# Research on Development of the Modern Service Industry Based on Financial Convergence

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**Abstract**

With the rapid growth of China's economy, convergence has become a basic form of modern organization in financial industry. Taking Guangdong province as example, this paper firstly sets up an evaluation index of financial convergence degree, then apply Factor Analysis method to quantify the financial convergence degree of Guangdong. Finally Multiple Regression Analysis and Cointegration Test prove the positive relationship between financial convergence and modern service industry in Guangdong.

**Keywords:** financial convergence; evaluation index; modern service industry

## 1. Introduction

With the rapid development of industrialization, urbanization, and marketization, finance is now widely affecting our economic and social life in every aspect. Financial convergence not only promotes the overall development of economy, but has a great impact on the adjustment and upgrading of economic structure, especially the modern service industry, which is known as the fastest growing industries in the process of modernization.

In recent years, there is an upsurge in the research on the relationship between finance and economic growth and industrial structure. Beck (2000) has carried out a regression analysis of the survey data among over 4000 enterprises in 54 countries, which has showed that the enterprise development speed is slower in a country with impoverished financial development, and that the smaller an enterprise is, the more financing restrictions it is facing. Later, the study done by Carlyn and Mayer (2003) have found that the market-oriented financial structure is conducive to the growth of high-technology and high-industry, while the bank-oriented financial structure is conducive to the growth of the traditional, low-risk industry. Jiang Xiaojuan etc. (2004) found out that the population size, the population density, and the urbanization level have positive correlations with the service industry development level, by using the 2002's data of over 269 regions and cities in China and applying the certain model tests. Ma Dan (2010) also carried out research on financial convergence to study the relationship between finance and development of the city.

From the above references, the scholars at home and abroad are making much more detailed research on the relationship between the financial and industrial structure. In the past two years, they have focused on the study of the third industry. Also, there are quite a few related domestic documents discussing the modern service industry.

In consideration of the widely-discussed topics of this research, this paper focuses on the perspective of the financial convergence and undertakes a further probe into the modern service industry. In the section 2, this paper explains how the transmission mechanism of the financial convergence promotes the development of modern service industry. In the section 3, we will enforce an empirical study on Guangdong Province in account of its financial leading position in China and rapid development of modern service industry. In the last part of the paper, we will provide some suggestions to Guangdong provincial government according to the conclusion of our model.

## 2. The Transmission Mechanismsof the Financial Convergence Promoting the Development of Modern Service Industry

Financial convergence can be viewed asa changing process, which refers to that the financial industry coordinates, configures, and combines the geographical conditions in coordination with the financial resources, and then generatesa financial regional intensive system in a certain region. There is no doubt that the financial convergence phenomenon can produce positive external effects, with the different mechanisms impacting on regional economic and financial development. Being one of the fastest growing industries,under the environment of financial convergence,the productivity of modern service industry is improving constantly.The transmission mechanismsthat financial convergence promotes the development of modern service industry are mainly showed in the following aspects:

(1) Capital formation mechanism. Financial convergence provides an effective source of funds for the development of modern service industry. Financial convergence formsa dense phenomenon of financial institutions, which can improve the efficiency of regional payment and trans-regional allocation of financial resources, provide financing facilities, and reduce the financing costeffectively. Our country's modern service industry is in its early stage of development, which needs a lot of money, thus the financing channels is very important for this sunrise industry. The formation of financial convergenceis undoubtedly of great impact to the region's financial financing activities.

(2) Technological innovation mechanism. Financial convergence provides an effective innovation power for the development of modern service industry. The study from Carlyn and Mayer (2003) shows thatthe market-oriented financial structure is conducive to the growth of high-technology and high-industry, while the bank-oriented financial structure is conducive to the growth of the traditional, low-risk industry, because the bank financial institutions investment takes on a conservative tendency, broadeningthe financing channel of large traditional industries, while on the other hand, the emerging industry, processing a tendency of highrisk, remains a rare target for many banking institutions. But under the environment of financial convergence, more diversified financing channels are available, which can effectively overcome the existing insufficiency of the traditional financing, provide an opportunity and form a necessary environment for the technology innovation of modern service industry, and promote further the core technology advance and innovation of modern service industry.

(3) Scale effect mechanism. Financial convergence provides a convenient scale effect for the development of modern service industry. By conforming to the geographical situation, the financial resources can take part in the regionalmovements and condense into the financial industry, thus form the financial convergence, which together bring about scale effect. Madan (2007) argues that sizable financial institutions in a certain region can form a strong competitive, promote financial products and services with stronger economic effect, and provide quality financial products and services for the region's modern service industry by absorbing, mobilizing, guiding, configuring, and developing financial resource of the region. On the other hand, the modern service industry not only enjoy a variety of financial products, but compare the cost performance in different financial institutions through financial convergence advantages, so as to select financial instruments which are more suitable for the industrial development.

