Research on Financial Development of Guangdong-Hong Kong-Macao Greater Bay Area Based on Endogenous Financial Economic Growth Model

Houpu Gao
FST, University of Macau, Macau, 999078, China

Abstract: Economic growth is a prerequisite for social development and political stability. Finance is the core and hub of modern economic operations and economic growth. GBA is an important strategy that the country is currently promoting. It is the region with the largest economic aggregate and the highest economic activity in China. Promoting the financial development of GBA has an important supporting role in enhancing the economy of the Bay Area and the national economy. Based on the strategy of GBA, this paper introduces the endogenous economic growth model of the financial sector to discuss the interaction and mutual restraint between financial development and economic growth in GBA.

1. Introduction
The construction of the GBA is a major strategy of the country. General Secretary Xi Jinping proposed to be a big article for reform and opening up. In the context of this national strategy, the financial development of GBA is also facing a golden opportunity. The 2017 government work report clearly stated that it is necessary to give play to the unique advantages of Hong Kong and Macao and enhance its position and function in the country's economic development and opening up. After the “GBA” rose to the national strategy, the financial development of GBA is an important part of it. In fact, in recent years, with the joint efforts of all parties, the financial cooperation between GBA has a solid foundation, and the level of financial cooperation has been continuously improved, which is conducive to building a new open economic and financial system, which is conducive to better playing Hong Kong and Macao, especially the role of the Hong Kong International Finance Centre to help build the “Belt and Road” will help promote closer financial cooperation between the Mainland and Hong Kong and Macao, and enhance the overall competitiveness of Guangdong, Hong Kong and Macau. Based on the significance, special status and broad prospects of the development of GBA, this paper takes the financial development of GBA as the entry point, and uses the endogenous financial economic growth model to conduct research and analysis on the financial development of GBA.

2. Background and Opportunities for Financial Development in GBA

2.1 Development of major financial types in GBA
Over the past 40 years of reform and opening up, China's financial development has taken an extraordinary path. In particular, the current international and domestic development situation is unstable. Under the impact of negative factors such as shrinking international trade, increasing trade friction, global investment momentum, capital market and foreign exchange market shocks, the globalization process has encountered a strong headwind. However, China's economic development resilience and strength are still sufficient, and the financial industry has made remarkable achievements.
in opening up to the outside world. The strategy of GBA provides an opportunity to further build an open economic and financial new system and create a new advantage for China's international competition.

2.1.1 Various financial businesses in the banking, securities and insurance industries have developed rapidly. The Chinese banking institutions in Hong Kong have become an important force. The development prospects of the Hong Kong banking market are infinite, and the development speed of Chinese banks is also very rapid. In the securities industry, Chinese-funded securities firms have gradually entered a good position. With the increasing number of Chinese-funded enterprises listed in Hong Kong, Chinese-funded financial institutions have launched overseas arrangements. In the insurance industry, Chinese-funded enterprises have emerged in the field of long-term insurance. In the asset management industry, the market share of Chinese-funded institutions is relatively low, but the number of institutions continues to grow and the market share has steadily increased.

2.1.2 The construction of the GBA broke out the demand for diversified financial services, providing a new opportunity for high-level interconnection and interconnection in the financial market. The funds are an important guarantee for the construction of world-class urban agglomerations in the GBA. GBA is actively building a modern economic system, which will definitely enhance the economic efficiency of financial services. The huge diversified demand for funds in GBA will provide a huge market for the development of the financial industry in GBA. With the continuous advancement of the construction of the GBA, the scale and scope of cross-border use of RMB in the GBA will gradually expand. As of the end of 2017, the total cross-border RMB settlement of Guangdong, Hong Kong and Macao was 9.93 trillion yuan, accounting for 71.6% of the total cross-border RMB settlement in Guangdong. In the first half of 2018, the cross-border RMB business of Guangdong, Hong Kong and Macao settled 98.86 billion yuan.
yuan, an increase of 47.5%, the RMB became the second largest settlement currency for economic and trade exchanges in GBA.

3. Opportunities for the coordinated development of GBA

3.1 The demand for cross-border asset allocation in GBA is strong. According to the survey data, the proportion of people with overseas net worth of high net worth increased from about 19% in 2011 to 56% in 2017. In terms of asset allocation categories, the offshore asset allocation of these high-net-worth individuals is concentrated in mainstream investment products such as savings and cash, stocks and bonds. As one of the world's major financial centers, Hong Kong has the characteristics of diversification and internationalization. The financial institutions of the three places have strengthened the cooperation and provided the residents of GBA with new products of RMB investment in domestic and overseas markets, enabling the financial institutions of the three places. Have the opportunity to further win customers and establish differentiated competitive advantages.

