

The Impact of Social Financing Scale on Real Economy in China -- Verification of VAR Model Based on Panel Data

Yu Bai, Dehong Liu and Rizwan Ullah

School of Economics and Management, Beijing Jiaotong University, China

Keywords: Social financing scale, Real economy, Panel data vector autoregression

Abstract: This paper studies the impact of social financing scale on real economy by using panel data vector autoregression model with the economic data of China's social financing scale from 2008 to 2017. The research shows that the scale of social financing has a short-term negative effect on economic development at the initial stage but then subsequently turns positive in later years, and its impact on economic development has a two-year lag period. Further analysis shows that the real economy has the same effect on the scale of social financing, that is, the scale of social financing is the financial performance of the development of the real economy.

1. Introduction

In recent years, with the rapid development of China's economy and financial markets, a variety of innovative financial products have emerged. Bank loans are no longer the only channel for social financing, and various non-traditional financial products are playing an increasingly important role. Since 2011, China's macro-control has introduced the new concept of "social financing scale" as a new indicator. The scale of social financing is a total index that comprehensively reflects the financial support to the real economy and the relationship between finance and economy. It is an important indicator for the monitoring and analysis of monetary policy and the product of the combination of monetary policy theory and Chinese practice.

In the past studies, scholars generally believed that the increase of social financing scale would promote economic growth. However, most of them selected the time series data of a certain province or city to do the multiple regression analysis, and very few explored it by using panel data from different provinces in China. In this paper, I chose the data which from 31 provinces and regions in China to investigate the impact of social financing scale on the real economy by using panel VAR model.

2. Literature review

Francisco (2009) pointed out that financial development has a positive impact on economic growth. Chinese scholars also have studied the relationship between financial development and economy through a variety of methods.[1] Xuejun Fan (2006) used maximum likelihood co-integration method to analyze the relationship between them and believed that there was a long-term positive correlation between financial development and GDP.[2] Song Yang and Tingting Huang (2019) used the regression method of GMM and LSDVC to analyze the relationship between financial development level and economic growth, and found that there was an inverted u-shaped relationship between them.[3]

Levine and Zervos (1998) showed that both bank credit and equity financing can promote the growth of real economy.[4] Cheng and Degryse (2010) found that banks could promote capital accumulation on the one hand while production efficiency on the other hand by releasing credit, thus promoting economic growth.[5] Songcheng Sheng (2012) believed that the scale of social financing was suitable as the intermediary target of China's monetary policy.[6] In addition, the branches of the People's Bank of China conducted empirical studies on the social financing data of Shandong province (2016)[7] and Hebei province (2014)[8] respectively. They found that the rapidly

developing scale of social financing had a positive role in promoting the development of real economy.

This paper adopts the definition of real economy in Qiang Li and Kangning Xu (2013). In the national economic industry classification, the tertiary industry (financial industry and real estate industry) is excluded, and all other industries are regarded as the real economy. [9]

3. Empirical analysis and data processing

3.1 Empirical model and variable setting

Panel Data Vector Autoregression model (panel-var) was first proposed by Holtz (1988). [10] This model introduced Panel Data on top of the basic Vector Autoregression model, allowing individual effects and heteroscedasticity in the data.

Panel-var (p) model of n observable random variables is expressed as:

$$Y_{it} = \alpha_{0t} + \sum_l^m A_{lt} Y_{it-l} + \sum_l^m B_{lt} X_{it-l} + \varphi_t f_i + \varepsilon_{it} (i = 1, 2, \dots, p \quad t = 1, 2, \dots, T)$$

Y_{it} is the vector of observable random variables at time t. X_{it} is the vector of observable and strictly exogenous variables at time t. f_i is the unobservable individual effect vector. $\alpha_{0t}, A_{lt}, B_{lt}, \varphi_t$ are all the regression coefficient vectors, and ε_t is random perturbation term.

Six variables are set in this paper

Table.1. Panel VAR model variable name and meaning

Name	Meaning	Definition
SF	Social financing scale	The total amount of social financing funds in various regions
GDP	Gross domestic product	GDP of each region minus the financial and real estate sectors
FI	Fixed asset investment	The total amount of fixed assets investment in all regions
CPI	Consumer price index	Consumer price indices in all regions
GT	Total retail sales of consumer goods	Retail sales of consumer goods in various regions
EI	Total import and export	Total import and export trade of each region

3.2 Data selection

In this paper, relevant data of 31 provinces and regions from 2008 to 2017 are selected from Wind. The interpolation method is used to fill in some missing data and the absolute data are processed with natural logarithm to reduce the heteroscedasticity and volatility of the data. The total of 1860 sets of data are obtained after processing, and stata14 is used for further analysis.

