and  $LQ_s$  represent the banking, insurance and securities industry location entropy respectively.  $B_c$ ,  $I_c$ ,  $S_c$  and  $G_c$ , respectively, are on behalf of the Zhongyuan urban agglomeration of financial institutions deposit and loan balance, premium income, securities trading volume and GDP.  $I$ ,  $B$ ,  $S$  and  $G$ , respectively, are the financial institutions deposit and loan balances, premium income, securities trading volume and GDP of Henan Province. At the same time, the financial development of Zhengzhou, which is the central city of Zhongyuan urban agglomeration, is ahead of other cities, and it also lists Zhengzhou's banking, insurance and securities location entropy in "Table III".

The data is from 9 cities in Zhongyuan urban agglomeration data. The date of securities trading volume was published since 2009, so the location entropy of securities industry only listed 5 years of index in "Table III". In "Table III", the location entropy result suggests that the Location entropy of banking industry is more than the critical value 1, and the Location entropy of insurance industry is near the critical value of 1, while the Location entropy of securities industry is significantly higher than 1. In a certain extent, the phenomenon of the agglomeration of financial industry exists in Zhongyuan urban agglomeration, but it's not very obvious. In contrast, Zhengzhou, as a central city, the degree of agglomeration of financial industry, is relatively high, especially in securities industry agglomeration.

TABLE III. REGIONAL ENTROPY OF FINANCIAL INDUSTRY IN THE ZHONGYUAN URBAN AGGLOMERATION IN 1996-2013

Particular year	Location entropy of banking industry		Location entropy of insurance industry		Location entropy of securities industry	
	Zhongyuan urban agglomeration	Zhengzhou	Zhongyuan urban agglomeration	Zhengzhou	Zhongyuan urban agglomeration	Zhengzhou
1996	0.99	1.53	0.92	1.09		
1997	1.01	1.42	0.94	0.93		
1998	0.99	1.41	1.02	1.06		
1999	1.04	1.55	1.15	1.37		
2000	1.05	1.58	1.15	1.26		
2001	1.10	1.85	1.13	1.40		
2002	1.10	1.91	1.14	1.43		
2003	1.11	1.96	1.14	1.32		
2004	1.12	2.02	1.13	1.46		
2005	1.11	2.03	1.07	1.25		
2006	1.08	1.92	1.02	1.21		
2007	1.08	1.88	1.01	1.19		
2008	1.08	1.99	0.95	1.09		
2009	1.12	2.07	0.95	1.08	1.42	3.28
2010	1.12	2.01	0.88	0.95	1.42	3.18
2011	1.12	1.85	0.92	0.94	1.43	3.04
2012	1.08	1.76	0.94	1.13	1.41	3.08
2013	1.12	1.85	1.00	1.26	1.39	2.83

IV. EMPIRICAL ANALYSIS OF THE RELATIONSHIP BETWEEN FINANCIAL INDUSTRY AGGLOMERATION AND REGIONAL ECONOMIC GROWTH IN ZHONGYUAN URBAN AGGLOMERATION

A. Selection of variables and model

This paper studies the relationship between financial industry agglomeration of Zhongyuan urban agglomeration and regional economic growth with the quantitative index of the financial industry agglomeration of Zhongyuan urban agglomeration, such as banks, insurance and securities location entropy. At the same time, the securities of the urban starts relatively late, and are small, so the data is difficult to obtain. Then the paper does not consider the impact of the securities industry on regional economy. The empirical analysis of the main indicators of the national product (GDP), bank location entropy (LQ<sub>b</sub>) and insurance location entropy (LQ<sub>i</sub>) studies the phenomenon between regional economic growth and financial industry agglomeration. The data were selected from 1996 to 2013, Which from “Henan Statistical Yearbook”, “China City Statistical Yearbook” and “China Insurance Yearbook” “Table IV”.

TABLE IV. PRIMARY DATA OF FINANCIAL INDUSTRY AGGLOMERATION AND ECONOMIC GROWTH OF THE ZHONGYUAN URBAN AGGLOMERATION

Particular year	GDP	LNGDP	LQ <sub>b</sub>	LNLQ <sub>b</sub>	LQ <sub>i</sub>	LNLQ <sub>i</sub>
1996	2002.74	7.60	0.99	-0.01	0.92	-0.08
1997	2194.35	7.69	1.01	0.01	1.15	0.14
1998	2340.82	7.76	0.99	-0.01	1.03	0.03
1999	2400.54	7.78	1.04	0.04	1.15	0.14
2000	2673.26	7.89	1.05	0.05	1.15	0.14
2001	2964.96	7.99	1.10	0.10	1.13	0.12
2002	3326.03	8.11	1.10	0.09	1.14	0.14
2003	3868.15	8.26	1.11	0.10	1.14	0.13
2004	4764.76	8.47	1.12	0.11	1.13	0.12
2005	5942.18	8.69	1.11	0.11	1.07	0.07
2006	7116.89	8.87	1.08	0.08	1.02	0.02
2007	8610.58	9.06	1.08	0.08	1.01	0.01
2008	10584.69	9.27	1.08	0.08	0.95	-0.05
2009	11289.99	9.30	1.15	0.14	0.99	-0.01
2010	13375.39	9.47	1.16	0.14	0.90	-0.10
2011	15885.48	9.65	1.12	0.12	0.92	-0.08
2012	17349.06	9.76	1.08	0.08	0.94	-0.06
2013	18961.52	9.85	1.12	0.11	1.00	0.00

