Effects of Financial Development on Real Economic Growth
An Evidence from China

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Abstract. In recent years, China's economy had reached a new normal of development, and was transitioning from a stage of high-speed growth to a stage of high-quality development. The COVID-19 pandemic had taken its toll on the global real economy. The high-quality development of China's economy needs the support from the financial sector more than ever. By using China's financial data and real economic data from 2001 to 2020, establishing Vector Autoregression (VAR) model and carrying out Johanson cointegration test, we discuss the effects of the financial development on the real economic growth. We find that there is a long-term stable equilibrium relationship between them, and believe that the financial development has supported the growth of the real economy in China.

Keywords: Financial development · Real economy · Financial scale · Financial structure · Financial efficiency

1 Introduction

In the 21st century, China's economy has developed rapidly and has become the main driving force for the sustainable global economic growth. The World Economic Outlook released by the International Monetary Fund (IMF) in April 2021 shows that as the world's second-largest economy, China's contribution to the global gross domestic product (GDP) growth is close to 30% annually. After the outbreak of COVID-19, the global economy experienced a deep recession, and the real economy suffered a heavy blow. In 2020, the global economy got a contraction of 4.4% based on Purchasing Power Parity (PPP). Globally, the COVID-19 has not been effectively controlled. In the post COVID-19 era, China's economy is still an important force leading the revival of global economy. Exploring the effects of the financial development on the real economic growth will contribute to deepen our understanding of the relationship between the financial sector and the economic growth, and formulate financial policies to promote the real economic growth.

The paper is proceeding as follows. Section 2 reviews the theoretical basis and research status of the impact of financial development on the real economy. In Sect. 3, we select the variables and determined the data source. Section 4 is empirical research. And some conclusions are contained in Sect. 5.

2   Theoretical Basis and Literature Review

For a long time, scholars have done a lot of studies on the relationship between the finan-
cial development and the economic growth, put forward and developed some financial
development theories such as the Financial Structure Theory, the Financial Deepen-
ing Theory, the Financial Repression Theory, the Financial Restraint Theory and the
Financial Function Viewpoint.

The discussion on the relationship between the financial development and the eco-
nomic growth can be traced back to John Locke and Adam Smith. They proposed that
only free development of the finance sector can promote the economic growth. By the
beginning of the 20th century, Schumpeter expounded how perfect banks can identify
successful enterprises, finance them and enhance innovation activities.

Gurley and Shaw (1967) clearly expressed that the financial development refers to
the increase in the types and number of financial assets and financial institutions. Two
years later, Goldsmith (1969) first defined the concept of the financial structure, and
believed that the financial development can promote the economic growth. In the 1970s,
McKinnon (1973) and Shaw (1973) put forward that financial liberalization and financial
deepening can promote the formation and improvement of financial markets, that is,
financial development, which is conducive to income increase and equal distribution. In
the 1990s, King and Levine (1993) put forward the Financial Function Viewpoint, taking
financial intermediary as an endogenous factor of the economic growth, and deemed that
with the deepening of financial functions, the financial development will promote the
long-term sustainable economic growth [1]. A few years later, Hellmann, Murdock and
Stiglitz (1997) put forward the Financial Restraint Theory. They pointed out that the
financial restraint means that the government creates rent opportunities in the private
sector through a series of financial policies, which provides appropriate incentives for
the development of financial organizations and can promote the financial deepening.

The early studies show that the financial development is an important determinant of
the economic growth, but the relationship between the financial development and the real
economy are mostly included in the research on the relationship between the finance and
the economic growth. With the outbreak of the financial crisis in 2008, people began to
pay more attention to the development of the real economy and its internal relationship
with the financial sector. However, due to the broad definition and interdependence with
other spheres of economic development, the effect of the financial development on the
real economic growth is unclear. There are three perspectives.

2.1   Promoting Real Economy Growth

Through empirical analysis, some scholars find that the financial development pro-
motes the real economic growth by optimizing the financial structure and stimulating
the functions of financial intermediary [2].