### 3. An Empirical Studyon Guangdong Province

Combined with the related theoretical researcheson financial convergence and the financial development of Guangdong province, this section first set up a evaluation index of financial convergencedegree,then applyFactor Analysis method to quantify thefinancial convergencedegree of Guangdong, based on which Multiple Regression Analysis and CointegrationTest will be used to consider the relationship between financial convergence and modern service industry in Guangdong.

3.1 The Construction of Financial Convergence Degree Evaluation Index

On the basis of the existing literaturefinancial convergence analysis and evaluation index[4],this paper selects the added value of the financial sector,the GDP proportion of the financial sector, lending and deposit balance of the local currency, lending and deposit balance of the foreign currency, household savings balance, premium income of the property insurance company, and premium income of the life insurance company as evaluation indexes of the financial convergence. The specific classifications can be seenin the following table.

Table 1. Financial convergence index

| | | |
|---|---|---|
| Financial convergence | Financial industry scale | Added value of the financial sector $X_1$ |
| | | GDP proportion of the financial sector $X_2$ |
| | Banking industry scale | Lending and deposit balance of the local currency $Y_1$ |
| | | lending and deposit balance of the foreign currency $Y_2$ |
| | | household savings balance $Y_3$ |
| | Insurance industry scale | premium income of the property insurance company $Z_1$ |
| | | premium income of the life insurance company $Z_2$ |

## 3.2 The Level Measurement of Financial Convergence Based on the Principal Component Analysis (PCA)

### 3.2.1 The Principle of Principal Component Analysis

The Principal Component Analysis assumes that among many variables there probably exist higher correlation coefficient between each variable, but in fact it is possible that some common factors affectthe results of these variables. Using the Principal Component Analysis, the common factors to affect the outcome can be found out between the variables related to each other.

### 3.2.2 The Steps of Principal Component Analysis

Step1. The data inspection and factor selection.Basedon the above table, the Factor Analysis function of the statistical software SPSS can be used to conduct data inspection, namely to inspect whether thedata is appropriate for applying the Factor Analysis method. The KMO of the index data showed in this paper has reached 0.701, which means that the data is suitable for factor analysis. On the basis of standardizing the data, the eigen value and variance contribution ratioare showed in the following table.

Table 2. Eigen value and variance contribution ratio

| Principal factorsinitial eigenvalue | | | The square capacity of the after-rotating factors and the eigen values | | |
|---|---|---|---|---|---|
| EV | VCR | CVCR | EV | VCR | CVCR |
| 1 6.232 | 69.543 | 69.543 | 6.122 | 68.544 | 68.544 |
| 2 2.221 | 15.322 | 84.865 | 2.113 | 15.215 | 83.759 |
| 3 1.112 | 11.654 | 95.976 | 1.004 | 10.654 | 94. 413 |

*Notes.* EV=eigen value; VCR=variance contribution ratio; CVCR=cumulative variance contribution ratio.

The Table 2 shows that the cumulative variance contribution ratio of the first three factors has reached 94.413%, suggesting that the first three factors have extracted most of the information of the original. In addition, after the rotation, the eigenvalues of the three factors are over 1, thus this paper selects these three factors to analyze.

Step 2. After selecting the suitable factors, this paper applies themaximum orthogonal rotation of variance to the factor capacity matrix. The assumption of the after-rotation factor capacity matrix is showed as follows.

Table 3. The factor capacity matrix after rotation

| Factors | 1 | 2 | 3 |
|---|---|---|---|
| $X_1$ | 0.981 | 0.456 | 0.243 |
| $X_2$ | 0.976 | 0.343 | -0.125 |
| $Y_1$ | 0.290 | 0.897 | -0.235 |
| $Y_2$ | 0.212 | 0.870 | -0.322 |
| $Y_3$ | -0.232 | 0.901 | 0.453 |
| $Z_1$ | -0.124 | -0.213 | 0.654 |
| $Z_2$ | 0.236 | -0.434 | 0.922 |

The above chart shows that the first principal component factor represents mainly the financial sector, the second factor the banking sector, and the third factor the insurance industry.

Step 3. After calculating the factor capacity matrix, the financial convergence level of Guangdong (Finance) of

the calendar year can be obtained by applying the regression calculation. The details are showed in the following table.