B. Stationary test

Economic analysis usually assumes that there is a long-term balance relationship between the variables, which are involved in the study of the economic theory. According to this assumption, in the estimation of long-term relationships, the time series are not satisfied with this assumption in most cases. Thus, the classical T test and F test, which is given by this assumption, will give misleading spurious regression

problems. In order to deal with this problem, this paper carries on the stationary test of the national gross product (GDP), bank location entropy (LQ<sub>b</sub>) and insurance Location entropy (LQ<sub>i</sub>). In “Table V”, the total national product (GDP), the bank location entropy (LQ<sub>b</sub>) and the insurance location entropy (LQ<sub>i</sub>) in the 2 order are a single integer.

TABLE V. TIME SERIES VARIABLE STATIONARY TEST

Variable	1% level	5% level	Test value	P value	Conclusion
LNLQ <sub>b</sub>	-3.857386	3.040391	2.143769	0.2314	Instable
LNLQ <sub>i</sub>	-3.857386	3.040391	2.179458	0.2194	Instable
LNGDP	-3.857386	3.040391	0.570655	0.9843	Instable
D(LNLQ <sub>b,1</sub> )	-3.959148	3.081002	3.991623	0.0094	Stable
D(LNLQ <sub>i,1</sub> )	-3.886751	3.052169	8.858505	0	Stable
D(LNGDP,1)	-3.886751	3.052169	2.441972	0.1459	Instable
D(LNLQ <sub>b,2</sub> )	-4.004425	3.098896	4.632216	0.0033	Stable
D(LNLQ <sub>i,2</sub> )	-3.92035	3.065585	15.37645	0	Stable
D(LNGDP,2)	-3.92035	3.065585	5.500437	0.0005	Stable

C. Co integration test

In this paper, the EG test is used to examine the co integration, such as the gross national product (GDP) and the bank location entropy (LQ<sub>b</sub>) and the gross national product (GDP) and the insurance location entropy (LQ<sub>i</sub>). In the second part, the paper has verified the stability of the national product (GDP), the bank location entropy (LQ<sub>b</sub>) and the insurance location entropy (LQ<sub>i</sub>), and the result shows that three variables is smooth at second difference. Then, the GDP (gross national product) and the bank's location entropy (LQ<sub>b</sub>) and the gross national product (GDP) and the insurance location entropy (LQ<sub>i</sub>) were carried out the regression operation. The regression formula is obtained as follows:

$$LNGDP = 12.54LNLQ_b + 7.69 + \mu_{11} \quad R^2 = 0.502$$

$$DW = 0.470 \quad (4.143) \quad (27.406)$$

$$LNGDP = 5.96LNLQ_i + 8.92 + \mu_{12} \quad R^2 = 0.398 \quad DW = 0.474$$

$$(-3.350) \quad (54.938)$$

For the type of residual error sequence  $\mu_{11}$  and  $\mu_{12}$  are unit root tests, the test results are as follows:

TABLE VI. ERROR TERM STABILITY TEST

Variable	1% level	5% level	Test value	P value
LNLQ <sub>b</sub>	-4.004425	-3.098896	-4.313898	0.0058
LNLQ <sub>i</sub>	-3.92035	-3.065585	-15.85502	0

TABLE VII. LNLQ<sub>b</sub> AND LNGDP CAUSALITY TEST

Causality hypothesis	Lag period	F value	P value
LNLQ <sub>b</sub> does not Granger Cause LNGDP	1	13.3995	0.0023
LNGDP does not Granger Cause LNLQ <sub>b</sub>		1.0105	0.3307

TABLE VIII. LNLQ<sub>i</sub> AND LNGDP CAUSALITY TEST

Causality hypothesis	Lag period	F value	P value
LNLQ <sub>i</sub> does not Granger Cause LNGDP	1	2.51921	0.1333
LNGDP does not Granger Cause LNLQ <sub>i</sub>		13.3309	0.0024

The inspection result from “Table VI”: under 1% significance level, LNLQ<sub>b</sub> and LNGDP, there is a cointegration relationship between LNLQ<sub>i</sub> and LNGDP, point to central plains urban agglomeration of Banks and insurance location entropy and there exists a long-term equilibrium relationship between regional economic growth.