3.2 The demand for cross-border financing of GBA enterprises is strong. The reform of the Hong Kong listing system has led more and more companies in the Greater Bay Area to go public in Hong Kong. Hong Kong's capital market reform and listing structure will bring financial resources into an innovative industry in a more effective way, and play the role of a technological innovation incubator, which will provide financial support for the development of Guangdong, Hong Kong and Macao as a regional center for innovative countries. GBA enterprises going to Hong Kong for listing and financing will face the problem of reasonable and effective allocation of funds in different countries and regions, different currencies, different types of resources and projects. This requires the financial institutions of GBA to play professional literacy and help customers. Design a suitable operating plan and find a counterparty to close the deal.

3.3 Promoting the docking of external markets by financial institutions in Guangdong will help various financial institutions to improve their product innovation capabilities. In the process of cooperation between financial institutions in the three places, cross-border funds flow more frequently through various channels to allocate assets. Financial institutions also have policy space and market base for product innovation, especially for financial institutions in Guangdong. It can enhance the ability of commercial banks to raise the use of RMB funds on a global scale, and provide more abundant innovative bank wealth management products for the market, which can provide opportunities for innovation and diversification of insurance products.
3.4 The GBA Strategy provides opportunities for financial development. According to the development plan of GBA, GBA will be built into a new international financial hub. Among them, Hong Kong's status as an international financial center will be further consolidated and upgraded. Guangzhou will improve its modern financial service system. Shenzhen will develop a stronger capital market based on the Shenzhen Stock Exchange and accelerate the opening of financial innovation. Macau will undertake financial cooperation services between China and Portuguese-speaking countries. These are of great significance for the formation of a financial development pattern with multiple support in the GBA. Under the impetus of a series of specific measures, it will not only greatly promote the reform, development and innovation of the financial industry in Guangdong, Hong Kong and Macao, but will also promote the continuous improvement of China's modern financial system and continuously improve the momentum of sustained and stable development of the financial industry. However, combined with the international and domestic financial development situation, while bringing infinite opportunities, the financial system in GBA is still not perfect, especially the degree of financial interoperability needs to be improved, and systemic risks should not be underestimated.
4. Endogenous financial economic growth model

4.1 Endogenous Economic Growth Theory
In the past research process of economic growth theory, economists generally pay attention to the physical aspects of economic growth, almost all of which focus on the relationship between actual variables such as capital accumulation, labor growth and technological progress and national income growth. In many growth models, there is often only one form of capital – physical capital, which completely excludes monetary and financial assets. It is also believed that money can only affect the business cycle in the short term, but does not have a substantial impact on long-term economic growth.

The theory of endogenous economic growth that emerged in the late 1980s provided a powerful driving force for the further development of the financial development theory that began in the early 1970s. The rapid integration of financial development theory and endogenous economic growth theory not only makes the difficult financial development theory enter a new stage, but also quietly changes the theory of economic growth, especially the endogenous economic growth theory, which only focuses on the real economy and ignores the currency. Endogenous economic growth refers to the promotion of long-term economic growth driven by forces outside the economy (such as exogenous technological progress, foreign investment, etc.), mainly driven by the internal forces of the economy (such as endogenous technological changes, capital accumulation, etc.). Endogenous economic growth can be divided into two types: “endogenous economic growth of factor input” and “endogenous economic growth of technological progress”. The former is mainly a growth model with endogenous savings rate or endogenous birth rate, the latter. Mainly use: endogenous progress models of technologies such as “learning by doing”, “knowledge spillover”, “human capital accumulation” and “research and development”. According to the endogenous economic growth theory, the behavior of economic entities can affect the long-term growth rate of the economy. Therefore, the financial system not only has a horizontal effect on economic growth, but also plays a sustained and significant role in the long-term growth of the economy.

4.2 Endogenous Financial Economic Growth Model and Verification
On the one hand, financial innovation promotes financial development, promotes financial deepening, and promotes economic growth. On the other hand, financial innovation can also promote economic growth through the function and transmission mechanism of the financial system. The following is an endogenous model for the interaction mechanism between financial development and economic growth. It explores the internal mechanism between financial development and economic growth to demonstrate that financial development itself is endogenous. Therefore, we choose the following indicators for testing.

