

Development of Financial Industry and China's Economic Growth: Heterogeneity across Regions and Time Periods

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ABSTRACT

This paper aims to provide a detailed analysis of the relationship between financial development and China's economic growth. With provincial panel data ranging from 1998 to 2016, we employ several indicators of financial development in China and construct fixed-effects econometric models. The paper first explores the general relation between financial development and China's economic growth and the differences before and after the financial crisis, and then further researches the heterogeneity across regions. Our empirical results show that for the last 20 years, the development of financial industry generally facilitates China's economic growth, with indirect financing and misallocation of financial resources imposing negative impacts. We introduce interaction terms of the financial indicators utilizing a "crisis dummy." The results reveal that the financial environment was essential during the crisis, while negative impacts of financial resources misallocation was magnified. We also divide our provincial data into four areas, and found that the role of financial development is more significant for less developed areas, representing more substantial marginal effects of improved financial environment. After the financial crisis, the policies best improve the financial development in northeast areas with massive state-owned enterprises contributing to economic growth, while the adverse effects mostly damaged developed east regions.

Keywords: Financial development, Economic growth, Heterogeneity, Financial crisis

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1. INTRODUCTION

1.1 Background & rationale

The relationship between financial development and China's economic growth has always been an essential topic for scholars. Financial development stands for to changes

in financial structure both short-term and long-term. The financial structure here represents the form, nature and relative scale of various financial instruments and institutions. Since the reform and opening up, finance and economy of China have maintained a trend of rapid development. In 1978, China's GDP was only 367.9 billion CNY. By 2016, China's GDP was as high as 744.127 billion CNY, which was 202.3 times as much as in 1978.

The factors affecting economic development are diverse and complex. According to the production function, capital, labor, and technology levels are the main factors affecting the long-term growth of a region or a country's economy. Previous studies were based on production functions, and few have analyzed from the perspective of financial development. In the existing reports, most of the research based on simple linear regression and nonlinear regression, and few people analyze it from the perspective of space and geography. To objectively describe the influence of financial development, this paper considers the heterogeneity over time and regions and thereby better explain the complicated economic environment in China.

Throughout historical researches home and abroad, we can discover that the relationship between financial development and China's economic growth is a controversial topic. Some studies believe that the two are positively related, while some others conclude that they are negatively correlated. The rest found that the relationship is nonlinear. Therefore, given the existing researches, this paper will establish a cross-section econometric model, once again evaluate the relationship.

In 2008 outbreaked the financial crisis, after which the Chinese government introduced a series of new policies, including the so-called "Chinese Economic Stimulus Program," also known as the "4-trillion stimulus package". According to Dalma et al. (2010), the stimulus provided funds for infrastructure projects and housing developments; a significant amount was used to assist local governments to lend money to state-owned companies. Over time, it is clear that the program had a profound effect on the financial industry. In this research, we will use our results to indicate the statistical impact of the stimulus program and thereby shows the degree of influence of the program on China's economy. It was also revealed that the central government would only provide 1.2 trillion yuan of funds. According to *The Financial Times* (2018), The rest of the funds were reallocated from the budget of provincial and local governments. Accordingly, the effect of the stimulus program would vary significantly in regions due to different local policies. A comparison later in this research would provide detailed information and evaluation on these differences.

1.2 Route of research

Our analysis follows mainly six steps: first, set up a simple multivariate regression model and generate interaction terms; second, create a cross section using data of 31 provinces in China (the data of Hong Kong and Macao are not available). With annual data from 1998 to 2016 and the basic model, do a multivariable regression using least-squares approximation and decide which variables are the most influential to the

development of China's economy as a whole; third, regress using the model with interaction terms added and annual data; evaluate the differences between the standardized coefficients before and after the year 2009 from a national (overall) perspective; fourth, divide the provinces into four big regions according to the National Bureau of Statistics of China (2011): East China: Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong & Hunan; Middle China: Shanxi, Anhui, Jiangxi, Hubei & Hunan; West China: Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shanxi, Gansu, Tsinghai, Ningxia & Xinjiang; Northeast China: Liaoning, Jilin & Heilongjiang; fifth, with the cross-section data, regress for each of the four regions using the basic model and compare the differences; finally, regress again using the provincial data and the model with interaction terms, examine the impact of policies after the financial crisis over different regions.

1.3 Novelties, implications & applications

Different from previous studies, this paper is unique in the following ways:

1. Our paper uses concrete provincial data only from trustworthy government sources (see in 3.1 Source of data), ensuring the validity in the first place;
2. We use three different indicators of financial development to analyze the influences on the economic growth of various aspects of the financial industry;
3. Instead of simply do a regression using a basic model, we create interaction terms and add them into our model to indicate the differences before and after the financial crisis;
4. We divide China into four regions, each with unique characteristics, and evaluate the difference in the significance of the financial industry across areas before and after the financial crisis; we would further utilize these comparisons to analyze the possible aims and policies of the Chinese government in the following years.

This study brings a new method, and future researchers can further utilize our results to understand the differences across regions in China and the significance of several financial indicators; the model with interaction terms can be used to analyze the profound effects of the financial crisis in a brand-new way.

2. LITERATURE REVIEW

Schumpeter was the earliest scholar who suggested the idea that financial development can promote economic growth. His researches provide a fundamental theory for later scholars. In 1952, classical economist Joan Robin proposed that "Enterprise leads the financial walk," while as written by Taivan et al. (2017), Lucas argued in 1988 that financial development and economic growth are irrelevant, and financial development should not be excessively emphasized. Ryszard Kaminski (2013) stated that with financial development, increasing accounting frauds led to economic recession.

A study done by King and Levine (2014) revealed that there was a positive correlation between the financial industry and economic growth, and the financial industry was the

source of economic growth. In 1997, Arestis and Demetriades (1997) pointed out that financial development is not necessarily the main reason for economic growth in many actual cases. Zhou Li and Wang Ziming (2002) found through empirical analysis that financial development and economic growth in various regions of China are positively correlated. The research of Chen Gang, Yin Xiguo and Pan Yang (2006) indicated that there is a positive correlation between China's financial development and economic growth, namely financial development has a positive effect on economic growth. The analysis of Wu Yongzheng and Lu Feng (2008) showed that the financial development and economic growth of the six central provinces are positively related, in the same way as they performed in the national scale. Wu Zhi (2010) conducted a Granger causality test on China's financial development and economic growth and found that there is a clear one-way causal relationship between the two, that is, economic growth leads to financial development, and Financial development does not influence economic growth. Lu Jing (2012) used provincial panel data to analyze the relationship between financial development and economic growth. The empirical results demonstrated that financial development has a positive effect on economic growth. Lai Juan (2013) analyzed the correlation between financial development and economic growth in Jiangxi Province and found that the factors affecting Jiangxi's economic growth are not only the scale but also the efficiency of financial development. There is a significant positive correlation between financial development and the economic growth of Jiangxi Province.

