Correlation Research Between Regional Financial Development and Economic Growth
--An Empirical Analysis of Time Series from 1979 to 2020 in Qiannan Prefecture

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Abstract: Since the implementation of the Reform and Opening policy, the scale of deposits and loans have been expanding in Qiannan Prefecture, Guizhou Province，China. However, the contribution rate of financial industry to Qiannan Prefecture's GDP has been declining. Literature review showed that the correlation between financial development and economic growth is dissimilar in different regions and periods. Thus, this research established a VAR model to analyse the economic and financial data of Qiannan Prefecture from 1979 to 2020, in order to research the relationship between financial development and economic growth in Qiannan Prefecture. The results shown that Qiannan Prefecture's financial development is positive correlation related to economic growth, regional economic growth has significantly promoted financial development. The financial development has obvious driving effect on the Qiannan Prefecture's economic growth in the early stage, but a stable trend at low level have been maintaining in the middle and later stages.

Keywords: Financial Development; Regional Economic Growth; VAR Model

1. Introduction

Financial development is closely linked to economic growth. Numerous social and economic subjects are inextricably linked with financial institutions. Governments, enterprises, social groups, and individuals require to save and invest in the financial market. Finance connects every subject in the economy and society into a huge network. It is not doubt about that the importance and influence of finance. The effective apply of financial resources will excellently promote national and regional economic growth. Professor Bai Qinxian (1998) proposed that financial resources are scarce strategic resources of a country. Qiannan Prefecture as a minority in Guizhou Province, China, where deposits and loans have increasing year by year. While the contribution rate of financial sector to local economic have declining. Thus, this research interested in that any effects of the current financial development on promoting the economic growth of Qiannan Prefecture. What is the relationship between financial development and economic growth of Qiannan Prefecture? Therefore, this research intended to establish a VAR model for empirical analysis based on the data from 1979 to 2020 of Qiannan Prefecture, in order to explore the relationship between financial development and economic growth [1].

2. Literature review

Many scholars have been researching the correlation between financial development and economic growth from the theoretical and empirical aspects. Hugh T. Patrick (1966) found out that a notable feature of the economic growth process has been marked by the increasing number and variety of financial institutions, also, the share of all financial assets related to

Gross National Product has also increased significantly over time in an economy dominated by the market and price allocation resources. Furthermore, Hugh T. Patrick proposed that policy makers should encourage appropriate expansion of financial institutions, in order to achieve the purpose of promoting economic growth. Raymond W. Goldsmith (1969) pointed out that economic growth affects the financial development, because of the financial structure could continue to change with the economic growth. Shaw ES (1973) believed that developing countries' financial and economic growth were hindered by interest rate restrictions, control of deposit reserves, and direct credit quota systems. Alberto Bucci *et al.* (2019) suggested that economic growth may non-monotonically related to financial development, even if finance has a positive impact on economic growth, the short-term costs associated with financial activities exceed the compensation for long-term gains, excessive finance could be detrimental to economic growth.

3. Empirical analysis of financial development and economic growth

3.1 Index selection and data sources

In this paper, the Gross Regional Product of Qiannan Prefecture was selected as the regional economic growth indicator to reflect the economic development of Qiannan Prefecture. Based on Goldsmith's concept of a financial correlation rate for the national level, deriving: financial correlation ratio = total financial assets/GDP, where, total financial assets at the national level include a variety of total financial assets of all financial institutions. However, when national experts and scholars are conducting regional finance research, whom considered the underdevelopment of the securities and insurance sectors in developing regions of China. The standard for total financial assets is usually the RMB deposits and loans balance of financial institutions. With reference to the research approach of domestic scholars, the balance of deposits and loans was used as total financial assets, due to the small proportion of financial assets of non-bank financial institutions in Qiannan Prefecture. Therefore, the ratio of the balance of deposits and loans to the gross regional product was selected as the indicator of the level of financial development in Qiannan Prefecture. The relevant indicator set used for the analysis were shown in Table 1. The data collected from the "Qiannan Statistical Yearbook from 1979 to 2020" were calculated according to the indexes and analyzed with Eviews10 software[2].

Table 1: Economic and Financial Indicators in Qiannan Prefecture

Variable name	Indicators	Description of the indicator
Level of economic growth	GDP	GDP of Qiannan Prefecture
Level of financial development	FIR	Ratio of deposit and loan balances to GDP in

3.2 ADF test

The variables GDP and FIR data were logarithmically processed in order to eliminate possible variance, the processed variables were denoted as LnGDP and LnFIR respectively, an ADF unit root was applied to test both variables. The test results were shown in Table 2.

