

Research on the Impact of Credit Expansion on the Synergistic Development of Guangdong's Regional Economy

Chun Feng, Yu Huang*, Jianru Pang, Guiying Zheng, Yuxin Ke

School of Economics and Finance, South China University of Technology, Guangzhou, 510006, China

*Corresponding author: 1134808767@qq.com

Abstract. Based on the study and understanding of previous literature and works, this article first collects and calculates and collates data on the gross domestic product of Guangdong Province, regional coordination coefficients and credit inputs in Guangdong Province from 2001 to 2019, and studies the current economic situation of the Pearl River Delta, Eastern Guangdong, Western Guangdong and Northern Guangdong regions in Guangdong Province from the perspectives of total volume, growth rate and degree of coordinated regional economic development; and analyses the total volume and growth rate of credit in Guangdong Province from the perspectives of Regional differences in bank credit.

Keywords: Credit Input, Regional Economic Coordination Coefficient, Spatial Autocorrelation, Financial Support.

1. Introduction

Since the reform and opening up, Guangdong's economy has achieved rapid growth while the contradiction of unbalanced regional development within the province has been highlighted, especially the huge gap in development between the Pearl River Delta and non-Pearl River Delta regions. The imbalance in regional economic development has become a major constraint on the high-quality and sustainable development of Guangdong's economy. As the core of a modern economy, finance plays an important guiding and regulating role in optimizing the allocation of regional resources and promoting the coordinated development of the regional economy. Bank credit is the main component of China's financial system, and the scale of credit input has an important impact on the performance of financial functions. This paper will propose reasonable indicators and methods for measuring the scale of credit input and coordinated regional development, and analysis the regional credit input, economic development gap and the correlation between the two in Guangdong on the basis of relevant empirical studies to further explore how credit input affects the degree of coordinated regional development in Guangdong Province, with a view to better understanding the macroeconomic operation rules of Guangdong and providing useful policy recommendations for the coordinated regional economic and financial development in the future.

2. Research and analysis of basic theories and methods

2.1 Analysis of credit input variance in Guangdong Province

2.1.1 Overall credit situation in Guangdong Province

The role of credit expansion in economic development should not be underestimated. Schumpeter (1934) [1] proposed in his economic development theory that the credit provided by banks to entrepreneurs enables them to obtain purchasing power for investment and production. Goldsmith (1969) [2] put forward the theory of financial structure and believed that the role of Finance in promoting economic development stems from the rearrangement of capital supply and demand of savers and investors by financial institutions. Levine & Zervos (1998) [3] research shows that there is a significant long-term positive relationship between financial development and economic growth. Lin Yifu (2009) [4] put forward the theory of optimal financial structure, emphasizing that financial institutions are based on the different industrial characteristics of the real economy.

Myrdal (1957) [5] proposed "cumulative circular causality". Financial centers are subject to the scale of the local market, which will bring the spillover effect of financial agglomeration. Li Lin and Ding Yi (2011) [6] believe that the spatial utility of financial agglomeration is reflected in the spillover effect of inter regional pull. Yu Yongze (2013) [7] believes that the spatial spillover effect of financial agglomeration is manifested in service spillover and information spillover.

Since 2009 to date, the loan balance of financial institutions in Guangdong Province has maintained a steady growth, and by the end of 2019, the total credit balance in Guangdong Province was as high as approximately RMB22.8 trillion, an increase of 11.78% compared to 2018, an increase of approximately RMB16 trillion compared to RMB6.8 trillion in 2009, and the total amount of credit as at FY2019 had reached 3.4 times that of FY2009, achieving a faster credit expansion development.

2.1.2 Analysis of regional differences in credit in the four major regions of Guangdong Province

Liu Shufang et al. (2009) [8] proposed that China's regional credit supply has the characteristics of regional agglomeration and regional dependence, which is not conducive to the coordinated development of economy. Han Ling (2014) [9] believes that there are differences in the contribution of credit to economic growth. Zhang Yiwei (2016) [10] believes that there is a problem of disharmony between financial resources and economic aggregate in the Pearl River Delta and non Pearl River Delta. Gong Qinlin (2021) believes that capital accumulation, technological innovation and industrial upgrading formed by financial agglomeration can promote economic development. Jiao Yu (2014) constructs a panel model based on the data of counties in Shandong Province. Through empirical research, it is found that the difference of bank credit rationing between regions leads to the expansion of regional economic gap.