Some scholars believe that there is only a one-way causality. Ang and Mckibbin (2007) used PCA method, statistically manipulated financial indicators instead of development indicators, made use of Malaysian data, used multivariate co-integration equations for the relationship between finance and growth (VECM) test and causality test and found that there is a causal relationship between financial industry and economic growth. Financial development mainly includes the development of financial agencies and the development of the stock market. Tan Ruyong (1999) found that there is a positive and significant relationship between the development of financial intermediaries and economic growth, indicating that the development of China's financial intermediaries is likely to promote economic growth, which also means the expanding of financial agencies may suggest the growth of China's economy. He also found that there is no significant negative correlation between China's stock market development and economic growth, which means that the impact of China's stock market development on economic growth is rarely significant. Some researches have found that there is a clear and significant nonlinear correlation, which negates the research model that usually sets the relationship between the two. Some others, including Zhao Zhengquan et al. (2007), have suggested that the relationship between China's financial development and economic growth is not evident. Other studies, including the research of Wang Jingwu (2015), have found out that there is a positive causal relationship between financial development and economic growth in east China, while there is a mutual inhibition between financial development and economic growth in west China. Therefore, there are significant differences in regional finance in China.

Previous studies have focused on the analysis of linear and non-linear relationships using time-series data and panel data, considering that financial development may have

spatial effects. Therefore, this paper sets up two different models to analyze the relationship between financial development and China's economic growth, verify whether a linear correlation exists, and validate the differences across time and regions.

3. DATA & VARIABLES

3.1 Source of data

Our national and provincial GDP, Population, Total Retail Sales of Consumer Goods, Fixed-asset Investment, Government Fiscal Expenditure, Export, Import, and CPI data are collected from the *China Statistical Yearbook* by the National Bureau of Statistics of China (2017); national Loan Balance and Deposit Balance data are from the National Bureau of Statistics of China; provincial Loan Balance and Deposit Balance data (1998 – 2015) are from *Almanac of China's Finance and Banking 2016* by the People's Bank of China (2016), and 2016 data are from each province's *Statistical Bulletin on National Economic and Social Development*.

3.2 Definitions of variables

According to Tim Callen (2017), Gross Domestic Product, also known as GDP, measures the monetary value of final goods and services that are bought by the final user and are produced in a country in a given period of time and is a critical indicator of economic growth. In this research, we will be using the following three indicators to represent financial development: Loan Balance (scale of the financial industry); Total Financial Interrelations Ratio (TFIR, the degree of economic monetization); Loan-to-Deposit Ratio (LDR, banking efficiency). In our research, TFIR and LDR are calculated as:

$$TFIR = \frac{\text{Loan Balance} + \text{Deposit Balance}}{GDP};$$

$$LDR = \frac{\text{Loan Balance}}{\text{Deposit Balance}}.$$

To analyze the effect of government policies after the financial crisis in 2008, we specially introduce interaction terms to examine the impact on TFIR and LDR, which will be explained later in this paper.

The three variables that we choose to indicate financial development are:

- Loan Balance (Loan): we use the loan balance to express the amount of financing. Loans are a vital tool for the banking industry to support the development of the economy and an essential way for financial resources to flow. In China, which is dominated by indirect financing banks, loans are a crucial variable in the financial system and one of the primary methods of financial support for the real economy. From the perspective of policy making, bank loans have also become an important indicator of national macroeconomic regulations and have become an essential tool for smoothing economic cycle fluctuations. Whenever the

economy is in recession or overheating, the loan balance becomes the focus of monetary policy. In general, an increase in the loan balance helps to promote regional economic growth.

- TFIR: the ratio of the deposit and loan balance of financial institutions to the gross domestic product. Some scholars, including R. W. Goldsmith (1969), believe that the financial interrelations rate positively correlates with the level of economic development. Other scholars, including Aghion et al. (2005), conclude that different financial structures apply to various stages of economic development: in the early stage of economic development, the improvement of this indicator generally helps to promote the growth of the real economy; after the economic development reaches a certain level, direct financing supports economic growth. From another perspective, most of the civil law countries mainly have indirect financing, while the United States and other countries using the air law system have direct financing, and the role of TFIR is uncertain.
- LDR: the ratio of the loan balance of a financial institution to the balance of a financial institution's deposit, also called the loan-to-deposit ratio. According to Cao Fengqi et al. (2014), scholars have not reached an agreement on the relationship between financial system efficiency and economic growth. The difference in the efficiency of financial system is an essential variable in deciding regional economic and social development differences. For example, in west China or backward regions, there is a phenomenon of “transfusion” of financial resources to east China or developed areas. Although there are policy constraints, banks are like pumping machines and are sending financial resources to areas with higher profits. Therefore, the conversion efficiency of financial resources in west China or backward regions is generally low.

These three indicators are considered the critical variables in our research.

The commonly-used calculation equation of GDP (utilizing expenditure method) is:

$$GDP = Consumption + Investment + Government Expenditure + (Export - Import).$$

As we can see, many economic factors are traditionally considered influential to GDP. Therefore, we add the following indicators as controlled variables:

- Population (Pop): The traditional view is that the more people there are, the more consumption and production an economy has. In our research, population stands for the number of people at 24:00 on December 31 each year. Hong Kong and Macao, as well as overseas Chinese, are not included in the total national population.
- Total Retail Sales of Consumer Goods (Retail): the number of physical goods that enterprises (firms and individuals) sell directly to individuals, social groups for non-production and non-business purposes through transactions, as well as the amount of income from providing catering services. According to the definition from the National Bureau of Statistics of China (2013), individuals include urban and rural residents and immigration personnel, and social groups include government organs, social organizations, troops, schools, enterprises and

institutions, neighborhood committees or village committees. This coefficient can measure the level of people's consumption power.

- Fixed-Asset Investment (FAI): a general term for the amount of work undertaken by the whole society to build and purchase fixed assets in the form of money and the related expenses in a certain period of time. This index is considered by many scholars a comprehensive index reflecting the investment scale, structure and development speed of fixed assets, and also an essential basis for observing project progress and assessing investment effect.
- Government Fiscal Expenditure (GFE): also known as public finance expenditure, represents the payment of financial funds by the government to provide public goods and services to meet the everyday needs of society under market economy conditions. Fiscal expenditure is the process of distribution and use by the state through various forms of fiscal revenue.
- Net Export (NetX): Under the open economy, trade and exports have become critical variables in regional economic development. The size of exports represents the production capacity of an area, the ability to solve employment and regional comparative advantages, and is also an essential variable in economic development.
- Consumer Price Index (CPI): a number reflecting the trend and degree of changes in the prices of consumer goods and services that are purchased by urban and rural residents in a certain period. According to the National Bureau of Statistics of China (2013), The index can be used to observe and analyze the impact of retail prices of consumer goods and prices of service items on the real cost of living of urban and rural residents.

