

Research Article

Quantitative Analysis of Financial Support and Social Credit System Impact on Food Processing Enterprise

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Abstract: With China's reform and opening up and the establishment of socialist market economic system, the financial industry plays an increasingly important role in the national economy, which has become the core of modern economy. In this study, we make an empirical test to analyze how the financial system will effect on the food processing enterprise. The result shows that the financial development increased one percentage can drive the output value of food processing enterprise increased by 0.942%, so the effect of financial system to food processing enterprise is obvious. From Johnson co-integration test, the result shows that there exist at least one direct co-integration relationship between financial system and food processing enterprise, which means that there exist a long-term equilibrium relationship between financial development and food processing enterprise.

Keywords: Financial ecology, food processing enterprise, granger causality, vector auto regression model

INTRODUCTION

The financial industry not only promotes the development of social investment, but also has beneficial effect to the optimal allocation of capital. Financial development can reduce the capital transaction cost and promote the optimization and upgrading of industrial structure in China at the same time (Ang, 2011). As China's financial development and the ceaseless rise degree of opening to the outside, China's financial internationalization process has been accelerated stage by stage and financial institutions have began carry out international operations actively (Dong and Louis, 2002). The continuously improvement of financial system has provided a strong guarantee to China's steady and rapid growth of economy, which can be discovered in China's reform and opening-up economic data.

The theoretical study of the relationship between financial development and industrial output value mainly include the financial deepening, financial constraints theory, financial structure and financial functions on these aspects. McKinnon (1973) and Shaw (1973) are representatives of financial deepening theory and Mackinnon proves that developing countries generally exist government intervention in the financial situation through the model, which has led to the inhibition of financial development in the developing countries and financial system is difficult to achieve its capital allocation function, thus reduced the stimulation effect of economy. Muhammad *et al.* (2013) investigates the relationship between industrial output

growths by incorporating financial development, the result shows that there is also bidirectional causality exists between financial development and industrial output growth. Jeremy *et al.* (2013) test how important is financial support for industrial output growth by using a costly state verification model. The result shows that about 29% of U.S. growth can be attributed to technological improvement in financial intermediation. Kendall (2012) investigate the connection between banking sector development, human capital and industrial output growth, the result shows that the banking sector is an important component of output growth.

There are many research investigates the relationship between financial system and industrial output value, especially food processing industry (Anning and Joyce, 1999; Paul, 2005; Saguy *et al.*, 2014; Sun and Chen, 2007). Some Chinese scholars also research about regional restrictions, economic structure that effect on the financial benefits (Song, 2003; Du, 2002; Zhang, 2007; Hu, 2005). These scholars' research results show that China's financial system has certain stimulation effect to the industrial output value, but the effect of finance system is different in different regions and economic level.

However, no scholars research on how the financial factors will effect on the food industry in the long run and how much the development of the food processing industry can be explained by can financial support Therefore, this study make research on the above problem by vector autoregressive model.

Table 1: Augmented Dickey-Fuller test (ADF)

Variable	Test statistic	1% critical value	5% critical value	10% critical value	Result
LnFIR	-1.677	-3.709	-2.983	-2.623	Unstable
LnFPE	0.585	-3.709	-2.983	-2.623	Unstable
D.LnFIR	-3.721	-3.709	-2.983	-2.623	Stable
D.LnFPE	-3.569	-3.709	-2.983	-2.623	Stable

MATERIALS AND METHODS

Data collection and evaluation index: In order to analyze how the financial development effect on the food processing enterprise, we use STATA 12.0 software and make a statistical analysis of financial ratios and total domestic economic data from the year of 1990 to 2013. The main indicator to gauge a country or regional financial development level is Financial Interrelation Ratio (FIR), which refers to a country's total financial assets and economic volume ratio and the formula can be expressed as:

$$FIR = F_r / W_r = \beta_r^{-1} \cdot [(\gamma + \pi + \gamma\pi)^{-1} + 1] \cdot [k\eta + \phi(1 + \lambda) + \xi] + \theta[1 + \phi]^{\frac{n}{2}} - 1$$

Economic significance of each symbol is represented by the formula is: F represents the area of financial assets; W represents region economy gross; usually use GDP for calculation; β represents capital output ratio and the output is equal to the ratio of capital, namely "capital coefficient"; γ represents the growth rate of GDP; π represents the rate of inflation; η represents external financing ratio; ϕ represents ratio of stock, bonds, options and other financial products to GDP; λ represents financial institutions to non-financial institutions financial products assets ratio; ξ represents foreign net creditor rate, which is expressed as the ratio of foreign financial capital to the financial amount; θ represents price sensitive financial assets ratio; ϕ represents asset price fluctuation ratio.