4.2.1 Selection and interpretation of several key indicators
A measure of financial innovation: financial innovation (FIL). Financial innovation will lead to a decrease in the proportion of transactional financial assets and an increase in the proportion of investment financial assets. We can use the ratio of the total financial assets (FA) of a country to the value of financial assets to reflect the degree of financial innovation. This indicator shows that the greater the degree of financial innovation, the greater the proportion of investment assets in financial assets, and the higher the degree of financial innovation. Among them, trading financial assets are financial assets that can be directly used for payment. According to the division of monetary level, they can be approximated as narrow money M1. If we use FIL to represent financial innovation, then:

$$\text{FIL} = \frac{\text{FA}}{\text{M}_1}$$

Measurement of financial development: financial correlation ratio (FI). The financial related ratio (FIR) refers to the ratio of the value of all financial assets in a country to the total economic output of a country on a certain date. This indicator focuses on the overall level of financial development in a country. The higher the financial correlation ratio, the greater the proportion of external financing and
indirect financing in a country's financing structure, the greater the separation of savings and investment, and the greater the scale of financial activities. Usually, we simplify the calculation of this indicator to the ratio of total financial assets (FA) to GDP. Which is:

\[ \text{FIR} = \frac{\text{FA}}{\text{GDP}} \]

Measurement indicators for financial deepening. Monetization rate (M/GDP), foreign investment ratio (Ic), real interest rate (R), and monetization rate (GDP) are measures to measure the financial repression of different developed and developing countries, and reflect the degree of financial deepening. Indicator, expressed as the ratio of money supply \((M_2)\) to GDP. With the deepening of financial deepening, the proportion of funds raised by the government in the fixed assets investment of the whole society will show a downward trend, that is, the proportion of extra-financial investment is increasing. The real interest rate \((R)\) reflects the price of a financial asset. In general, it is expressed by the one-year resident deposit rate \((R)\) minus the current year's inflation rate \((RT)\).

4.2.2 Inspection of the model

The test of the model shall be carried out on the basis of relevant analysis. Correlation test. The correlation between FIL and GDP, FIR, \(M_2/GDP\), and \(R\) was tested using SPSS13.0 to verify whether there is a linear correlation between them. The results show that FIL is significantly correlated with GDP and FIR, that is, there is a significant correlation between financial innovation and economic growth, financial development, monetization rate, and foreign investment ratio. However, the correlation coefficient between FIL and \(R\) is 0.169, and it has not passed significant. The sex level test shows that there is no significant linear relationship between financial innovation and real interest rates.

| GDP  | FIL  | \(M_2/GDP\) | I    | R    |
|------|------|-------------|------|------|
| 0.469| 0.732| 0.611       | 0.837| 0.197|

Cointegration test. The stationarity of the time series is tested to see if there is a long-term proportional relationship between the sequences. First, the original sequence is tested for stationarity. It can be seen that the test values of the original sequence are greater than the critical value of 5%, so it is necessary to differentiate the original sequence. The test results after the first-order difference show that the ADF test values after the first-order difference of FIL, FIR, \(IGDP\), and \(R\) pass the 5% threshold test. After the first-order difference of \(GDP\), although it did not pass the 5% threshold test, it passed the 10% threshold test, so it is considered that \(GDP\) is in a stable state after the first-order difference.

| Original time series | ADP test |
|----------------------|----------|
|                      | Test value | 5% threshold | SC value | Lag order |
| GDP                  | 0.244     | -3.12        | 19.84    | 1         |
| FIL                  | -2.216    | -3.12        | 0.327    | 1         |
| FIR                  | -2.369    | -3.24        | -1.607   | 1         |
| \(M_2/GDP\)         | -1.204    | -3.98        | -2.827   | 1         |
| \(R\)                | -2.981    | -3.14        | 6.115    | 1         |

Based on the above analysis results, co-integration test is carried out on whether there is a long-term proportional relationship between the indicators. The results show that the \((GDP)\), \((FIL,FIR)\), \((M_2/GDP)\), \((FIL)\) test values all pass the 5% threshold, that is, there is a long-term equilibrium between FIL and \(GDP\), FIR, \(M_2/GDP\), which means There is a long-term proportional relationship between China's financial innovation and China's economic growth, financial development, monetization rate and foreign investment ratio. However, the \((FIL,R)\) test value did not pass the significance level test, that is, there is
no long-term equilibrium relationship between financial innovation and the indicators reflecting the price of financial assets, which confirms the previous correlation analysis results.

| Original time series | ADP test | Test value | 5% threshold | SC value | Lag order |
|----------------------|----------|------------|--------------|----------|-----------|
| GDP                  |          | 1988       | -1.96        | 18.221   | 1         |
| FIL                  | -3.698   | -1.96      | 0.224        | 1        |
| FIR                  | -3.008   | -1.96      | -2.008       | 1        |
| M2/GDP               | -4.897   | -1.96      | 4.396        | 1        |
| R                    | -5.913   | -1.96      | 6.178        | 1        |