#### D. Granger causality test

Granger causality test is mainly used to analyze whether there is a causal relationship between the stationary time series variables, as well as the direction of causality. In “Table VII” and “Table VIII”, the results show that empirical analysis will not exist the problem of false regression, the regression results are valid.

In “Table VII”, it can be seen that the bank location entropy is the Granger reason of the GDP in the Zhongyuan urban agglomeration, which means that the bank industrial agglomeration is the motive of economic growth, while economic growth on bank industry agglomeration effect is not obvious. In “Table VIII” it can be seen that the insurance industrial agglomeration of Zhongyuan urban agglomeration is the Granger reason of its GDP, and the GDP is the Granger reason of the location entropy of the insurance industry, So the study shows that the insurance industry agglomeration is the cause of economic growth, and the economic growth is also the cause of the insurance industry. There is the interaction between the two variables.

## V. CONCLUSION AND SUGGESTION

Through empirical analysis of the financial industry agglomeration and regional economic growth of Zhongyuan urban agglomeration, we can see that financial industry agglomeration is the core of economic growth granger reason, to some extent, financial industry agglomeration can promote core economic growth. But in the context of the actual situation, the central plains urban agglomeration of financial industry agglomeration phenomenon exists in general, but the level of agglomeration is not high and at an early stage, so the accumulation ability is not strong. With the improvement of economy and financial level of Zhongyuan urban agglomeration, the ability of financial industry agglomeration area will be witnessed a gradual increase trend. In order to accelerate the speed of Zhongyuan urban agglomeration of financial industry

agglomeration and to promote the sustainable development of regional economy, this paper puts forward three policy Suggestions with the development status of Zhongyuan urban agglomeration.

#### A. Vigorously develop small and medium financial institutions and Internet banking institutions

Financial system of Zhongyuan urban agglomeration belongs to the dominant type of banks, and large commercial banks occupy the leading position. The predominant industry of Zhongyuan urban agglomeration is the coal industry, electric power, aluminum etc. These industries are mostly state-owned enterprises. The former controls the source of credit funds, and the latter determines the flow of credit funds, so this situation will not be conducive to development of the Zhongyuan urban agglomeration of financial industry and economy. Therefore, Zhongyuan urban agglomeration encourages private capital into the financial sector, and vigorously to introduce and to develop small and medium financial institutions As a result, the financing difficulties of small and micro enterprises will be solved and it will promote the financial industry's innovation and development.

Since June 2013, the growth of the domestic Internet banking rose rapidly .Although the Internet banking institutions are facing many uncertainties, whose risk is far more than the traditional financial industry. However, as a new thing, Internet banking has not only opened up a new era of grass-roots financial management, but also for the majority of small and medium enterprises to open up new financing channels. So the development is unlimited. At the moment, the emerging Internet banking is cultivating its financial "seed" from place to place. With this opportunity, Zhongyuan urban agglomeration should introduce the relevant supporting policies to encourage the creation and development of the Internet financial institutions, and it gains the advantages of the financial industry development.

#### B. Exert the leading role of the government in agglomeration planning

Taking the weak economic foundation of Zhongyuan urban agglomeration into account, the financial industry agglomeration formation should choose the government to promote agglomeration mode. On the one hand, the government should vigorously develop the financial industry, and promote financial integration of urban agglomeration; On the other hand, we should plan and optimize the industrial structure and optimize the industrial layout, and promote the sustainable development of the real economy. Zhongyuan urban agglomeration is a whole. If it wants to play the overall advantages, the government must unify the urban agglomeration planning system. Problems existing in the core area are the high proportion of secondary industry, industrial structure convergence and the existence of local protectionism. So the government requires the implementation of regional economic integration, what's more, the government should unify development of economic and social development plan, furthermore, the government should improve the overall competitiveness of

urban agglomeration and enhance economic strength of Zhongyuan urban agglomeration.

### C. Construction of financial background service center

With the rapid development of computer information technology and the changing of financial innovation, the business of the foreground and background that will be separated is an obvious trend in financial sector. The foreground handles financial transactions mainly, for this reason the foreground usually need to directly face the customer to carry out business activities, so the foreground of the financial business mainly concentrated in the big financial center; And financial background is to provide service and support for the front desk business unit, including data processing, post-loan management, customer service, file management, staff training, and so on. On the account the financial background service system is too big, many financial institutions enhance competitiveness, and cost savings, and it will choose to transfer financial back-office operations to the relatively low cost area or outsource to other professional to undertake unity management directly.

As an emerging industry, financial back-office service has a huge demand on labor, capital and information technology equipment. The core with certain economic, financial infrastructure, education foundation and full of technical personnel has the very big advantage in becoming the background of a financial institution service center. Especially, in currently implementing of Zhengzhou-Kaifeng integration, Zhengzhou will be a regional financial center, then, Kaifeng which can rely on Zhengzhou, plays its cost advantages and location advantages to build financial background service center.

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