Recently, through empirical studies, some Chinese scholars also believe that there is
a positive correlation relationship between the financial development and the real eco-
nomic growth in China. They think that the financial development leads to the expansion
of financing scale, the reduction of financing cost, the improvement of capital marginal

efficiency, and the increase of investment in fixed assets, so as to effectively promote the growth of the real economy [3, 4].

2.2 Restrained Real Economy Growth

The outbreak of the financial crisis in 2008 hit the global real economy hard. While studying the causes of the financial crisis, scholars questioned the view that the financial development promotes the growth of the real economy. Some scholars think that the financial development has a certain inhibitory effect on the real economy. They find that rapid financial development will reduce the efficiency of resource allocation, and inhibit the development of the real economy [5].

Using panel data of different periods in various provinces of China, some scholars believe that the effect of the financial development on the real economic growth becomes negative, due to too much capital flowing into the virtual economic sector and diminishing the marginal return of financial resources [6, 7].

2.3 Non-linear Impact on Real Economic Growth

With the deepening of research, many scholars have noticed that the relationship between the financial development and the real economic growth is no longer simple linear, but may be nonlinear (Hung, 2009; Ductor and Grechyna, 2015).

Some Chinese scholars show that, due to the systematic differences in the demand of the real economy for the financial services at different stages of the economic development, the mismatch between the finance and the real economic development caused by the "threshold effect" between financialization and the real economic growth, and the critical point of the impact of the finance on the real economy from the "blessing effect" to the "Curse effect", there was a nonlinear relationship between the financial development and the China's real economic growth [8–10].

3 Variables and Data

3.1 Variables

3.1.1 The Real Economy

The real economy is considered to be the production, distribution, exchange and other economic activities of material means. From the industrial level, the real economy in a narrow sense only means the manufacturing industry, and that in a broad sense includes all industries except the finance sector and the real estate sector. In this paper, we use the remaining part of the GDP after deducting the output value of the finance sector and the real estate sector as the output value of the real economic sector, which is also the dependent variable.

3.1.2 Financial Development Level

We measure the level of the financial development from three aspects: scale, structure and efficiency, and choose the financial development scale, the financial development structure and the financial development efficiency as explanatory variables.

3.1.2.1 Financial Development Scale

The financial scale is an indicator to measure the level of financial development in terms of the total amount. We use the ratio of the sum of deposits and loans of financial institutions to the gross domestic product (GDP) to measure the scale of financial development, which is noted as FDA.

$$FDA = \frac{(\textit{Total loans of financial institutions} + \textit{Total deposits of financial institutions})}{GDP} \tag{1}$$

3.1.2.2 Financial Development Structure

The financial structure is an indicator to measure the level of financial development in terms of the structure. We use the ratio of total market capitalization to total loans of financial institutions to measure the financial development structure, which is noted as FDS.

$$FDS = \frac{\textit{Total market capitalization}}{\textit{Total loans of financial institutions}} \tag{2}$$

3.1.2.3 Financial Development Efficiency

The financial efficiency is an indicator to measure the quality of financial development, that is, the efficiency of financial resource allocation. We use the loan-to-deposit ratio that is the ratio of total loans of financial institutions to total deposits of financial institutions, to measure the efficiency of financial development, which is noted as FDE.

$$FDE = \frac{\textit{Total loans of financial institutions}}{\textit{Total deposits of financial institutions}} \tag{3}$$

3.2 Data

In this paper, we use China's data from 2001 to 2020 to empirical analyze the support of the financial development for the real economy growth. The data are mainly from National Bureau of Statistics of China and People's Bank of China. We use Retail Price Index to convert the annual output value of real economy, and then take the natural logarithm as the dependent variable, which is noted as LY. In the paper, Eviews 7.2 is used.