Table 2: Results of the data stability test

variable	ADF test t-value	Threshold value			P-value	Results
		threshold value (1%)	threshold value (5%)	threshold value (10%)		
LnGDP	-0.505163	-3.605593	-2.936942	-2.606857	0.8796	Instability
D.LnGDP	-4.150405	-3.605593	-2.936942	-2.606857	0.0023	stability
LnFIR	-0.517645	-3.600987	-2.935001	-2.605836	0.8773	stability
D.LnFIR	-5.515499	-3.626784	-2.945842	-2.611531	0.0001	stability

From the above results, LnGDP is non-stationary, while LnFIR is a stationary sequence. However, at first-order difference, the t-values of both series passed the ADF test with a confidence level of 5%. Therefore, LnGDP and LnFIR obeyed a first-order single integer, which could construct the VAR model.

3.3 Determining the optimal lag order

The optimal lag order was required to determine for establishing the VAR model.

Table 3: The output results of optimal lag order by Eviews10

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-19.04819	NA	0.010089	1.079394	1.164705	1.110003
1	121.7242	259.8874	9.08e-06	-5.934572	-5.678640	-5.842746
2	130.8612	15.93120*	6.99e-06*	-6.198009*	-5.771455*	-6.044965*
3	133.6999	4.658361	7.46e-06	-6.138454	-5.541278	-5.924193

According to the output of the optimal lag order, the optimal situation is the case with the most asterisks in the second order lag, thus, the VAR model took the second order lag for analysis.

3.4 Johansen cointegration test

Because first-order single integer of LnGDP and LnFIR, the Johansen cointegration test was applied to verify the long-run equilibrium relationship between LnGDP and LnFIR.

Table 4: Output results of Johansen cointegration test

Hypothesized NO.ofCE(s)	Eigenvalue	Trace Statistic	0.05 CriticalVa	Prob.**	Max-Eigen Statistic	0.05 CriticalV	Prob.**
None*	0.457649	34.61185	20.26184	0.0003	24.47371	15.89210	0.0018
Atmost1*	0.223884	10.13814	9.164546	0.0326	10.13814	9.164546	0.0326

According to the results in Table 4, a cointegration relationship between LnGDP and LnFIR at the 5% confidence level. The cointegration equation was LnGDP=4.770734LnFIR. Therefore, a positive correlation and long-term equilibrium between financial development and economic growth in Qiannan Prefecture, which is consistent with the actual situation of Qiannan Prefecture. Qiannan Prefecture belongs to an underdeveloped area of ethnic minorities, the funds for regional economic development mainly come from bank credit. The annual loan balance of financial institutions in Qiannan Prefecture have been increasing year by year. Until 2020, the loan balance of financial institutions reached 201.35 billion yuan in Qiannan Prefecture, the total GDP of Qiannan Prefecture have been growing as well. It showed that financial development facilitates economic growth, and economic growth also promotes financial development in Qiannan Prefecture [3].

3.5 VAR model

The Johansen cointegration test resulted in a long-run equilibrium relationship, The VAR(2) model was established in the case of second-order optimal lag period.

Table 5: Results of VAR model parameter estimates

	LnGDP	LnFIR
LnGDP(-1)	1.434192	0.035126
	(0.16038)	(0.16313)
	[8.94230]	[0.21533]
LnGDP(-2)	-0.490835	0.143729
	(0.16461)	(0.16743)
	[-2.98177]	[0.85845]
LnFIR(-1)	0.320436	0.549376
	(0.15765)	(0.16035)
	[2.03257]	[3.42613]
LnFIR(-2)	-0.064132	-0.403255
	(0.14331)	(0.14576)
	[-0.44750]	[-2.76650]
C	0.248068	-0.519690
	(0.10414)	(0.10592)
	[2.38204]	[-4.90628]