So that we can get the financial development index based on this method. The data of output value of the food processing enterprise is collected from Beijing statistic year book and Caixin database, period from 1990 to 2013. We also undertake log processing to data, noted as LnFIR and LnFPE.

ADF unit root test: The unit root test was first put forward by David Dickey and Wayne Fuller, so it is also called DF test. DF test is a basic method in stationarity test, if we have a model as:

$$Y_t = \rho Y_{t-1} + \mu_t$$

DF test is the significance test to the coefficient. If $\rho < 1$, when $T \rightarrow \infty$, $\rho T \rightarrow 0$, that means the impulse will be reduced when the time is increased. However, if $\rho \geq 1$, the impulse will not be reduced with the time, so that this time-series data is not stable. The basic DF test model can be written as:

$$Y_t = \beta_1 + \beta_2 t + (1 + \delta) Y_{t-1} + \mu_t$$

If we add the lagged variable of ΔY_t in formula 10, then it will be called the augmented Dickey-Fuller test, so that ADF test model can be written as:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum_{i=1}^m \Delta Y_{t-i} + \varepsilon_t$$

Data stable is the premise of establishing VAR model, an Augmented Dickey-Fuller test (ADF) is a test for a unit root in a time series sample. We use ADF unit root test to inspect LnFIR and LnFPE, the result as is shown in Table 1. Through the test results we can see that LnFIR and LnFPE are non-stationary, then we test on d.LnFIR and d.LnFPE and demonstrate that they are stable, so we can build the VAR model and use granger test and cointegration test.

RESULTS AND DISCUSSION

VAR model: Vector Auto Regression (VAR) is a statistical model used to capture the linear interdependencies among multiple time series. An estimated VAR model can be used for forecasting and the quality of the forecasts can be judged. VAR model is the simultaneous form of autoregressive model, A VAR (p) model of a time series y (t) has the form:

$$A_0 y_{(t)} = A_1 y_{(t-1)} + \dots + A_p y_{(t-p)} + \varepsilon_{(t)}$$

In this study, I use AIC, SC criterion to identify the lag length. From the result, we can get that the minimum AIC is in lag 2, so I choose lag 2 as the lag length. Then, we build the VAR model of LnFIR and LnGDP as:

$$LnFPE = 1.325 + 2.05LnFPE_{t-1} - 1.187LnFPE_{t-2} + 0.942LnFIR_{t-1} + 0.257LnFIR_{t-2}$$

According to the formula, it can be seen that the effect is financial system promotes output increase of food processing enterprise. LnFIR at lag 1 period increased one percentage can drive LnFPE growth by 0.942%, LnFIR at lag 2 period increased one percentage can drive LnFPE growth by 0.257%, so the effect of financial support on food processing industrial growth is obvious. Financial system will promote the growth of the food processing industry in short time. In order to analyze the relations between financial system

and food processing industry, we use granger causality test to analyze this VAR model, the result is shown in Table 2. From Table 2, we can get that LnFIR is the reason to LnFPE, which means financial system is the reason to output increase of food processing enterprise. At the same time, LnFPE is also the reason to LnFIR, so that food processing industry is also the reason to financial system; this is also same to the conclusion above.

At the same time, we take Johnson co-integration test to analyze the long-term relations between financial system and food processing industry, the results is shown in Table 3. Co-integration is a statistical property of time series variables. Two or more time series are co integrated if they share a common stochastic drift, if two or more series are individually integrated but some linear combination of them has a lower order of integration, then the series are said to be co integrated.

According to the results, there exist at least one direct co-integration relationship between financial system and food processing industry, which means that there exist a long-term equilibrium relationship between financial system and output increase of food processing enterprise.

Impulse-response analysis: According to the results above, we can get that there exist a long-term equilibrium relationship between financial system and output increase of food processing enterprise and financial system is the reason to food processing industry, also the VAR model is stable. In order to

analyze the VAR model, I use Impulse-response function, the results is shown in Fig. 1 and 2.