4 Empirical Analysis

According to the time series data of LY, FDA, FDS and FDE, we draw the sequence diagram (Fig. 1), which shows that the change trends of the four sequences are the same basically, and they may have cointegration relationships. All figures in this paper are drawn using Eviews 7.2.
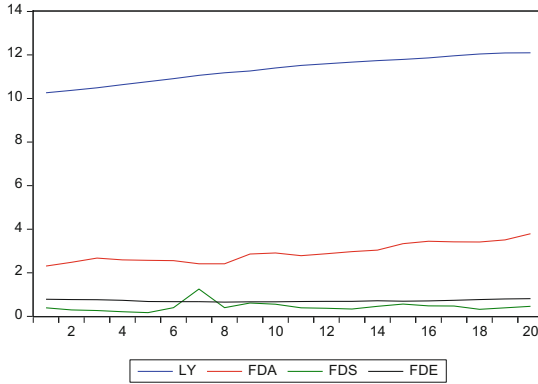
Fig. 1. Sequence diagram of variables. Note: Sequence diagram of variables © 2022 by Huadong Xiao is licensed under CC BY-NC-SA 4.0. To view a copy of this license, visit http://creativec ommons.org/licenses/by-nc-sa/4.0/.

4.1 Stability Test

In this paper, the Augmented Dickey-Fuller (ADF) unit root test is used to judge the stationarity of the data. The results of ADF unit root test show that the original time series data are non-stationary. However, after first-order difference, FDA, FDS and FDE are stable at 1% confidence level, LY is stable at 10% confidence level, that is, the adjusted variables are ultimately first-order single integration series, and they may have cointegration relationships.

4.2 Lag Order of the Model

The optimal lag order of the corresponding VAR model should be determined before cointegration test. We establish VAR model, and then use Eviews 7.2 to calculate the values of Likehood Ratio (LR) test statistics (each test at 5% level), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quinn Information Criterion (HQ) under different lag intervals. The five indicators all hint that the optimal lag should be of order 2.

4.3 Johanson Cointegration Test

In order to test whether there is stable cointegration relationships between variables, Johanson cointegration test is used. The test results are shown from Tables 1, 2, 3 and 4.

As shown in Table 1 and Table 2, at the significance level of 5%, trace test and maximum eigenvalue test show that there are 3 cointegration relationships. Table 3 shows the unrestricted cointegration coefficients, and Table 4 shows the standardized coefficient of the first cointegration relationship. After determining there are 3 cointegration relationships between LY, FDA, FDS and FDE, we use the method of AR unit root test to verify the correctness of the cointegration relationship. The results are shown in Fig. 2. The reciprocal absolute values of the roots of all AR characteristic polynomial lie inside the unit circle, which indicates that VAR model satisfies the stability condition.

Table 1. Trace test results

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.987220	123.3780	47.85613	0.0000
At most 1*	0.850236	49.26029	29.79707	0.0001
At most 2*	0.596825	16.98245	15.49471	0.0296
At most 3	0.086601	1.539894	3.841466	0.2146

Note: * denotes rejection of the hypothesis at the 0.05 level. ** MacKinnon-Haug-Michelis (1999) p-values
Source: The data in the table are calculated by the author according to the original data.

Table 2. Maximum Eigenvalue test results

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None*	0.987220	74.11774	27.58434	0.0000
At most 1*	0.850236	32.27784	21.13162	0.0009
At most 2*	0.596825	15.44255	14.26460	0.0324
At most 3	0.086601	1.539894	3.841466	0.2146

Note: * denotes rejection of the hypothesis at the 0.05 level. ** MacKinnon-Haug-Michelis (1999) p-values
Source: The data in the table are calculated by the author according to the original data.