The parameter estimates are written in matrix form as follows:

$$\begin{bmatrix} LnGDP_t \\ LnFIR_t \end{bmatrix} = \begin{bmatrix} 1.434192 & 0.320436 \\ 0.035126 & 0.549376 \end{bmatrix} \begin{bmatrix} LnGDP_{t-1} \\ LnFIR_{t-1} \end{bmatrix} + \begin{bmatrix} -0.490835 & -0.064132 \\ 0.143729 & -0.403255 \end{bmatrix} \begin{bmatrix} LnGDP_{t-2} \\ LnFIR_{t-2} \end{bmatrix} + \begin{bmatrix} 0.248068 \\ -0.519690 \end{bmatrix}$$

Which wrote in algebraic form as follows:

LnGDP= 1.434192*LnGDP(-1) - 0.490835*LnGDP(-2) +0.320436*LnFIR(-1)- 0.064132*LnFIR(-2) + 0.248068

LnFIR = -0.035126*LnGDP(-1) + 0.143729*LnGDP(-2) +0.549376*LnFIR(-1) -0.403255*LnFIR(-2) - 0.519690

From the above equation, In the case of lagging Phase I, financial development was driving economic growth positively in Qiannan Prefecture, while economic growth was weakly counteracting financial development. In the case of lagging phase II, financial development had a small negative effect on economic growth in Qiannan Prefecture; while economic growth had a positive effect on financial development in Qiannan Prefecture [4].

3.6 Impulse response analysis

A unit circle smooth test was performed to test the stability of the VAR (2) model. As shown in Figure 1, the eigen roots of the VAR(2) model were all within the unit circle (one of the roots has a value of 0.994849＜1, also within the unit circle), thus, the model is stable.

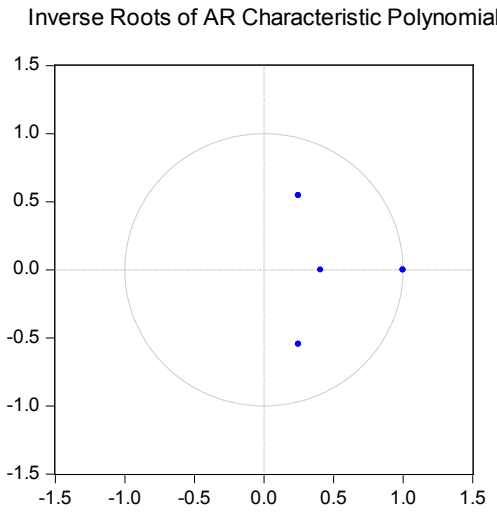

Figure 1: Map of VAR (2) model feature root position

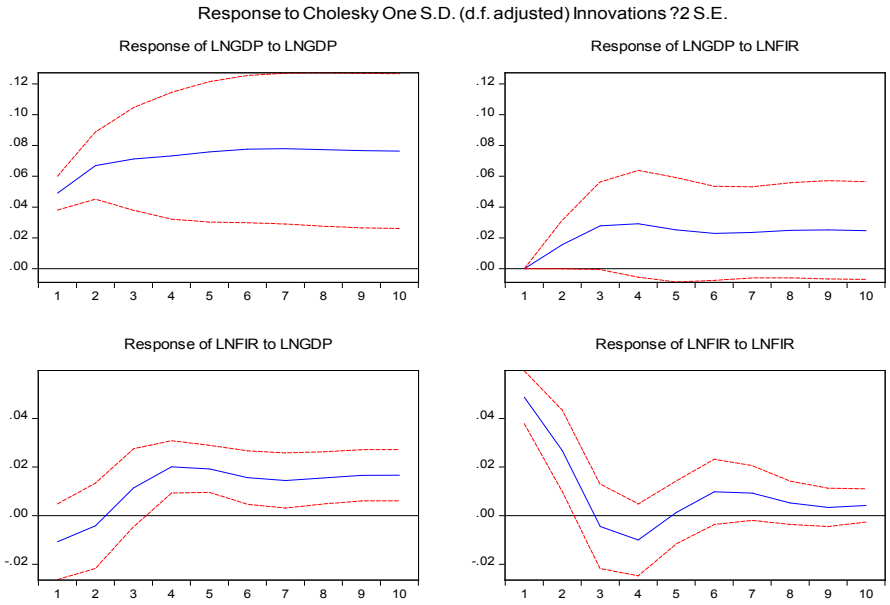

Figure 2: Diagram of VAR (2) model impulse response analysis

From the chart of response of LnGDP to LnGDP in Figure 2, the economy rose in the face of its own shocks in periods 1-2, and then gradually levels off after the peak in period 2. This showed that the economy of Qiannan could grow rapidly when given a shock of its own, and then economic growth remained somewhat stable. Qiannan seized the policy of reform and opening up to develop its economy rapidly, and then maintained a stable growth rate to develop [5].