Table 4. The financial convergence level of Guangdong

| Year | Finance | Year | Finance |
| --- | --- | --- | --- |
| 1978 | -2.102 | 1996 | -0.7251 |
| 1979 | -2.011 | 1997 | -0.644 |
| 1980 | -1.84 | 1998 | -0.463 |
| 1981 | -1.359 | 1999 | -0.482 |
| 1982 | -1.2 | 2000 | -0.501 |
| 1983 | -1.687 | 2001 | -0.41 |
| 1984 | -1.646 | 2002 | -0.439 |
| 1985 | -1.534 | 2003 | -0.258 |
| 1986 | -1.457 | 2004 | -0.577 |
| 1987 | -1.73 | 2005 | 0.004 |
| 1988 | -1.292 | 2006 | 0.085 |
| 1989 | -1.222 | 2007 | 0.166 |
| 1990 | -1.13 | 2008 | 0.147 |
| 1991 | -1.049 | 2009 | 0.228 |
| 1992 | -0.9681 | 2010 | 0.309 |
| 1993 | -0.687 | 2011 | 0.49 |
| 1994 | -0.825 | 2012 | 0.571 |
| 1995 | -0.725 | 2013 | 0.652 |

The above chart shows that with the increase of the year, Guangdong's financial convergence level have increased gradually, which is in accord with the actual situation of Guangdong province. With the reform and opening-up, the number of the financial institutions in Guangdong is increasing constantly, the financial network has improved tremendously, and thus the financial convergence level has increased accordingly. The trend is showed at the figure 1.
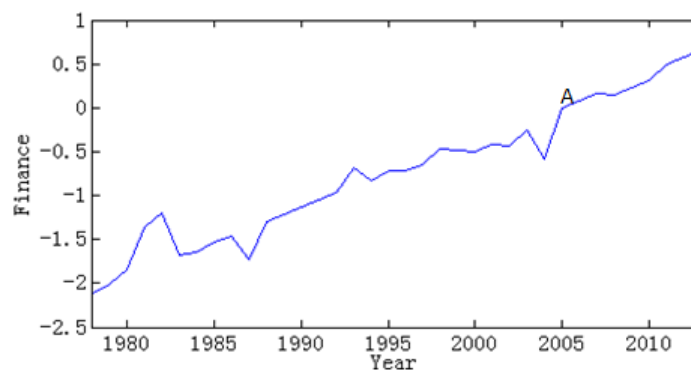


Figure 1. The trend of finance of Guangdong

As can be seen from the above figure, in 2005, it is the first year with a positive value which indicates that the policy ofupgrading of industrial structure enforced by the government achieved breakthrough, at least in financial industry.

*3.3 The Multiple Regression Model Based on Financial Convergence*

3.3.1 The Establishment of the Model

There are many factors that can influence the modern service industry. According to the literature analysis presented in this paper and other related literature at home and abroad, the disposable income of urban residents, the level of urbanization, marketization andinformationization, the development scale of the second industry, the labor input, and the scale of opening-up can all influence the development of modern service industry in

Guangdong province. Therefore, this paper builds up a regression model as follows:

$$lny_t = \alpha_0 + \alpha_1 ln(finance) + \beta_i ln(control) + u_t$$

In the model, yt represents the total output value of the modern service industry, finance represents the variable of the financial convergence level, and control represents the other variables to affect the added value of modern service industry. As a control variable of this model, ut represents the regression residual value. In order to reduce the possible existing heteroscedasticity in the time series, this paperuses the natural logarithm to represent them.

3.3.2 The Variable Selection and Demarcation

Based on the existing literature, the control variables that will impact on the modern service industry are:

1) The disposable income of urban residents, denoted as INCOME. Zhang Qing (2013), in the study of modern service industry,has proved that with the improvement of actual income level, people will enjoy higher demand for the service products, namely, the consumption structure will shift from basic necessities to advanced necessities, and then tothe more advanced products such as education, medical and health products, etc.. Under the guidance of the consumption structuralshift, the configuration of labor, capital and other factors of production will shift to modern service industry.

2) The level of urbanization, denoted as CITY. Li Juan (2010), in her researchon the factors affecting the development of modern service industry of China, has pointed out thatthe city is a space carrier in the development of service industry, and also the center of service industry. The experience of the global developmentshows that population concentrationis more conducive to the growth of the service industry, and the size of the population determines the potential market of goods, thus the size of the market ranks as the primary influential factor of the development of service industry. The expansion of the cities, the reduction of the transaction costs, and the enhancement ofthe economic efficiency have liftedthe level of the service industry unceasingly. This paper reflects the level of urbanization based on the proportion of urban population.

3) The development scale of the second industry, denoted as INDUSTRY. The production service is the foundation of the third industry. The second industry determines the size of the total volume of production, which largely determines GDP and further affect people's livesand their demandsforthe modern service industry. Meanwhile, the second industry acts as aintermediate productto modern service industry, which thus promotes the development of modern service industry.

4) The total amount of investment capital, denoted as CAPITAL. The increase of the total amount of investment capital can promote the growth of the modern service industry and expand the market and production scale of the advantaged modern service industry.

