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An Empirical Study on the Effects of Regional Financial Structure's Transformation on Economic Growth: Based on the Data of Henan Province, China

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Abstract

Based on the data of Henan province during the year of 1994 to 2013, this paper empirically tests the effects of regional financial structure on economic growth by employing some econometric methods, such as Co-integration, Granger causality test, impulse response and variance decomposition based on VAR etc.. The results are as follows: to some extent, the transformation of Henan province's financial structure has a negative effect on its economic growth, but variance decomposition shows that the negative effect is very limited.

Key words: Financial structure; Economic growth; Co-integration; Impulse response; Variance decomposition

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INTRODUCTION

Over the years, despite the financial industry in Henan province has seen considerable development, but its financial structure has little change: The Finance Interrelations Ratio (FIR) is far below the national average level, the rates were only 1.0175, 1.0242 and

1.0172 during 2009-2011. The lower FIR rate shows the enterprises in Henan have lower rate of external financing. In the financial structure, the development is extremely uneven, the direct financing balance is far less than the indirect financing level, during 2005-2008, the proportion of credit financing in enterprises' external financing in Henan is basically more than 90%; the proportion of direct financing is low, the highest proportion of equity financing in 2007 is only 12.2%, the proportion of bond financing is lower, the highest is only 5%. The relevant studies suggest that when the financial structure adapts to the conditions of economic development, economic structure, etc, it will promote the economic growth, otherwise, it will hinder the economic growth.

There are numbers of literatures that have discussed the effects of financial structure on economic growth at home and abroad. As Goldsmith (1969) found that changes in the financial structure have a positive effect on economic growth. Shaw (1973) and McKinnon (1973) studied the impact of financial structure's transformation on economic growth in developing countries from two perspectives of "financial repression" and "financial deepening" respectively. Based on panel data, empirical researches of Levine and Zervos (1998), Beck and Levine (2004) found that the stock market and banking development played significant roles in promoting the economic growth in long run. Ma (2005), Lin, Sun and Jiang et al. (2009) found that only the financial structure matches the economic and industrial structure, can it promote the development of entity economy. Based on the data of 51 countries during 1990-2008, Luo (2010) found that the marginal utility of financial structure change in developing countries was positive, and financial deepening played a significant role in promoting economic growth; while the signs of excessive financial deepening were obviously in developed capital markets, and there was a negative correlation between financial development and economic growth. Based on

the data from 88 countries during 1990-2005, Li and Han (2009) found that there was a significant correlation between financial structure and economic growth with panel co-integration, but the coefficient of the impact of the financial structure on the economic growth in developed countries is small, and the impact of banking development on economic growth in developing countries is stronger. Based on panel data of China's 31 provinces during 2000-2009, Wang et al. (2011) found that the development of stock market and financial efficiency could significantly promote the economic growth, and there was a negative correlation between credit scale and economic growth.

From the literatures above, most literatures can be found based on the relationship between financial structure and economic growth at the macro-level, while less has investigated the effect of regional financial structure changes on economic growth. Therefore, based on the provincial level, which is the relevant economic data in Henan Province, this paper will empirically test the effect of financial structure on the regional economic growth.

1. DATA AND VARIABLE STATIONARITY TEST

1.1 Data

In this part, the data for empirical research is from the relevant statistical yearbook of each year, which comes from websites of National Bureau of Statistics and Statistics Department of Henan Province, the sample length of the observation data is from 1994 to 2013, the deposits and loans of financial institutions in Henan are selected, the country's deposits and loans of financial institutions and its money supply M2, those 5 data are used to calculate the total financial assets of Henan province (specifically, it is represented by the proportion of deposits and loans of financial institutions of Henan that accounts for the deposits and loans of financial institutions across the country, and then multiply the money supply M2), and then the GDP of Henan is divided by the total amount of financial asset, the Financial Interrelations Ratio (FIR) of Henan province can be got. The nationwide consumer price index (CPI) is selected as an alternative variable of prices, and the year of 1994 is used as the base period for fixed base processing, and then the fixed base CPI is divided by nominal GDP of Henan province, which makes the real GDP of Henan to be got as the alternative variable of economic growth. In addition, in the empirical research, the alternative indicators: Real GDP and the Financial Interrelations Ratio have gone through natural logarithm processing. The relevant calculation as follows can be obtained by Eviews 6.0.