From Fig. 1, we can get that when LnFIR received one unit impact, it will lead LnFPE increase currently, LnFPE at t = 1 period is 0.000095 and then increased to 0.0216 at t = 1 period. LnFPE will reach the max at t = 5 period and begin to be stable then. It illustrates there is long-term effect between financial system and output increase of food processing enterprise. At the same time, when LnFPE received one unit impact in Fig. 2, it will lead a major increase currently and return to the basic situation at t = 8 period. According to the impulse analysis results, we can get that financial system will significant influence the output of food processing enterprise, so that it is important to enhance the innovation of financial system.

Then, we make cholesky variance decomposition to the VAR model, the results is shown in Fig. 3 and 4. The cholesky variance decomposition also shows the same result, the contribution degree of LnFIR to LnFPE is gradually increased. From Fig. 3, we find the contribution degree of LnFIR to LnFPE at t = 1 period is 30.2% and then return back to 7.4% at step 2, this means financial system has obvious interpretative strength to food processing industry in the short-term. Then, the contribution degree of LnFIR to LnFPE increased gradually from step 2 and finally research to 30.83% at step 8. From the Fig. 4, we can find that LnFIR has a good contribution degree to itself, contribution degree of LnFPE to LnFPE is reached 69.3% at step 1 and then increased 92% at step 2. This proves that the food processing enterprises have a

Table 2: Granger causality test

Equation	Excluded	Chi ²	df	Prob>chi ²
LnFIR	LnFPE	14.868	2	0.001
LnFPE	LnFIR	27.802	2	0.000

Table 3: Johnson co-integration test

Rank	Parms	LL	Characteristic value	Statistic	5% significant level
0	6	66.989590		20.9545	15.41
1	9	76.801423	0.64400	1.3309*	3.76