As can be seen from Figure 1 below, the loan balance of financial institutions in the four regions of Guangdong Province is in a state of continuous expansion. Due to the advantages of advanced system, relatively concentrated industrial economy and human resources, the volume of loan balance in the Pearl River Delta far exceeds that in other regions of Guangdong Province. At the same time, the slope of loan balance curve is also the steepest, which shows that the growth rate of credit in the Pearl River Delta is the largest compared with other regions, The average growth rate reached 13.16%. This is followed by the eastern part of Guangdong, followed by the western part of Guangdong, while the slowest credit expansion is in northern Guangdong. The extreme imbalance in regional credit development has long been a difficulty for Guangdong Province, which is related to the topography of the various regions of the province, with northern Guangdong being inland and mountainous, where foreign trade is not well developed and industries are not sufficiently developed.

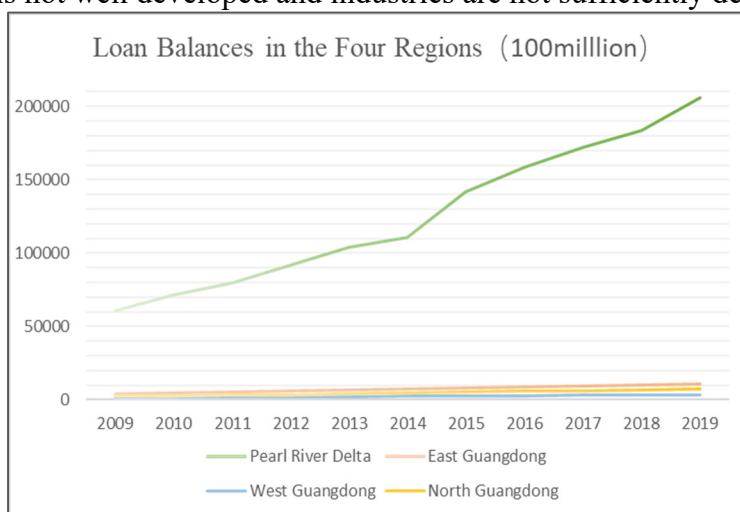


Figure 1 Loan Balances of Financial Institutions in the Four Regions of Guangdong Province, 2009-2019

The data on the loan balance of financial institutions in each region of Guangdong Province in 2009 and 2019 as a percentage of the province's loan balance volume is taken and plotted in the

following circular chart, where the inner ring is the data in 2009 and the outer ring is the loan balance data of each region in 2019. According to Figure 2, it is more clearly shown that the credit economic strength of the PRD region has a pivotal position in Guangdong Province, accounting for 88.68% in 2009, while in the course of a decade of development, the credit share of the PRD has continued to increase, and by 2019, the loan balance share of financial institutions in the PRD has grown to 90.36%, with the western and northern regions of Guangdong remaining largely unchanged, while the eastern region of Guangdong's loan balance share declined slightly. This part of the data illustrates to a certain extent that the imbalance in regional credit development, and indeed regional economic development, within Guangdong Province still exists and continues to intensify with a subtle amount of change.

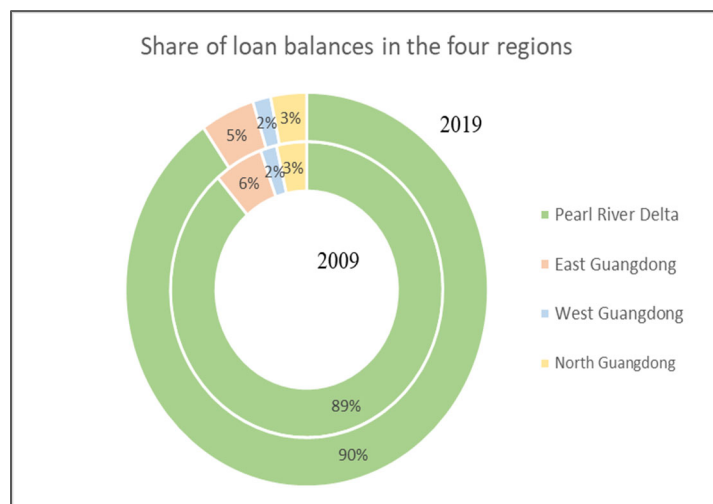


Figure 2 Share of loan balances of financial institutions in the four major regions, 2009 and 2019

3. Actual model analysis

The subject of this paper is a study of the impact of credit expansion on the synergistic development of the regional economy of Guangdong, the selection of variables mainly focuses on the impact of credit expansion on economic growth and the level of regional coordinated development.