3.3 Summary statistics

Since GDP, Loan GDP, Population, Total Retail Sales of Consumer Goods, Fixed-Asset Investment, Government Fiscal Expenditure and Net Export are all with large numbers; we take the logarithm of them to linearize the data and avoid extreme values (provincial Net Export data are kept original due to negative values). Table 1 & 2 below are the summary statistics of all variables that are going to be used in our models:

Table 1. Summary Statistics of Variables (National)

Variable	Obs.	Mean	Std. Dev.	Min	Max
logGDP	19	12.45706	.7519149	11.3527	13.51997
logLoan	19	12.56231	.8358947	11.36818	13.87946
TFIR	19	2.672803	.3659879	2.138869	3.456269
LDR	19	.7262874	.0706966	.6509354	.9041379
logPop	19	11.7893	.0309653	11.73416	11.83697
logFAI	19	11.79454	1.08039	10.25436	13.3154
logGFE	19	10.7656	.9921511	9.197858	12.14289
logNetX	19	9.018382	1.039608	7.531156	10.51409
CPI	19	101.8842	2.114045	98.6	105.9

Table 2. Summary Statistics of Variables (Provincial)

Variable	Obs.	Mean	Std. Dev.	Min	Max
logGDP	589	8.67606	1.262526	4.516339	11.30041
logLoan	589	8.724806	1.296445	4.311942	11.61664
TFIR	589	2.605777	.9496255	1.296529	7.87515
LDR	589	.7632597	.1678392	.2329603	1.574698
logPop	589	8.063367	.8693863	5.529429	9.30556
logFAI	589	8.037298	1.39808	3.719893	10.88412
logGFE	589	6.953026	1.20205	3.786233	9.506444
NetX	589	6227846	4.50e+07	-3.03e+08	2.64e+08
CPI	589	101.9666	2.230155	96.4	110.1

The variables in Table 1 & 2 are explained detailly in 3.2 Definitions of variables; those with “log” as prefixes have been taken logarithms.

When processing data of TFIR and LDR, we see significantly different trends before and after the year 2009, which again verifies our method of establishing a model with interaction terms using 2009 as a turning point. Figure 1 & 2 below are the national TFIR and LDR values from 1998 to 2016:

As shown in Figure 1, the values of TFIR after 2009 are generally higher than before 2009; Figure 2 shows that LDR kept decreasing rapidly before 2009 while increased steadily after 2009.

To indicate the effect of changes in these two variables on GDP, we introduce a logical variable:

$$dummy = \begin{cases} 0, & \text{when Year} < 2009; \\ 1, & \text{when Year} \geq 2009. \end{cases}$$

Thus, we create the following two interaction terms:

$$TFIR_Inter = dummy * TFIR;$$

$$LDR_Inter = dummy * LDR.$$

Figure 1. National TFIR, 1998 - 2016

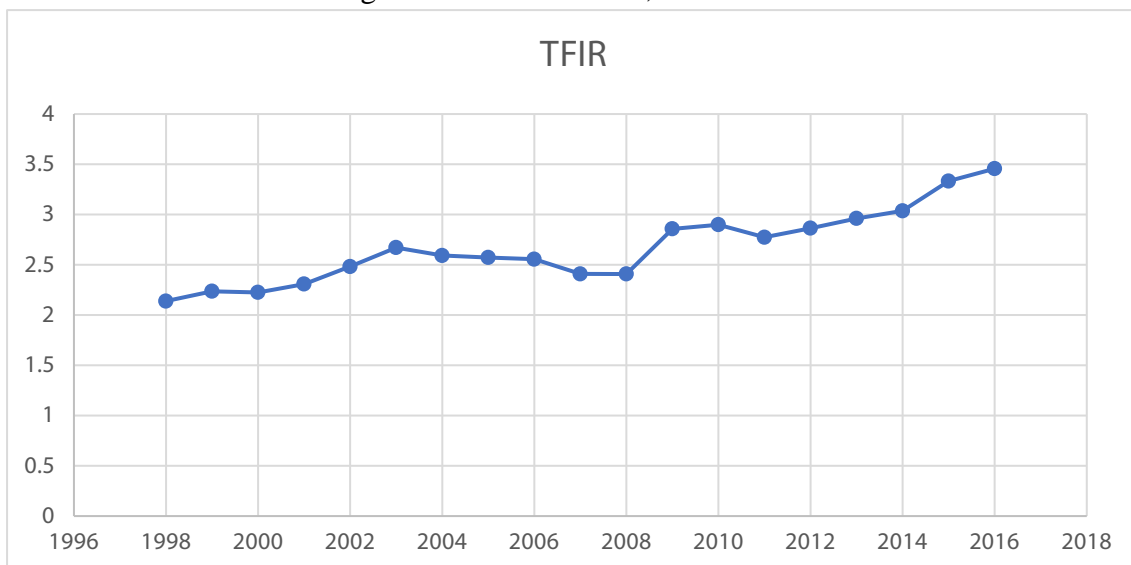
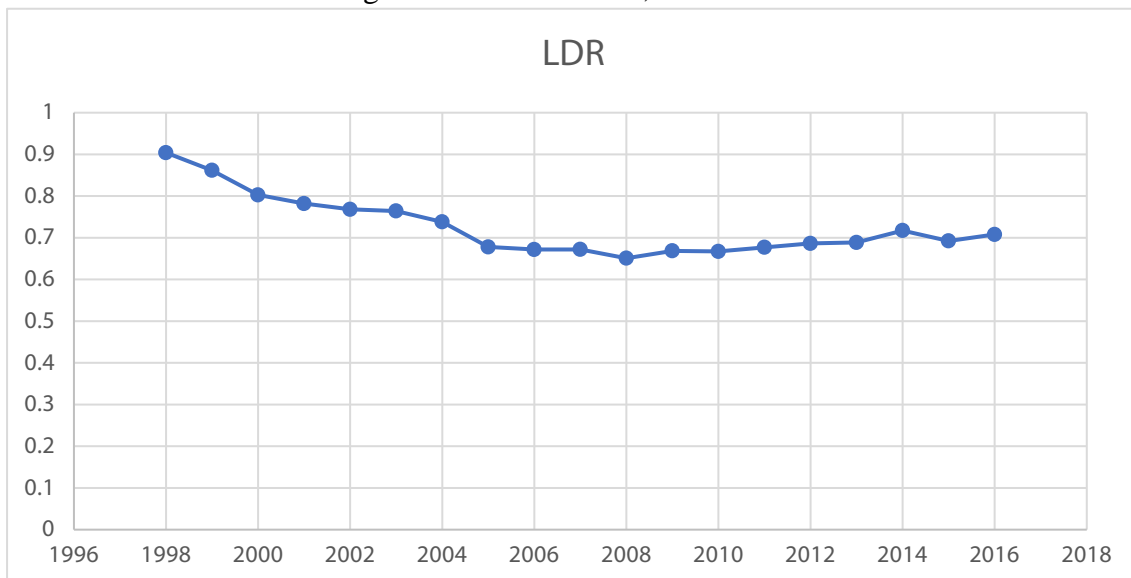