1.2 Variable Stationary Test

The empirical research with time series data to do research needs to do stationarity tests for the series, Table 1 shows the results. From Table 1, at the significance level of 1%, the ADF test values of the two series of economic growth (lnGDP) and Financial Interrelations Ratio (lnFIR) are both greater than the critical value, thereby accepting the null hypothesis that the series has unit root, which means these two series are non-stationary. Table 1 also shows that ADF test values of the two first-order difference series accepts the null hypothesis of the existence of unit root at 1% significance level, while the ADF test values of the two second-order series reject the null hypothesis at 1% significance level, so that the two second-order difference series are stationary, so the series (lnGDP, lnFIR) are $I(2)$ processes.

Table 1
ADF test of Series

Variables	ADF test value	1% critical value	P	Conclusion
lnGDP	-2.5570	-4.6679	0.3008	Non-stationary
Δ lnGDP	-1.9937	-3.9204	0.2862	Non-stationary
$\Delta\Delta$ lnGDP	-4.0203	-3.9591	0.0089	Stationary
lnFIR	-1.3454	-4.6162	0.8393	Non-stationary
Δ lnFIR	-2.7358	-3.9204	0.0898	Non-stationary
$\Delta\Delta$ lnFIR	-4.2486	-2.7406	0.0004	Stationary

2. EMPIRICAL STUDY ON THE EFFECT OF FINANCIAL STRUCTURE ON ECONOMIC GROWTH IN HENAN PROVINCE

2.1 Co-Integration Test

In this part, the Johansen co-integration test that based on regression coefficient test is used to test whether there exists a long-term and stable equilibrium relationship between economic growth (and Financial Interrelations Ratio in Henan province. The trace statistic test shows that under the significance level of 5%, there is a co-integration equation between economic growth and Financial Interrelations Ratio in Henan province, which means a long-term and stable equilibrium relationship between the two sequences. Also, the maximum-eigenvalue statistic test shows that there exists a long-term and stable equilibrium relationship between the economic growth and Financial Interrelations Ratio in Henan province.

Based on the above Johansen co-integration test, taking the eigenvector that the maximum eigenvalue corresponds to as the co-integrating vector and standardizing it, the

standardized co-integration vector is $\beta = (1, 0.6420, -0.1217)$, thus, the co-integration equation about the economic growth and Financial Interrelations Ratio in Henan province can be obtained:

$$\ln\text{GDP}_t = -0.6420\ln\text{FIR}_t + 0.1217\text{@trend} + \eta_t \quad (1)$$

(0.0214) (0.006)

In Equation (1), numbers in parentheses are standard errors. From the parameter and standard error of Financial Interrelations Ratio in Equation (1), it can be concluded that the parameter of Financial Interrelations Ratio is significant, and therefore the Financial Interrelations Ratio of Henan has a significant impact on its economic growth. Since the empirical data are calculated in the natural logarithm, so the parameter of Financial Interrelations Ratio is elastic, which means that if the Financial Interrelations Ratio increases by 1%, the economic growth decreases by 0.642%, namely, the financial structure of Henan province that measured by Financial Interrelations Ratio hindering its economic growth.

2.2 Granger Causality Test

The above Johansen co-integration test indicates that there exists a long-term and stable relationship between economic growth and Financial Interrelations Ratio of Henan province, and in order to determine their relationship, the Granger causality test is carried out, and the test result is shown in Table 2. The test result in Table 2 shows that Financial Interrelations Ratio is the Granger causality of economic growth.

Table 2
Granger Causality Test of lnGDP and lnFIR

Lag number: 2			
Null hypothesis	Observation	F-stat	p
lnFIR does not Granger cause lnGDP	16	4.3512	0.0405
lnGDP does not Granger cause lnFIR		1.2937	0.3129

2.3 The Impulse Response and Variance Decomposition Analysis Based on VAR Model

2.3.1 Impulse Response Analysis

Based on the VAR model, this section will analyze the impulse response of the dynamic process of the Financial Interrelations Ratio that impacts on the economic growth in Henan province, in which the VAR model is based on the first difference of the two series. In the VAR estimation of the series $\Delta\ln\text{FIR}$ and $\Delta\ln\text{GDP}$, the selection of the optimal lag order number is based on the Akaike Information Criterion and HQ information criteria, and the optimal lag order is 2. The VAR stability test shows, all the inverse mold of the roots of VAR (2) are all in the

unit circle, and thus it indicates that the VAR (2) model is stable, which can be further analyzed.