5) The cultural level of the urban residents, denoted as CULTURE. The cultural level of the urban residents reflects the education level of city residents. When the urban residents' cultural level is high, on the one hand it means that the knowledge reserve capacity is large, providingnumerous talents for the modern service industry which is based on high-technology;while on the other hand, the high-qualified talents'demands for modern service industry is much more potential, which will further promote the development of modern service industry. To identify the urban residents' cultural level, this paper utilizes the ratio between the total enrollment of schools and the total population as a standard.

3.3.3 Augmented Dickey-Fuller (ADF) Test

Before taking Co-integration Multivariate Regressiontest, the variables must first go through the ADF test, only those which share the unit root with the same order are qualified to the ADF test. Otherwise, variables with longer time span can easily lead to spurious regression. This paperfinds out the following results by using the ADF test, operating the EVIEWS software, controlling the confidence levelα= 0.05, and carrying on the test with no intercept items and no trend form test.

Table 5. The results of the Augmented Dickey-Fuller (ADF) test

| Variables | ADF | P-Value |
|---|---|---|
| ln(income) | -2.447 | 0.030 |
| D(ln(income),1) | -3.187 | 0.072 |
| ln(city) | -3.112 | 0.033 |
| D(ln(city),1) | -2.978 | 0.080 |
| ln(industry) | -1.733 | 0.001 |
| D(ln(industry),1) | -1.676 | 0.051 |
| ln(capital) | -2.303 | 0.003 |
| D(ln(capital),1) | -1.233 | 0.063 |
| ln(culture) | -3.233 | 0.002 |
| D( ln(culture),1) | -2.333 | 0.005 |

The above chart shows that the original sequence of the residents' income level (ln(income)),the urbanization level (ln(city)), the secondary industry scale (ln(industry)), and the total investment capital (ln(capital)) are not stable. After the first-order difference and another inspection, the above four variables are stable, therefore they share the unit root with the same order, which are available to the co-integration analysis.But the residents' cultural level (ln(culture)) is still unstable despite of the first-order difference, which means that this variable should be eliminated. Thus the regression model is as follows:

$$lny_t = \alpha_0 + \alpha_1 ln(finance) + \beta_1 ln(income) + \beta_2 \ln(city) + \beta_3 \ln(industry) + \beta_4 \ln(capital) + u_t$$

In this model, $y_t$ represents the total output value of modern service industry, income the residents' income level, city the urbanization level, industry the second industry scale, and capital the total amount of investment capital.

3.3.4 Analyzing the Results of the Co-Integration Test

The EVIEWS software is used to undergo the Co-integration test, and the results are as follows:

$$lny_t = 7.5485 + 2.3432 ln(finance) + 3.9555 ln(income) + 3.6044 ln(city) + 2.4932 ln(industry) + 5.8912 ln(capital) + u_t$$

(1.3445) (2.5657) (3.2934) (7.3455) (3.4565) (2.5645)

$R^2$=0.946，$F$=454.353，$DW$=3.949

The above formula manifests that the Goodness of Fit is 0.946, each factor is significant under the condition of the confidence level$\alpha$= 0.05, and the statistics F accords withthe relevant inspection, which showsthat the integral regression effect is excellent. The ADF test is carried out on the residual error, indicating that the residual error sequence is stable which is at around 5%. Therefore, in the above equation, there exists a long-term equilibrium relationship between the added value of modern service industry and other variables such as the financial convergence level, the household income, the urbanization level, the second industry scale and the total investment capital.

## 4. Conclusion and Enlightenment

This paper inspects the financial function and the internal mechanism of the added value of modern service industry from the perspective of financial convergence. On the basis of the research results at home and abroad, this paper builds an evaluation index system of financial convergencedegree, examines the long-term equilibrium relationship between the financial convergence level of Guangdong and the added value of modern service industry in Guangdong through the Co-integration test, which finally finds out that the level of the financial convergencecan promote the modern service industry in Guangdong province. In addition, the factors such as residents' income level, urbanization level, secondly industry scale andtotal investment capital remains a long-term equilibrium relationship with modern service industry.

According to the above conclusions, in order that the financial convergence of Guangdong can promote the modern service industry better, for one thing, the Guangdong provincial government should further strengthen the financial ecological environment construction, improve the attractiveness of the financial resources, so that it can promote the financial technology and the service innovations in the financial institutions, which at last will improve the quality of the financial convergence. For another, the government should try its best to lift the level of the residents' income, urbanization, and enhance the scale of the second industry and thetotal volume of investment capital. In this way, the Guangdong's modern service industry will develop rapidly andcorrespondently it can lift the growth of GDP, which will achievea balanced development of the economy.

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