Figure 2. National LDR, 1998 - 2016



4. EMPIRICAL ANALYSIS

4.1 Metrological models

As stated earlier in the paper, we will use the least-squares approximation with the following two linear regression models:

Basic model:

$$\log GDP_{it} = \alpha_0 + \alpha_1 \log Loan_{it} + \alpha_2 TFIR_{it} + \alpha_3 LDR_{it} + \alpha_4 X_{it} + \delta_i + \mu_t + \varepsilon_{it};$$

The model with interaction terms:

$$\log GDP_{it} = \alpha_0 + \alpha_1 \log Loan_{it} + \alpha_2 TFIR_{it} + \alpha_3 TFIR_Inter_{it} + \alpha_4 LDR_{it} + \alpha_5 LDR_Inter_{it} + \alpha_6 X_{it} + \delta_i + \mu_t + \varepsilon_{it}$$

where the subscript i represents provinces; t stands for years; dependent variable $\log\text{GDP}_{it}$ represents GDP (taken log of); key independent variables include $\log\text{Loan}_{it}$ which refers to Loan Balance (taken log of), TFIR_{it} , LDR_{it} , and the interaction terms TFIR_Inter_{it} and LDR_Inter_{it} (as explained in 3.4 Interaction terms); X_{it} represents controlled variables, including Population, Total Retail Sales of Consumer Goods, Fixed-Asset Investment, Government Fiscal Expenditure, Net Export, and CPI (all of above were taken log of except CPI); δ_i stands for provincial fixed effects; μ_t refers to time fixed effects; ε_{it} represents random disturbance.

4.2 Baseline results & analysis (basic model)

We start by examining the correlations of Loan Balance, LFIR, and LDR with GDP utilizing the basic model. Beginning with only key variables, we gradually add controlled variables. In Table 3, the first column directly describes the relationship between financial indicators and GDP; the second column adds in Population; the third adds Total Retail Sales of Consumer Goods; the fourth adds Fixed-Asset Investment; the fifth adds Government Fiscal Expenditure; the sixth adds Net Export; the seventh adds CPI; the eighth approximates using random-effects model to test the sensibility of the results.

The coefficients of Loan Balance, TFIR and LDR are significance under the significance level of 1%. After adding controlled variables, these coefficients are still outstanding given the significance level of 1%. The coefficient of Loan Balance is positive, representing a positive relationship with GDP; the coefficients of TFIR and LDR are negative, referring to an inverse relationship with economic development. Therefore, the results prove that there are strong relationships between financial development and China's economic growth.

The increase in the total amount of loan balance contributes to China's GDP, which confirms that financial promotion of the real economy is in line with economic development. The loan balance reflects the total credit volume (i.e., the absolute size of the loan). The efficiency of the financial system measures the loan-to-deposit ratio (i.e., the relative size of the loan). Therefore, from the perspective of credit supply, financial development can promote regional economic growth.

The inverse relationship between TFIR and GDP indicates the drawbacks of the development of indirect financing in China. The financial institution operates between suppliers and demanders as an intermediary, cutting the connection between the two, and reduces the investors' concern about the operation status of the investment receivers and the pressure and constraints on the funder's use of funds to a certain extent. Our result validates the study of Wang Pengbo, Yu Tao and Cheng Long (2018).

Table 3. Baseline Regression Results (Basic Model)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	logGDP	logGDP	logGDP	logGDP	logGDP	logGDP	logGDP	logGDP
logLoan	0.7399*** (0.0198)	0.7953*** (0.0189)	0.6796*** (0.0218)	0.6195*** (0.0244)	0.5434*** (0.0248)	0.5669*** (0.0243)	0.5661*** (0.0243)	0.7033*** (0.0198)
TFIR	-0.2118*** (0.0075)	-0.2425*** (0.0074)	-0.2148*** (0.0076)	-0.1922*** (0.0087)	-0.1866*** (0.0082)	-0.1986*** (0.0081)	-0.1990*** (0.0082)	-0.2363*** (0.0080)
LDR	-0.5625*** (0.0293)	-0.6337*** (0.0277)	-0.5381*** (0.0280)	-0.5031*** (0.0282)	-0.4138*** (0.0288)	-0.4040*** (0.0278)	-0.4048*** (0.0278)	-0.5390*** (0.0245)
logPop		0.3676*** (0.0357)	0.4072*** (0.0336)	0.4906*** (0.0367)	0.4605*** (0.0349)	0.4044*** (0.0348)	0.4014*** (0.0349)	0.0060 (0.0070)
logRetail			0.2663*** (0.0298)	0.2455*** (0.0294)	0.2535*** (0.0278)	0.2510*** (0.0268)	0.2491*** (0.0269)	0.2841*** (0.0165)
logFAI				0.0590*** (0.0116)	0.0230* (0.0118)	0.0113 (0.0115)	0.0102 (0.0116)	-0.0281** (0.0125)
logGFE					0.1639*** (0.0202)	0.1579*** (0.0195)	0.1601*** (0.0196)	0.0290*** (0.0109)
NetX						-0.0000*** (0.0000)	-0.0000*** (0.0000)	-0.0000*** (0.0000)
CPI							-0.0020 (0.0018)	0.0039*** (0.0014)
Constant	3.1575*** (0.1385)	0.2020 (0.3138)	-1.2089*** (0.3328)	-1.6958*** (0.3390)	-1.6714*** (0.3200)	-1.3185*** (0.3141)	-1.0829*** (0.3818)	0.9807*** (0.1567)
Time Fixed	YES	YES	YES	YES	YES	YES	YES	NO
Prov. Fixed	YES	YES	YES	YES	YES	YES	YES	NO
Observations	589	589	589	589	589	589	589	589
R ²	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.997

Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Increase in the efficiency of the financial system has not promoted China's economic growth, which is inconsistent with the mainstream concept. Commonly speaking, improvements of the financial system would improve the efficiency of financial institutions serving the real economy, and thus would promote economic growth. According to Yang Xu et al. (2010), with the rapid development of finance, the negative correlation between financial efficiency and economic growth has become the paradox of financial development. On the one hand, more financial resources are invested in the real economy; on the other, such investment in financial resources hinders economic growth. The most likely reason is that mismatches exist in the using of financial resources, that is, not all financial funds are efficiently invested in the fields and industries that support the development of the real economy. Some areas and industries in China that have access to financial resources are inefficient or ineffective in the use of financial resources. More likely, these areas and industries that occupy financial resources have squeezed the financial support that relatively efficient companies could otherwise obtain. In short, this kind of financial mismatch has caused a strange circle of financial development that hinders economic growth. The above analysis and reasoning are consistent with the report of Song and Storesletten (2011), which further confirms the weakness of China's financial development to a certain extent.