3.1 Empirical analysis based on GDP

3.1.1 Model selection

In this paper, Guangdong Province is divided into four regions, namely the Pearl River Delta, Eastern Guangdong, Western Guangdong and Northern Guangdong, and the bank credit balance of each region is selected as the explanatory variable, the GDP of each region is taken as the explanatory variable, and the retail sales of all consumption, freight transport per capita, the number of regional patents, fiscal expenditure and fixed asset investment are taken as the control variables respectively, and the explanatory, explanatory and control variables are logarithmically processed. To address this issue, the following model was constructed:

$$\ln GDP_{i,t} = \alpha + \beta_1 \ln credit_{i,t} + \varphi_2 \ln consum_{i,t} + \varphi_3 T_{i,t} + \varphi_4 \ln pat_{i,t} + \varphi_5 \ln finance_{i,t} + \varphi_6 \ln fix_{i,t} + \varepsilon_{i,t}, i = 1, 2, \dots, n; t = 1, 2, \dots, m \quad (1)$$

3.1.2 Selection of panel model

The panel can be specifically divided into three types of models: fixed effects models, random effects models and mixed regressions. As the software chosen for this study is Stata 16.0, it is necessary to determine the choice of models for the four regions of Guangdong Province through the F test and Hausman test. The results of the tests are shown in Table 1.

Table.1 F test, Hausman test results and panel selection

	Pearl River Delta	East Guangdong	West Guangdong	North Guangdong
F Test	21.72 (0.0000)	167.98 (0.0000)	14.96 (0.0000)	2.50 (0.0671)
Hausman Test	45.48 (0.0000)	114.20 (0.0000)	157.64 (0.0000)	
Model selection	Fixed effect	Fixed effect	Fixed effect	Mixed effect

According to the results of the F-test, northern Guangdong selected the mixed effects for the panel regression, while the other three major regions passed the F-test. According to the results of the Hausman test, the fixed-effects model was selected for the three major regions of PRD, Guangdong East and Guangdong West.

3.1.3 Analysis of the empirical results

In order to further improve the accuracy and credibility of the model estimation, the above regression equation was operated to remove heteroskedasticity and form contemporaneous correlation effects in this paper, which made the model interpretation more reasonable, and the analysis results are shown in Table 2.

Table 2: Model 1 regression results

variable	Pearl River Delta	East Guangdong	West Guangdong	North Guangdong
Incredit	0.3443*** (0.000)	0.3258*** (0.000)	0.6052*** (0.000)	1.2044*** (0.000)
Inconsum	-0.1012*** (0.003)	0.0820* (0.062)	0.0201 (0.755)	0.0812** (0.042)
T	0.0050** (0.026)	-0.0072*** (0.000)	0.0026*** (0.000)	0.0021*** (0.000)
Inpat	0.0252 (0.276)	-0.0211 (0.197)	0.0785*** (0.000)	-0.0525*** (0.000)
Infinance	-0.1767** (0.002)	-0.0592* (0.056)	-0.2308* (0.060)	0.0742 (0.385)
Infix	0.0065 (0.378)	-0.0110* (0.073)	0.0251** (0.033)	0.0070 (0.511)
Constant term	0.6501*** (0.000)	0.3209*** (0.000)	0.8796*** (0.000)	0.1166* (0.087)

The coefficients on the credit term are positive and significant at the 1% level for all four regions, indicating that credit inputs have a positive effect on economic growth. However, the magnitude of the coefficient of the credit term varies across the four regions of the province, indicating that the intensity of the impact of credit input on economic growth varies in each region and requires specific analysis of the actual situation in each region.

Among them, the coefficient level for the PRD region is at a low level of 0.3443, which indicates that the contribution of credit allocation to economic growth in the PRD region is limited. Compared to the other three regions, commercial banks mostly tend to allocate credit to the PRD region. Zhou Aimin and Liu Xinrui (2021) point out through empirical analysis that concentration is significantly and positively related to bank credit risk; the higher the bank concentration, the greater the bank credit risk, and that over-concentration of credit leads to higher capital risk, and therefore the contribution of bank credit to economic growth in the region is relatively low. Compared with the other three regions, the PRD region has a huge advantage in terms of GDP, and the marginal benefit of credit to economic growth will be relatively lower.

From the data, we found that the marginal returns to credit investment were higher in northern and western Guangdong. The northern and western regions of Guangdong belong to the regions with low levels of economic development in Guangdong Province, the gap between the PRD and non-PRD economic aggregates is wide and the absolute gap remains high. North and West Guangdong are relatively weak in terms of industrial structure and sloppy economic growth patterns, so the role of credit in promoting the economy is more obvious. Credit investment is conducive to promoting the transformation of the industrial structure, the upgrading of education, the improvement of infrastructure and the introduction of talents in northern and western Guangdong, which promotes higher production efficiency and capital utilization and brings about high-quality growth of the regional economy.