Table 3. Unrestricted Cointegrating Coefficients

LY	FDA	FDS	FDE
7.834820	−8.493267	9.451383	36.52621
13.43286	−7.823641	−9.692896	31.82891
−21.58073	26.43676	−2.669807	−125.9995
−4.975109	0.101128	−5.066954	−49.30964

Source: The data in the table are calculated by the author according to the original data

4.4 Granger Causality Test and Cointegration Equation

In order to judge whether there are causal relationships between the variables, Granger causality test is used. The results show that there is Granger causality between LY and FDA, and FDA is the Granger cause of FDE, FDS is the Granger cause of FDA, and LY is the Granger cause of FDE. Based on our previous theoretical discussions of the real economy and financial scale, financial structure and financial efficiency, we believe that there is a long-term balanced relationship between the financial development and the real economic growth, and the real economic growth is affected by financial scale, financial

Table 4. Normalized cointegrating coefficients of 1st cointegrating equation

LY	FDA	FDS	FDE
1.000000	−1.084041	1.206331	4.662036
	(0.04881)	(0.08050)	(0.25626)

Note: Log likelihood = 177.3248. The figures in brackets are standard deviations
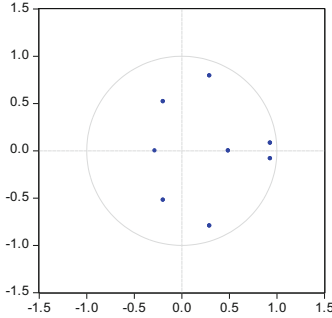Source: The data in the table are calculated by the author according to the original data.

Fig. 2. Distribution diagram of inverse roots of AR characteristic polynomial. Note: Distribution diagram of inverse roots of AR characteristic polynomial © 2022 by Huadong Xiao is licensed under CC BY-NC-SA 4.0. To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-sa/4.0/.

structure and financial efficiency. Therefore, the cointegration equation is established by choose the first cointegration relationship, as shown in Eq. (4).

$$LY = 1.08FDA - 1.21FDS - 4.66FDE \qquad (4)$$

4.5 Impulse Response and Variance Decomposition

By measuring the impulse response, we can clearly see the impact of one standard deviation innovations of the random error term in a certain period on the dependent variable in the future. The impulse response function diagram of LY's response to one standard deviation innovations impact of FDA, FDS and FDE respectively is shown in Fig. 3.

Figure 3 shows that the response of LY to Cholesky one standard deviation (S. D.) innovations of LY has remained stable and positive in 5 years. The response of LY to Cholesky one standard deviation innovations of FDA is relatively weaker than that of LY, but both are positive, indicating that the expansion of financial scale can promote the growth of real economy in a long time. The response of LY to Cholesky one standard deviation innovations of FDE is weak, and basically fluctuates below 0. The response of LY to Cholesky one standard deviation innovations of FDS is more sensitive, it begins to decline after reaching the maximum value in the first phase, and slowly rises after
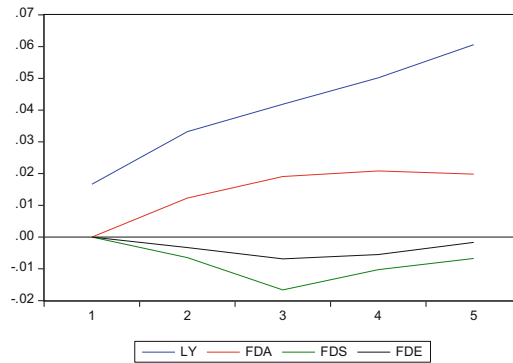
Fig. 3. The impulse response diagram of LY to Cholesky one S. D. Innovations. Note: The impulse response diagram of LY to Cholesky one S. D. Innovations © 2022 by Huadong Xiao is licensed under CC BY-NC-SA 4.0. To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-sa/4.0/.

Table 5. Variance Decomposition of LY

Period	S.E.	LY	FDA	FDS	FDE
1	0.016652	100.0000	0.000000	0.000000	0.000000
2	0.039797	87.14367	9.518925	2.647625	0.689782
3	0.063425	77.84332	12.80166	7.920412	1.434611
4	0.084322	79.45172	13.34904	5.962443	1.236802
5	0.105947	83.05882	11.95472	4.177866	0.808589

Source: The data in the table are calculated by the author according to the original data

reaching the minimum value in the third phase. The effect of FDS on LY is always negative.