Looking at the controlled variables: the coefficients of Population, Total Retail Sales of Consumer Goods, and Government Fiscal Expenditure are all positive, which fits the economic calculation of GDP stated earlier and again validates our model.

4.3 Baseline results & analysis (heterogeneity across time)

To visualize the differences before and after the financial crisis, we regress using our model with interaction terms, as shown in Table 4.

The results validate our interaction-terms model; the coefficients of Loan Balance, TFIR, and LDR, along with the interaction terms TFIR_Inter and LDR_Inter, are significant under the significant level of 1% most of the times (otherwise under 5%) with or without controlled variables added.

To compare detailly between the three indicators of financial development, we then run an extra test to standardize the coefficients:

Table 4. Baseline Regression Results (Heterogeneity across Time)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	logGDP	logGDP	logGDP	logGDP	logGDP	logGDP	logGDP	logGDP
logLoan	0.8572*** (0.0196)	0.8605*** (0.0192)	0.7472*** (0.0233)	0.6856*** (0.0252)	0.6100*** (0.0260)	0.6187*** (0.0256)	0.6192*** (0.0255)	0.7177*** (0.0197)
TFIR	-0.3117*** (0.0100)	-0.3063*** (0.0098)	-0.2711*** (0.0104)	-0.2484*** (0.0109)	-0.2370*** (0.0105)	-0.2385*** (0.0103)	-0.2410*** (0.0103)	-0.2574*** (0.0087)
TFIR_Inter	0.0551*** (0.0045)	0.0436*** (0.0050)	0.0381*** (0.0048)	0.0386*** (0.0046)	0.0345*** (0.0044)	0.0289*** (0.0045)	0.0304*** (0.0046)	0.0277*** (0.0051)
LDR	-0.5201*** (0.0278)	-0.5682*** (0.0288)	-0.5114*** (0.0283)	-0.4756*** (0.0283)	-0.4010*** (0.0287)	-0.3931*** (0.0282)	-0.3948*** (0.0281)	-0.4972*** (0.0266)
LDR_Inter	-0.1579*** (0.0264)	-0.1201*** (0.0269)	-0.0706*** (0.0263)	-0.0696*** (0.0256)	-0.0582** (0.0244)	-0.0565** (0.0240)	-0.0570** (0.0239)	-0.1283*** (0.0224)
logPop		0.1922*** (0.0384)	0.2575*** (0.0374)	0.3419*** (0.0394)	0.3325*** (0.0375)	0.3100*** (0.0371)	0.3001*** (0.0373)	-0.0044 (0.0073)
logRetail			0.2265*** (0.0292)	0.2050*** (0.0287)	0.2173*** (0.0273)	0.2195*** (0.0268)	0.2148*** (0.0268)	0.2645*** (0.0164)
logFAI				0.0609*** (0.0109)	0.0288** (0.0112)	0.0193* (0.0112)	0.0177 (0.0112)	-0.0059 (0.0128)
logGFE					0.1451*** (0.0193)	0.1436*** (0.0189)	0.1472*** (0.0190)	0.0224* (0.0122)
NetX						-0.0000*** (0.0000)	-0.0000*** (0.0000)	-0.0000*** (0.0000)
CPI							-0.0038** (0.0018)	0.0043*** (0.0014)
Constant	2.5719*** (0.1324)	1.1574*** (0.3108)	-0.1786 (0.3414)	-0.6693* (0.3435)	-0.7643** (0.3271)	-0.6413** (0.3223)	-0.1576 (0.3929)	0.9478*** (0.1529)
Time Fixed	YES	YES	YES	YES	YES	YES	YES	NO
Prov. Fixed	YES	YES	YES	YES	YES	YES	YES	NO
Observations	589	589	589	589	589	589	589	589
R ²	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.998

Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5. Variables with Standardized Coefficients (General)

logGDP	Coef.	Std. Err.	t	P>t	Beta
logLoan	.8572012	.0196116	43.71	0.000	.8802314
TFIR	-.3116543	.0099912	-31.19	0.000	-.2344149
TFIR_Inter	.0551433	.00449	12.28	0.000	.0702241
LDR	-.5200643	.0277916	-18.71	0.000	-.0691369
LDR_Inter	-.1579159	.0263899	-5.98	0.000	-.046969
Constant	2.571946	.1324432	19.42	0.000	.

From the beta values in Table 5, before the year 2009, a 1% increase in Loan could stimulate a 0.88% increase in GDP; a 1 unit increase in TFIR could lead to a 0.23% decrease in GDP; a 1 unit increase in LDR could result in a 0.07% decrease in GDP. Thus, TFIR was more influential to economic growth than LDR before the financial crisis, and these influences are proved to be negative.

According to our definition described in 3.4 Interaction-terms, the influence to GDP of TFIR after 2009 can be simply calculated by adding the beta values of the coefficients of TFIR and TFIR_Inter; the above is also true to LDR. Therefore, after 2009, a 1 unit increase in TFIR leads to a $(|-0.2344149 + 0.0702241| \approx)$ 0.16% decrease in GDP, and a 1 unit increase in LDR results in a $(|-0.0691369 - 0.046969| \approx)$ 0.12% decrease in GDP. In other words, after the financial crisis, TFIR was 30% less influential to economic growth with LDR becoming nearly twice as influential as before.

The above results reflect the effects of government policies on China's economy from a financial perspective. The negative impact of TFIR was partly decreased since the use of funds were now strictly controlled and invigilated by government officials, the effective convention of financial support into industrial output would be insured; state-owned industries would more readily receive funds due to reinforcements of the policies by the government.

However, the adverse effect of LDR was amplified after the financial crisis. As described in 1.1 Background & rationale, the "4-trillion" investment was not all provided by the central government, and nearly three quarters came from local finance, bank credits, and private capital. To make the economic stimulus plan work as soon as possible, the National Development and Reform Commission approved a series of major investment projects at a speed exceeding the regular rate and quickly consumed local supporting funds. Later, local governments had no financial capacity to make supporting investments, and there were still projects continually launched. Since the local government did not have the power to issue bonds at that time, the private capital was limited, and a significant number of matching funds were filled by local government guarantees, which caused the local debt to skyrocket. Under heavy debt pressure, local governments used a more substantial portion of their fiscal funds to pay their debts, crowd out funds for long-term development, which in turn reduced local fiscal revenues and further hindered economic growth. Besides, most of the four-trillion investment was put in infrastructure, among which the most demanding were cement, steel, etc., with high pollution, high

consumption of energy, and low added value. Many of these enterprises had already invested heavily in upgrading and gradually phasing out part of the production capacity. However, the implementation of the four-trillion plan suddenly brought huge profits, which delayed the elimination process and expanded the backwardness due to firms' aim of profit maximization. When the investment was over, overcapacity grew, and the prices of some industrial products plummeted, bringing damage to economic growth.