It is worth noting that the economic growth brought about by credit investment in the eastern part of Guangdong is at the lowest level, unlike the Pearl River Delta, which does not have a high credit scale, and therefore the reasons for the phenomenon need to be analysed from other perspectives. The analysis of Guangdong's regional economic development in 2019 released by the Guangdong Provincial Bureau of Statistics suggested that in 2019, the East Wing achieved a value added of RMB 507.658 billion in the private economy, accounting for 73.0% of its regional GDP, which ranked first in the province. These figures fully illustrate the importance of the private economy in Eastern Guangdong, but small and medium-sized private enterprises have a high risk of operation and a high incidence of non-performing loans, so credit large enterprises and state-owned enterprises, which in turn affects the efficiency of credit resource allocation and exacerbates the problem of "difficult financing" for private enterprises. The flourishing of private lending has certainly eased the financing difficulties of private enterprises, but the high risk of private lending has also greatly restricted the healthy and sustainable development of private enterprises in eastern Guangdong.

3.2 Construction of spatial panel model and analysis of empirical results

3.2.1 Spatial correlation test

To further study the impact of credit expansion in local municipalities on the coordinated development of Guangdong's regional economy, this paper adopts a spatial econometric approach to estimate the spillover and crowding-out effects of credit growth.

The linkage status of the regional economy is first measured by Moran's I coefficient. It is expressed as follows:

$$I = \frac{n}{\sum_{i=1}^n \sum_{j=1}^n W_{ji}} \times \frac{\sum_{i=1}^n \sum_{j=1}^n W_{ij} (x_i - \bar{x})(x_j - \bar{x})}{\sum_{i=1}^n (x_i - \bar{x})^2} \quad (2)$$

The global Moran's I index for Guangdong Province from 2000-2019 was calculated to be greater than 0, and all were significant at the 5% level. The regional economic correlations are strong enough to allow for spatial panel analysis.

3.2.2 Model selection and spatial matrix construction

The LMlag of Guangdong Province is still not significant at the level of 10%, while the RLMlag of the Pearl River Delta is only significant at the level of 5%. Considering that the LM Test coefficients of various regions are different, we comprehensively select the spatial autocorrelation model for spatial empirical analysis. The spatial autocorrelation model is the general situation of spatial error model and spatial autoregressive model. When the conditions are not met, the SAR model will automatically degenerate into SEM model and SAR model, It is suitable for the data characteristics used in this paper.

The general model for SARAS (1, 1) is constructed as follows.

$$\begin{cases} y_{it} = \rho w'_{it} y_t + x'_{it} \beta + u_i + \gamma_t + \varepsilon_{it} \\ \varepsilon_{it} = \lambda m'_t \varepsilon_t + v_{it} \end{cases} \quad (3)$$

3.2.3 Analysis of empirical results

From these results, the core variable in credit is positive and significant at the 1% level for both Guangdong province and the four regions. In terms of direct effects, the effect of credit growth on economic growth is significantly positive in all regions, with the coefficient being larger in non-PRD regions than in PRD regions, suggesting that credit has a greater effect on economic growth in non-PRD regions.

In terms of spatial effects, the indirect effect is 0.435 and significant at the 1% level for Guangdong province, indicating that, from a province-wide perspective, credit expansion in cities shows a spillover effect and is conducive to coordinated economic development. From a province-wide perspective, controlling for the remaining economic development-related variables, every 1% expansion of credit in a city can contribute to a 0.435% increase in GDP per capita in neighboring cities. The four regional spillover effects range from -0.0473 to 0.0239 and are not significant, indicating that the credit expansion of cities in each of the four regions does not have a significant impact on the GDP per capita of their neighboring cities.

4. Conclusion

(1) Credit input had a positive impact on economic growth in all four regions of Guangdong Province, indicating that credit expansion can promote economic growth. However, the degree of impact of credit input on economic growth differs in each region, with credit input having only a relatively small positive impact on economic growth in the PRD region, while credit input has a larger positive impact on economic growth in northern and western Guangdong.

(2) The spillover effect of credit in the whole province of Guangdong is obvious, while the spillover effect of credit in the four regions is not significant, implying that the spillover effect of credit growth in the cities of Guangdong is not limited to the region. It also fully illustrates that the credit growth of Guangdong's cities has a positive contribution to the economic growth of neighboring cities, which is conducive to narrowing the gap in the province's economic level.

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