Through variance decomposition, we can know the share of each variable affecting other variables, and whether each variable has a predictive effect, because the change of standard error (S. E.) represents the change law of the variable. Table 5 shows the variance decomposition results of LY, that the S.E. of LY is more than 10% caused by the impact of FDA's residual, about 5% is caused by the impact of FDS's residual, while the impact of FDE is weak, only about 1%.

5   Conclusions

In this paper, we empirically study the effects of the financial development on the real economic growth in China, based on the data of 2001–2020. The study can help us better understand the relationship between the finance and the economic development as China has entered a new normal in economic development, so that the financial development can better serve the real economic growth. The main conclusions include:

(1) The finance development has a long-term balanced relationship with the real economic growth.

(2) The expansion of the financial scale can effectively promote the growth of the real economy.

(3) The financial efficiency and financial structure have restraining effects on the growth of the real economy.

The real economy is the source of material wealth, the basis for promoting employment and achieving social stability, and the material basis of the virtual economy. In the post COVID-19 era, financial measures is crucial to the revival of the real economic growth. We should effectively implement supply-side structural reform in the financial sector and accurately serve the real economy, and reasonably reduce leverage to fend off major financial risks. We should promote high-quality development of the digital finance and the inclusive finance to effectively solve the financing problems of SMSEs. We should vigorously develop the format and the mode of "contactless finance".

References

1. R. G. King, R. Levine Finance and Growth: Schumpeter Might Be Right. Quarterly Journal of Economics. No. 3, vol. 108, 1993, pp. 717–737. DOI: https://doi.org/10.2307/2118406.
2. Tan Ruyong. An Empirical Study on the Relationship between Financial Development and Economic Growth in China. Economic Research Journal, No. 10, 1999, pp. 53–61. DOI: CNKI:SUN:JJYJ.0.1999-10-013.
3. Guo Lihong, Zhang Xiangjian, Xu longbing. The Effect of Aggregate Financing to the Real Economy and Financial Structure on the Real Economy. Studies of International Finance, No. 6, 2014, pp. 6–74. DOI: https://doi.org/10.3969/j.issn.1001-828X.2014.23.301.
4. Zhu Xi'an, Li Wenjing. The Regional Differences between Financial Development and Real Economy: Based on Shapley Value Decomposition Model. Inquiry into Economic Issues, No. 2, 2019, pp. 109–117. DOI: CNKI:SUN:JJWS.0.2019-02-015.
5. Thomas I. Palley. Financialization: What It Is and Why It Matters. Levy Economics Institute of Bard College, Working Papers, No. 525, 2007, DOI: https://doi.org/10.1057/978113726 5821_2
6. Tian Weimin. Why Did Financial Development Inhibit Economic Growth: Empirical Evidence from China's Provincial Panel Data. Economic Issues, No. 1, 2017, pp. 27–32+120. DOI: CNKI:SUN:JJWT.0.2017-01-006.
7. Zhang Lin, Zhang Weikang. Study on the Efficiency and Influencing Factors of Finance Serves the Growth of Real Economy. Journal of Macro-quality Research, No. 1, vol. 5, 2017, pp. 47–60. DOI: https://doi.org/10.13948/j.cnki.hgzlyj.2017.03.005.
8. Zhang Yichun, Wang Guoqiang. A Study of Non-Equilibrium Relationship between Financial Development and Real Economic Growth: An Empirical Analysis Based on Double Threshold Regression. Contemporary Finance & Economics, No. 6, 2015, pp. 45–54. DOI: https://doi.org/10.13948/CNKI:SUN:DDCJ.0.2015-06-006.
9. Pan Haiying, Zhou Min. Non-linear Effects of Financialization on Real Economic Growth and its Stage Characteristics. Financial Economics Research, No. 1, vol. 34, 2019, pp. 18–27+42. DOI: CNKI:SUN:JIRO.0.2019-01-002.
10. Xia Zhangxu, Liu Yulin. "Blessing" or "Curse": Non-linear Development of Finance and the Real Economy. Finance & Economics, No. 6, 2019, pp. 28–41. DOI: CNKI:SUN:CJKX.0.2019-06-004.