5. FURTHER RESEARCH

5.1 Results & analysis with four regions (basic model)

In 4. Empirical Analysis, we generally discussed the correlation between financial development and China's economic growth. However, vast differences exist across various regions in China; the importance of financial industry in development areas may differ from other places. Therefore, as described in 1.2 Route of Research, we divide our provincial data into four big areas and regress for each of them, as shown in Table 6 .

From the results of the regressions, the coefficients of Loan Balance, TFIR and LDR are significance under the significance level of 1%, and still being significant after adding controlled variables, which further validates the applicability of our model in China's environment. The goodness-of-fit stays strong with values approaching 1 in all cases. In the four regions, the coefficients are the same in signs but different in values.

Economically speaking, East China (column 1 & 2) is the most developed among the four regions, after which is Middle China (column 3 & 4); West China is the least developed (column 5 & 6); Northeast China (column 7 & 8) lies in between. The coefficients of Loan Balance in West China and Northeastern China are the greatest among the four areas, meaning that credit and loan are an essential stimulator of the economy in less developed regions of China. The absolute value of the coefficient of TFIR is the highest in Middle China, meaning that the drawbacks of indirect financing are the most profound in this area. The absolute value of the coefficient of LDR in East China is the lowest, indicating that developed regions in China have better financial systems; thus, financial resources would be allocated to more effective and efficient producers, minimizing the adverse effects it brings to the economy.

5.2 Results & analysis with four regions (heterogeneity across time)

To detailed show the impact of the Chinese government's policies after the financial crisis, we regress using the model with interaction terms, as shown in Table 7 below:

Table 6. Regression Results for Four Regions (Basic Model)

Region	East China		Middle China		West China		Northeast China	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	logGDP	logGDP	logGDP	logGDP	logGDP	logGDP	logGDP	logGDP
logLoan	0.5006*** (0.0526)	0.3602*** (0.0623)	0.6898*** (0.0499)	0.6814*** (0.0548)	0.8002*** (0.0309)	0.5434*** (0.0357)	0.7556*** (0.0513)	0.6989*** (0.1204)
TFIR	-0.1300*** (0.0133)	-0.1169*** (0.0200)	-0.3610*** (0.0208)	-0.3570*** (0.0200)	-0.2534*** (0.0106)	-0.2055*** (0.0099)	-0.2981*** (0.0265)	-0.3676*** (0.0501)
LDR	-0.2919*** (0.1073)	-0.1994** (0.0829)	-0.3683*** (0.0402)	-0.3584*** (0.0369)	-0.6627*** (0.0466)	-0.3630*** (0.0529)	-0.4934*** (0.0658)	-0.4298*** (0.1225)
logPop		0.6295*** (0.0627)		0.3984*** (0.0960)		0.3429*** (0.0605)		2.0792** (0.8243)
logRetail		0.2942*** (0.0466)		0.1310*** (0.0443)		0.3221*** (0.0425)		-0.0859 (0.3438)
logFAI		0.0340 (0.0307)		-0.0184 (0.0207)		0.0439* (0.0224)		-0.0732** (0.0329)
logGFE		0.1459*** (0.0339)		0.1249** (0.0561)		0.1762*** (0.0351)		0.0675 (0.1089)
NetX		-0.0000 (0.0000)		-0.0000 (0.0000)		-0.0000 (0.0000)		-0.0000 (0.0000)
CPI		-0.0008 (0.0036)		-0.0009 (0.0028)		0.0002 (0.0025)		0.0054 (0.0096)
Constant	4.5481*** (0.3579)	-2.0491*** (0.7790)	3.4903*** (0.3256)	-0.9839 (0.9044)	2.7603*** (0.1976)	-1.6961*** (0.5843)	3.1294*** (0.3957)	-13.4213* (7.6814)
Time Fixed	YES	YES	YES	YES	YES	YES	YES	YES
Prov. Fixed	YES	YES	YES	YES	YES	YES	YES	YES
Observations	190	190	114	114	228	228	57	57
R ²	0.998	0.999	0.999	0.999	0.999	0.999	0.999	0.999

Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7. Regression Results for Four Regions (Heterogeneity across Time)

Region	East China		Middle China		West China		Northeast China	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	logGDP	logGDP	logGDP	logGDP	logGDP	logGDP	logGDP	logGDP
logLoan	0.7197*** (0.0545)	0.4098** (0.0668)	0.8887*** (0.0405)	0.7837*** (0.0525)	0.9393*** (0.0343)	0.6651*** (0.0423)	0.7788*** (0.0640)	0.6505*** (0.1195)
TFIR	-0.2342*** (0.0185)	-0.1389*** (0.0230)	-0.4828*** (0.0221)	-0.4381*** (0.0232)	-0.3527*** (0.0183)	-0.2659*** (0.0176)	-0.3793*** (0.0382)	-0.3193*** (0.0569)
TFIR_Inter	0.0463*** (0.0064)	0.0146** (0.0059)	0.0800*** (0.0114)	0.0582*** (0.0116)	0.0572*** (0.0129)	0.0261** (0.0111)	0.0729** (0.0310)	-0.0899* (0.0569)
LDR	-0.3857*** (0.0974)	-0.2579*** (0.0840)	-0.3468*** (0.0437)	-0.3665*** (0.0456)	-0.5853*** (0.0437)	-0.3569*** (0.0508)	-0.4636*** (0.0628)	-0.3269** (0.1266)
LDR_Inter	-0.1489*** (0.0558)	0.0207** (0.0451)	-0.1411*** (0.0415)	-0.0491** (0.0456)	-0.2658*** (0.0426)	-0.1700*** (0.0367)	-0.2403* (0.1445)	-0.2028* (0.1578)
logPop		0.5723*** (0.0669)		0.1651* (0.0979)		0.3080*** (0.0585)		4.0017*** (1.3182)
logRetail		0.2824*** (0.0483)		0.0845** (0.0395)		0.2517*** (0.0429)		0.1017 (0.3444)
logFAI		0.0324 (0.0301)		-0.0151 (0.0183)		0.0375* (0.0213)		-0.0820** (0.0331)
logGFE		0.1411*** (0.0334)		0.1118** (0.0498)		0.1601*** (0.0342)		0.0686 (0.1043)
NetX		-0.0000 (0.0000)		-0.0000 (0.0000)		-0.0000 (0.0000)		-0.0000 (0.0000)
CPI		-0.0029 (0.0036)		-0.0015 (0.0025)		-0.0014 (0.0024)		0.0031 (0.0092)
Constant	3.2387*** (0.3595)	-1.5743** (0.7961)	2.2409*** (0.2638)	0.7283 (0.8622)	1.8443*** (0.2262)	-1.4866** (0.5722)	3.0856*** (0.5006)	-30.3442** (11.4696)
Time Fixed	YES	YES	YES	YES	YES	YES	YES	YES
Prov. Fixed	YES	YES	YES	YES	YES	YES	YES	YES
Observations	190	190	114	114	228	228	57	57
R ²	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999

Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The model is proved to work in all areas in China, with coefficients of key variables and interaction terms being significant even when controlled variables are added.