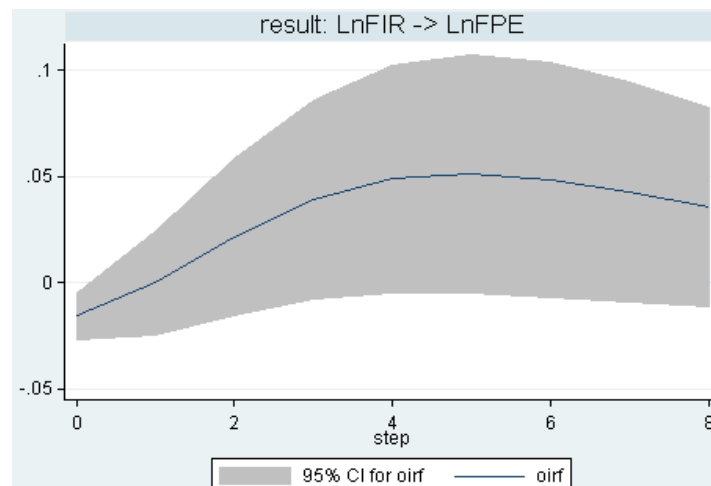


Fig. 1: Impulse-response analysis for LnFIR to LnFPE

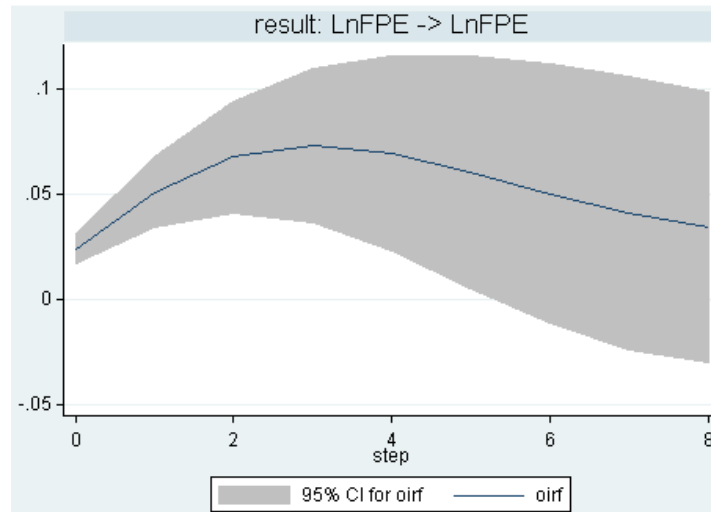


Fig. 2: Impulse-response analysis for LnFPE to LnFPE

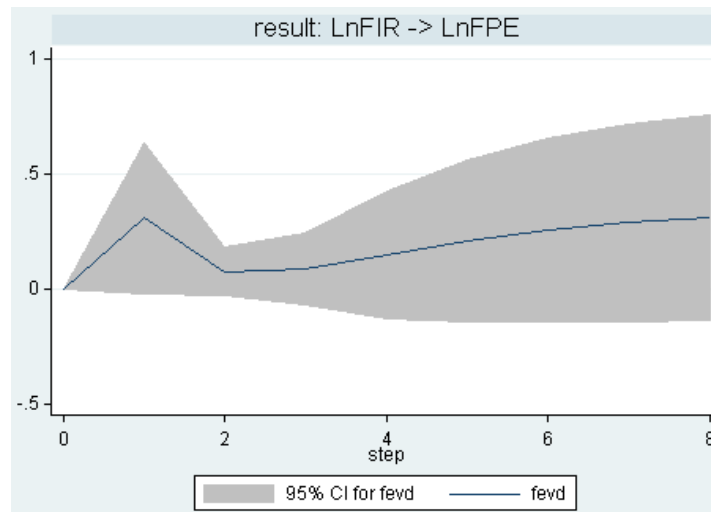


Fig. 3: Cholesky variance decomposition for LnFIR to LnFPE

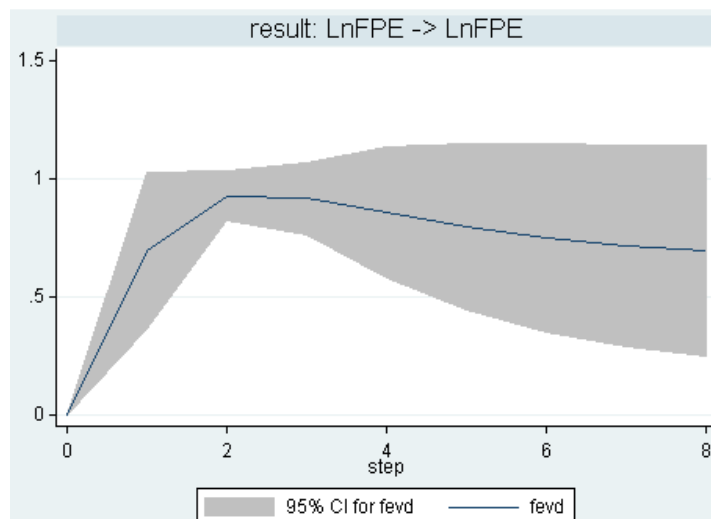


Fig. 4: Cholesky variance decomposition for LnFPE to LnFPE

Table 4: The result of variance decomposition

Step	LnFIR	LnFPE	Step	LnFIR	LnFPE
1	0.3066	0.6933	5	0.2061	0.7938
2	0.0740	0.9259	6	0.2530	0.7469
3	0.0851	0.9148	7	0.2864	0.7135
4	0.1465	0.8534	8	0.3083	0.6916

certain business expansion. The result of variance decomposition means that financial system has an important contribution degree to the output of food processing enterprise and can be used to explain the output growth of food processing industry (Table 4).

CONCLUSION

Above all, there are long-term interaction effects between China's financial system and output growth of food processing industry. Financial development can promote food processing industry to grow continuously and the food processing industry can also promote the development of finance. Also, the financial system and food processing industry have long-term stability of mutual promotion relationship. According to the data of 1990 to 2010, it can be figured out that effect of financial development prompting food processing industry growth in 2005 can be found gradually after 2006. Financial system has a certain lag effect to output growth of food processing industry. Considering the importance of financial system, it is necessary to pay more attention to the development of financial industry and optimize capital configuration, improve the new technology industry and improve policy oriented industry financing capacity, in order to promote China's financial structure optimize ceaselessly. China also needs to pay attention to the degree of financial development should be suitable for the local food processing industry development level in different regions and avoid excessive financial support at the same time.

Because there is long-term interactive relationship between financial system and output growth of food processing industry, we should support financial industry and draw lessons from international financial crisis at the same time and ensure that the speed of financial development and economy is coordinated. Otherwise China need to strengthen financial supervision, optimize the financial structure constantly and continue to promote financial reform, in order to improve the efficiency of the financial system and support food processing industry steady, fast development.

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