4.2.3. Inspection and conclusion. The high correlation between variables does not mean that there must be a causal relationship between them. Therefore, it is necessary to further determine whether there is a causal relationship between the indicators through the Granger causality test.

| Causal test direction | Lag period length | F value statistics | P     |
|-----------------------|-------------------|--------------------|-------|
| FIR=GDP              | 2                 | 3.224              | 0.488 |
| FIL= FIR             | 3                 | 5.178              | 0.222 |
| FIL= M2/GDP          | 2                 | 4.359              | 0.012 |
| FIL≠R                | 3                 | 1.569              | 0.293 |

The Granger causality test was performed on the sequence GDP, FIL, FIR, M2/GDP, and R. The results show that FIRL and GDP, FIR, M2/GDP, Granger test statistic F, all pass the 5% significance level test, that is, FIL is the reason of GDP, FIR, M2/GDP, and that the financial innovation in China can explain Economic growth, financial development, and changes in the rate of monetization and foreign investment. However, financial innovation is not the reason for the actual interest rate R, and cannot explain the changes in the price of financial assets.

Through the above empirical tests, we can see that China's financial innovation can affect the level of financial development, the degree of financial deepening, the changes in financial structure and the state of economic growth. In addition, it has confirmed the long-term equilibrium relationship between financial innovation and financial development, monetization rate, proportion of extra-finance investment, and economic growth. However, China's financial innovation cannot explain the change (R) of financial asset prices in financial deepening. This explains to some extent that the main ways in which China's financial innovation promotes economic growth are: promoting financial development, promoting the overall level of financial deepening, etc.

5. Policy recommendations

5.1 Establish local financial risk prevention system and mechanism. In combination with national strategic requirements and local financial regulatory practice needs, we will accelerate the pace of reform in the local financial risk prevention and control system and mechanism, and work harder to improve the local financial supervision system and implement risk prevention and control responsibilities. It is possible to explore the establishment of risk prevention and withdrawal mechanisms for local systemically important financial institutions and financial institutions, and to
establish and improve major financial market exit mechanisms as soon as possible. Strengthen local financial regulatory enforcement and legislation, strengthen the capacity building of local financial supervision and law enforcement, and actively promote local financial regulatory legislation.

5.2 **Strengthen the construction of the regional financial system.** Cultivate diversified financial supply entities, strengthen and improve local financial institutions and financial institutions, and promote these institutions to provide targeted services for the development of the real economy. Expand diversified financial supply channels and support the development of cross-border financing. Create a functional financial trading platform, actively develop green financial products, and promote the interconnection of financial resources between the three places.

5.3 **Innovative GBA financial synergy development model.** Support the establishment of financial information platform, encourage financial enterprises in Guangdong, Hong Kong and Macao to jointly establish a big data credit system, share financial data of three places, assist financial institutions to prevent risks, and effectively promote information sharing. Develop green finance and use the advantages of Australian-funded financial institutions to gradually deepen international business and promote the coordinated development of Guangdong's financial structure. Promote Hong Kong and Macao insurance industry to carry out medical insurance and property insurance business in the Mainland, improve competition in the domestic insurance industry, and promote the development of the domestic insurance industry.

5.4 **Strengthen the role of the government guidance fund.** Promote the establishment of industrial guidance funds, introduce specific industrial guidance fund management methods, and clarify specific matters such as fund investment areas, cooperation methods, and profit-making benefits. Accelerate the development of risk investment and organize the construction of angel investment network platform. Accelerate the financing of intellectual property pledges, and establish and improve the mechanism for the evaluation and transformation of intellectual property rights. Encourage banking institutions to strengthen cooperation with securities companies and provide investment and loan linkage solutions for enterprises. Support bank financial institutions and venture capital to form strategic alliances, and carry out pilot projects of investment and loan linkage.

5.5 **Optimize the development environment of science and technology finance.** Innovate technology insurance products and services, improve the credit system of science and technology enterprises, and establish and improve the credit rating system of technology enterprises. Improve financial information construction, support financial institutions to continuously improve electronic payment systems, etc., and improve the level of financial infrastructure services. Introduce and cultivate professional technology financial intermediaries, relax market access, develop and cultivate a system of science and technology financial intermediaries. Vigorously develop the listed service business of technology enterprises and strengthen the cooperation in science and technology finance between relevant institutions.

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