Next, we standardize the coefficients; the results are shown in Table 8 below:

Table 8. Variables with Standardized Coefficients (Four Areas)

logGDP	East China	Middle China	West China	Northeast China
logLoan	.7566645	.9282639	.974567	.7489768
TFIR	-.2752788	-.2718869	-.1857269	-.183255
TFIR_Inter	.0775396	.1149401	.0703089	.1111507
LDR	-.04156	-.0752351	-.081083	-.114976
LDR_Inter	-.0471635	-.0645322	-.0801943	-.111178
Constant

Table 9 down below summarizes the useful information provided in Table 8:

Table 9. Change in Key Variables with Standardized Coefficients (Four Areas)

Variable	logLoan	TFIR			LDR		
		Before 2009	After 2009	% Change	Before 2009	After 2009	% Change
logGDP	/						
East	0.76	-0.28	-0.20	-28%	-0.04	-0.09	113%
Middle	0.93	-0.27	-0.16	-42%	-0.08	-0.14	86%
West	0.98	-0.19	-0.12	-38%	-0.08	-0.16	99%
Northwest	0.75	-0.18	-0.07	-61%	-0.11	-0.23	97%

From Table 9, it is clear that the policies after the financial crisis have various effects across different parts of China. For TFIR, the decrease in the adverse impacts on GDP is the greatest in Northwest China. This phenomenon can be explained by the large number of national funds received by the giant state-owned firms in heavy industries. With abundant natural resources and government invigilation, these firms would more effectively contribute to regional GDP.

If we look at LDR, the adverse effects on GDP in East China increased 113% which is the greatest across China. Here the drawbacks of the “4-trillion” project are validated: the massive funds given to state-owned enterprises in the old industries led to excess production capacity and crowded out the living space of a large number of private companies in the developed areas. Local governments in the developed regions had to devote a significant proportion of its budget into fulfilling the requirements from Beijing, hindering government support for the industries which could facilitate economic growth.

5.3 Robustness checks

To better study financial development and China’s economic growth, as well as further validate our findings, we will do two extra robustness checks.

In the above analysis, we have been using GDP as the dependent variable. Now we substitute Loan Balance (Loan) with Loan Balance per capita (Loanpc) and use GDP per capita (GDPpc) as the new dependent variable (we still take the logarithm of Loanpc and GDPpc). The regression results for the basic model are as below:

Table 10. Regression Results for Robustness Check (Basic Model)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	logGDPpc	logGDPpc	logGDPpc	logGDPpc	logGDPpc	logGDPpc	logGDPpc	logGDPpc
logLoanpc	0.7510*** (0.0145)	0.7953*** (0.0189)	0.6796*** (0.0218)	0.6195*** (0.0244)	0.5434*** (0.0248)	0.5669*** (0.0243)	0.5661*** (0.0243)	0.7033*** (0.0198)
TFIR	-0.2274*** (0.0062)	-0.2425*** (0.0074)	-0.2148*** (0.0076)	-0.1922*** (0.0087)	-0.1866*** (0.0082)	-0.1986*** (0.0081)	-0.1990*** (0.0082)	-0.2363*** (0.0080)
LDR	-0.5864*** (0.0247)	-0.6337*** (0.0277)	-0.5381*** (0.0280)	-0.5031*** (0.0282)	-0.4138*** (0.0288)	-0.4040*** (0.0278)	-0.4048*** (0.0278)	-0.5390*** (0.0245)
logPop		0.1628*** (0.0449)	0.0868** (0.0428)	0.1100*** (0.0420)	0.0040 (0.0418)	-0.0287 (0.0407)	-0.0324 (0.0408)	-0.2907*** (0.0194)
logRetail			0.2663*** (0.0298)	0.2455*** (0.0294)	0.2535*** (0.0278)	0.2510*** (0.0268)	0.2491*** (0.0269)	0.2841*** (0.0165)
logFAI				0.0590*** (0.0116)	0.0230* (0.0118)	0.0113 (0.0115)	0.0102 (0.0116)	-0.0281** (0.0125)
logGFE					0.1639*** (0.0202)	0.1579*** (0.0195)	0.1601*** (0.0196)	0.0290*** (0.0109)
NetX						-0.0000*** (0.0000)	-0.0000*** (0.0000)	-0.0000*** (0.0000)
CPI							-0.0020 (0.0018)	0.0039*** (0.0014)
Constant	1.3342*** (0.0333)	0.2020 (0.3138)	-1.2089*** (0.3328)	-1.6958*** (0.3390)	-1.6714*** (0.3200)	-1.3185*** (0.3141)	-1.0829*** (0.3818)	0.9807*** (0.1567)
Time Fixed	YES	YES	YES	YES	YES	YES	YES	NO
Prov. Fixed	YES	YES	YES	YES	YES	YES	YES	NO
Observations	589	589	589	589	589	589	589	589
R ²	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.995

Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 11. Regression Results for Robustness Check (Heterogeneity across Time)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	logGDPpc	logGDPpc	logGDPpc	logGDPpc	logGDPpc	logGDPpc	logGDPpc	logGDPpc
logLoanpc	0.8495*** (0.0169)	0.8605*** (0.0192)	0.7472*** (0.0233)	0.6856*** (0.0252)	0.6100*** (0.0260)	0.6187*** (0.0256)	0.6192*** (0.0255)	0.7177*** (0.0197)
TFIR	-0.3040*** (0.0097)	-0.3063*** (0.0098)	-0.2711*** (0.0104)	-0.2484*** (0.0109)	-0.2370*** (0.0105)	-0.2385*** (0.0103)	-0.2410*** (0.0103)	-0.2574*** (0.0087)
TFIR_Inter	0.0453*** (0.0048)	0.0436*** (0.0050)	0.0381*** (0.0048)	0.0386*** (0.0046)	0.0345*** (0.0044)	0.0289*** (0.0045)	0.0304*** (0.0046)	0.0277*** (0.0051)
LDR	-0.5521*** (0.0256)	-0.5682*** (0.0288)	-0.5114*** (0.0283)	-0.4756*** (0.0283)	-0.4010*** (0.0287)	-0.3931*** (0.0282)	-0.3948*** (0.0281)	-0.4972*** (0.0266)
LDR_Inter	-0.1235*** (0.0268)	-0.1201*** (0.0269)	-0.0706*** (0.0263)	-0.0696*** (0.0256)	-0.0582** (0.0244)	-0.0565** (0.0240)	-0.0570** (0.0239)	-0.1283*** (0.0224)
logPop		0.0527 (0.0435)	0.0047 (0.0417)	0.0275 (0.0408)	-0.0575 (0.0404)	-0.0713* (0.0398)	-0.0807** (0.0399)	-0.2866*** (0.0196)
logRetail			0.2265*** (0.0292)	0.2050*** (0.0287)	0.2173*** (0.0273)	0.2195*** (0.0268)	0.2148*** (0.0268)	0.2645*** (0.0164)
logFAI				0.0609*** (0.0109)	0.0288** (0.0112)	0.0193* (0.0112)	0.0177 (0.0112)	-0.0059 (0.0128)
logGFE					0.1451*** (0.0193)	0.1436*** (0.0189)	0.1472*** (0.0190)	0.0224* (0.0122)
NetX						-0.0000*** (0.0000)	-0.0000*** (0.0000)	-0.0000*** (0.0000)
CPI							-0.0038** (0.0018)	0.0043*** (0.0014)
Constant	1.5312*** (0.0377)	1.1574*** (0.3108)	-0.1786 (0.3414)	-0.6693* (0.3435)	-0.7643** (0.3271)	-0.6413** (0.3223)	-0.1576 (0.3929)	0.9478*** (0.1529)
Observations	589	589	589	589	589	589	589	589
R ²	0.998	0.998	0.998	0.998	0.999	0.999	0.999	0.995

Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The coefficients of Loanpc, TFIR, and LDR are always significant given the significance level of 1% under any circumstances. Therefore, our basic model passes the robustness check.

Now we also do the robustness check for the model with interaction terms; the results are in Table 11.

As shown, the coefficients of the key variables and interaction-terms stayed significant after adding a series of controlled variables; our interaction-terms model also passes the robustness check.

To summarize, after processing the dependent and independent variables, the regression results are still satisfactory. Therefore, the robustness of our findings is validated.

6. CONCLUSION

This research analyzed the relationship between the development of the financial industry using empirical data of Chinese provinces from 1998 to 2016 and further revealed the heterogeneity over regions and the vast differences before and after the financial crisis. We used Loan Balance (scale of the financial industry), Total Financial Interrelations Ratio (TFIR, the degree of economic monetization), and Loan-to-Deposit Ratio (LDR, banking efficiency) to indicate financial development, and Gross Domestic Product to represent economic growth. To compare the difference in the influences of financial indicators on economic growth, we innovatively created a model with interaction terms, along with the basic model, and divided Chinese provinces into four big regions to regress using the least-squares method. Our findings suggest that:

1. Increase in the scale of the financial industry would facilitate China's economic growth;
2. The development of indirect financing in China to some extent impedes economic growth;
3. Along with the development of financial institutions, the misallocation of financial resources hinders China's economic growth;
4. In general, the government policies after the financial crisis help to offset the negative impacts of indirect financing on economic growth while magnified the adverse effects of financial resources misallocation;
5. Credit and loan are more significant in stimulating economic growth in West China, indicating more substantial marginal effects of financial environment improvement; the drawbacks of indirect financing on the economy are the most profound in Middle China; East China's effective financial systems allocate financial resources in economic growth more efficiently than other regions;
6. After the financial crisis, the government policies best help state-owned firms in Northeast China to contribute to economic growth, while the adverse crowding-out effects and excess production capacity were the most damaging to East China.

From the theoretical perspective, this study sets an example of adding interaction

terms into model to illustrate the heterogeneity before and after the financial crisis. Besides, the differences in the coefficients of the three financial indicators proves the theory that financial development generally facilitates China's economic growth while some financial aspects do impose negative impacts.

From the practical perspective, future researchers can use our conclusions to understand the differences in the significance of several financial indicators and the heterogeneity across regions in China before and after the financial crisis. This paper also provides scholars with empirical results that can be utilized to analyze the influences of Chinese governments' policies.

To best amplify the positive impacts and avoid the drawbacks, the Chinese government may consider working on the following two aspects:

1. Expand the scale of financial industry and promote the direct financing market.

Promoting the financial industry is a necessary choice for China to achieve a stable increase in GDP. China's currency should be released even before China's capital projects are fully open. Due to the profit-seeking nature of capital, capital will automatically flow to regions and sectors with high profits, so that countries and areas where capital projects are entirely mobile have around the same profit margin and growth rate, which is also the reason why the economic growth rates of European and American countries maintained at around 3%. When China fully opens its capital, its economic growth rate and return on capital will inevitably be lowered to the level of developed countries because of the mechanism of average profit margin driven by capital profitability, regardless of technology and producing efficiency. At present, China's per capita GDP still does not reach the level of developed countries with a considerable distance from Europe and the United States. Therefore, although excessive money has caused inflation and other problems, from the long-term perspective of national strategy, it is still a very effective catch-up strategy.

Of course, excessive financial development is prone to problems such as financial bubbles, thereby increasing the degree of virtualization of the economy, expanding financial risks, and even eroding the profits of the real economy, damaging the growth of the real economy. Here we should note that financial exclusion, regional distribution, and discrimination are also important reasons why financial resources cannot enter the real economy. In summary, this paper believes that China should continue to promote financial development, expand financial scale, and promote financial deepening.

Nowadays, since the role of indirect financing in promoting economic growth has been gradually weakened, it is necessary to encourage the development of direct financing markets and build multi-level capital markets. Specifically, the government may promote the reform of the stock market; increase the proportion of the bond market; improve the liquidity and form a multi-level capital market; promote the development of the bond market and enhance the trading mechanism of it. Also, we must relax financial constraints and develop private finance. At present, the financial system at the top of China has established, but private finance and grassroots finance are still not standardized.

2. Improve the efficiency of financial institutions and solve the misallocation of financial resources.

Although China's financial development has made rapid progress, there are still severe financial mismatches in some regions, which requires various measures such as increasing financial openness and improving financial efficiency. Accordingly, the government can achieve a good interaction cycle between finance and the real economy. Increasing financial openness is not only to increase the efficiency of opening up foreign capital, but more importantly, to introduce more competition mechanisms within the country, and to force existing financial institutions to improve services and cultivate new markets. On the other hand, the government should improve financial structure and promote financial innovation. Closed and banned domestic financial markets are particularly undesirable. Although open finance can lead to and aggravate financial risks, our reforms cannot be squandered; we must consider its contribution to overall financial efficiency and economic growth. Higher requirements should be imposed on financial regulatory agencies, and appropriate supervision is required.

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