The chart of response of LnGDP to LnFIR in Figure 2 showed that the financial impact of Qiannan Prefecture's economy. Financial development was rapid in the earlier period and plateaued after peaking in periods 3-4. Thus, the impact of economic growth on financial development is significantly positive in Qiannan. The initial shock response is fast, and then maintain stability in the long term.

The chart of response of LnFIR to LnGDP in Figure 2, showed that the economy grew rapidly in the earlier period when faced the shock of financial development, a slight decline after the peak in period 5 and then eventually stabilised. This means that an obvious effect of Qiannan's financial development in promoting economic growth in the early stages, which is consistent with the results of the cointegration test. A very rapid decline at the beginning of the period when financial development faced its own shocks, it was negative in period 3-4, raised to a positive value after going to zero in period 5, and levels off from period 9. This is also in line with the realities of financial development in Qiannan. At the beginning of the Reform and Opening, there were only a few state-owned banks in Qiannan, with the gradual liberalisation of the country's finance, the expansion of the financial sector, especially the increased in the number of banks, has strengthened competition in the market. Thus, the shock of financial development was a declining process for itself at the beginning of the period with Qiannan Prefecture's economy expanded. When the economic and financial scales were relatively matched, Qiannan Prefecture's financial industry promoted economic development, but also to promote its own development[6].

4. Conclusion and suggestion

4.1 The financial industry should strongly support the industrial transformation and upgrading of Qiannan Prefecture.

In terms of the conclusions of the empirical analysis, the economic growth of Qiannan Prefecture has a significant contribution to financial development. If the financial sector wants to become bigger and stronger in the future, it required to do a better job of funding economic growth in Qiannan Prefecture. The financial institutions in Qiannan Prefecture should play the key role of capital financing and follow the trend to innovate financial products. Moreover, actively adapt to the new situation of economic development, in order to guide and support the transformation and upgrading of industries in Qiannan Prefecture. Currently Qiannan Prefecture is taking full advantage of national and Guizhou provincial policy support, accelerating the pace of industrial transformation and upgrading. The concrete implementation of the restructuring of the agricultural industry in the dam area of Guizhou Province in terms of primary production and the agricultural industrial revolution. Continuing to implement of the "Transformation of Thousands of Enterprises" programme in the secondary sector, planning to focus on the construction of new building materials, ecological foodstuffs, modern chemicals, energy and other industries during the Fourteenth Five-Year Plan period. In terms of the three industries, focusing on building tourism "nine projects" to promote the integrated development of culture, sports, and tourism [7].

4.2 The financial sector should actively support scientific and technological innovation in Qiannan Prefecture

Several international and domestic forecasts and analyses indicated that the next area of economic growth must be technological innovation. Qiannan Prefecture's economic growth is mainly driven by fixed asset investment, which is showing signs of weakness. From the above analysis, economic growth in Qiannan Prefecture is in a stable period currently. Although there is not converging trend yet, if Qiannan Prefecture do not keep up with the situation and transform in time, it could be at disadvantage situation in the next economic period. Qiannan Prefecture's financial sector should gradually reduce its capital investment in fixed assets, increasing support for its real economy, actively supporting scientific and technological

innovation in Qiannan Prefecture, in order to cooperate with the government's use of "Policy + Funding", to guide enterprises to innovate in science and technologies, to create a favourable atmosphere for science, technology and innovation, and to enhance enterprises' independent innovation ability [8].

4.3 Diversifying the financial sector and improving financial quality

Qiannan Prefecture's financial system is dominated by banks. From the conclusion, the influence of financial development on itself is negatively correlated. It also shows that Qiannan Prefecture, an underdeveloped area for ethnic minorities, where excessive financial competition is not conducive to the development of the financial industry. Therefore, When the government introduces the financial industry, it should not only consider introducing the banking industry, but also enrich the financial sector, diversify and develop financial services with high-quality, and pay attention to cooperative promotion of non-bank financial institutions, and securities to build a diversified financial market system. In addition, while the number of the financial industry is increasing, Qiannan Prefecture should pay attention to the quality improvement and risk control. Bank credit should be combined with the industrial transformation, upgrading, and technological innovation, in order to promote the growth of the real economy with improved investment.

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