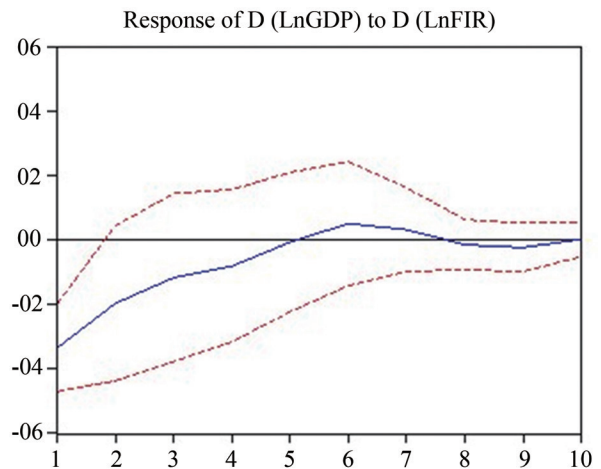


Figure 1
Impulse Response Functions

Figure 1 shows that the generalized impulse response of the economic growth to one standard-error positive shock of the Financial Interrelations Ratio. The solid line in Figure 1 represents the impulse response of the endogenous variable to shocks, and the broken lines on both sides shows the values of impulse response function plus or minus twice of the standard error, i.e., indicating a possible range of the impulse response. As can be seen from Figure 1, when the Financial Interrelations Ratio occurs to have a standard-error shock, the response of economic growth to Financial Interrelations Ratio shock decreases immediately, and it decreases by 3% in the first period, then gradually picks up, and gradually converges to 0 since the 5th period, which indicates that the negative impact of Financial Interrelations Ratio on the economic growth in Henan lasts longer.

2.3.2 Variance Decomposition Analysis

In order to analyze the contribution of structural shocks to endogenous variable change, the method of forecasting error variance decomposition is used to further evaluate the relative importance of structural shocks. Table 3 shows the variance decomposition results of Financial Interrelations Ratio shocks contributed to economic growth change in Henan province. As is shown in Table 3, without considering the contribution rate of economic growth itself, the relative variance contribution rate of Financial Interrelations Ratio to the economic growth is gradually increased, and it reaches the maximum 5.58% after the 10th period. Combining with the analytical results of impulse response, it can be concluded that the influence of Financial Interrelations Ratio to the economic growth in Henan province is limited.

Table 3
Variance Decomposition Analysis

The variance decomposition of $\Delta \ln \text{GDP}$			
Period	s.e.	$\Delta \ln \text{GDP}$	$\Delta \ln \text{FIR}$
1	0.032792	100.0000	0.0000
2	0.039078	97.79448	2.20552
3	0.040423	97.93826	2.06174
4	0.040863	96.15189	3.84811
5	0.040953	96.12296	3.87704
6	0.041168	95.23565	4.76435
7	0.041203	95.19475	4.80525
8	0.041316	94.71512	5.28488
9	0.041342	94.67637	5.32363
10	0.041406	94.41601	5.58399

CONCLUSION

Based on data of Henan province during 1994-2013, this paper empirically test the effects of financial structure on regional economic growth by employing some methods such as co-integration, Granger causality test, impulse response and variance decomposition based on VAR model. The research found:

First, the financial structure of Henan province has a negative effect on its economic growth. Granger causality test have shown that the financial structure of Henan is the Granger cause of its economic growth, while Johansen co-integration test also indicated that there is a long-term and stable equilibrium relationship between them, the level of financial structure increases by 1%, the economic growth decreases by 0.642%. The impulse response analysis that based on VAR model also shows that the impact of financial structure in Henan province has led to the decline of its economic growth.

Second, the hindering effect of the financial structure of Henan on its economic growth is limited. Variance decomposition shows that the blocking effect of the financial structure on its economic growth in Henan is very limited, and the highest relative variance contribution rate is only 5.58%.

Based on these studies, it is believed that the financial structure must be optimized to promote economic growth in Henan province, therefore, there needs to adjust and optimize the financial structure of Henan province by accelerating the economic restructuring, stimulating bank vitality, improving SME financing system and building provincial and local commercial banks and so on.

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