3.3 Empirical process of panel-var model

3.3.1 Unit root test

LLC and ADF-fisher unit root tests are used for panel data to avoid false regression and ensure the validity of the estimated results. If the test results are stable, the statistical rule of time series will not change with the passage of time.

Table.2. Panel VAR unit root check

Variable	LLC		ADF-Fisher		Conclusion
	t	p-value	t	p-value	
lnsf	-9.8480	0.000	-5.1669	0.000	Stable
lngdp	-19.7380	0.000	-14.1135	0.000	Stable
lnfi	-7.9902	0.000	-6.7840	0.000	Stable
cpi	-5.0209	0.000	-8.9078	0.000	Stable
lngt	-38.2895	0.000	-22.1888	0.000	Stable
lneci	-21.9878	0.000	-15.1885	0.000	Stable

3.3.2 Determination of lag order

When AIC, BIC and HQIC are used to choose the best lag order, it is generally preferred to choose AIC, BIC or HQIC minimum model. When the above three are not consistent, BIC and HQIC are generally better than AIC. As shown in table 3 below, the conclusions of the three are consistent, so the two-order lag VAR model is selected.

Table.3. The lag order of panel VAR model

Lag order	AIC	BIC	HQIC
1	2.3331	5.4782	3.5992
2	-5.9631*	-1.9446*	-4.3398*
3	-4.4595	0.6392	-2.3933
4	-3.8114	2.6681	-1.1796

* is the best lag order.

3.3.3 Granger test

Granger causality test can be conducted for the stationary serial data, through which we can preliminarily study whether there is a causal relationship between the scale of social financing and various economic variables, and judge the direction of the causal relationship.

Table.4. Panel VAR granger test

Null hypothesis	Chi-square	P-value	Conclusion
sf does not Granger cause gdp	1.2678	0.531	can't reject H_0
fi does not Granger cause gdp	3.4239	0.181	can't reject H_0
cpi does not Granger cause gdp	3.8596	0.145	can't reject H_0
gt does not Granger cause gdp	0.2972	0.862	can't reject H_0
ei does not Granger cause gdp	4.6244	0.099	can't reject H_0
(sf fi cpi gt ei) Joint inspection	20.8240	0.022	reject H_0

Partial results of granger tests are extracted to form table 4. Among all the 36 results obtained, there is an obvious feature that most of the predicted p values of a single variable lag term for another variable are not significant, that is, the null hypothesis cannot be rejected and this variable cannot be considered as the granger cause of another variable. But the joint inspection of the five variables (sf, fi, cpi, gt, ei) are significant under 5% level.

Granger test just reacts the successive relationship, but it's not the true sense of cause and effect. Its causal relationship is likely to be influenced by many factors. We cannot just believe the financing variables: fixed asset investment and other economic variables has no effect on the gross national product. It needs further analysis.

3.3.4 Impulse response analysis

To further study the relationship between social financing scale and economic variables, the impulse response functions are tested. We focus on the impact response of social financing scale to GDP, fixed asset investment, consumer price index, total retail sales of consumer goods and total import and export. And the results are shown in figure 1 and figure 2 below.

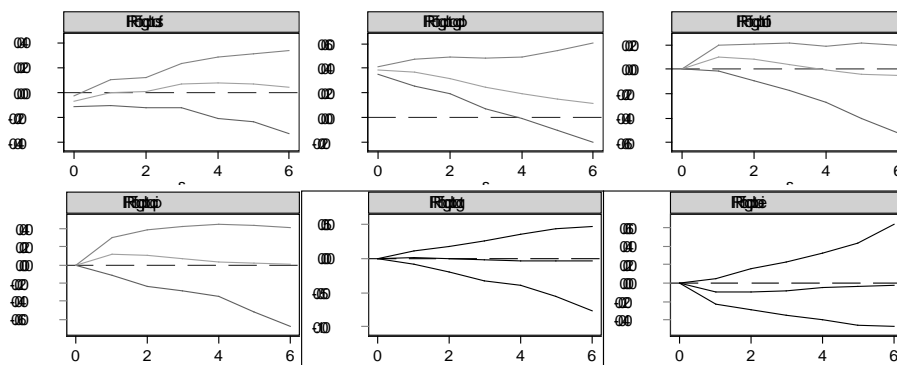


Figure 1. GDP's shock response to other indicators

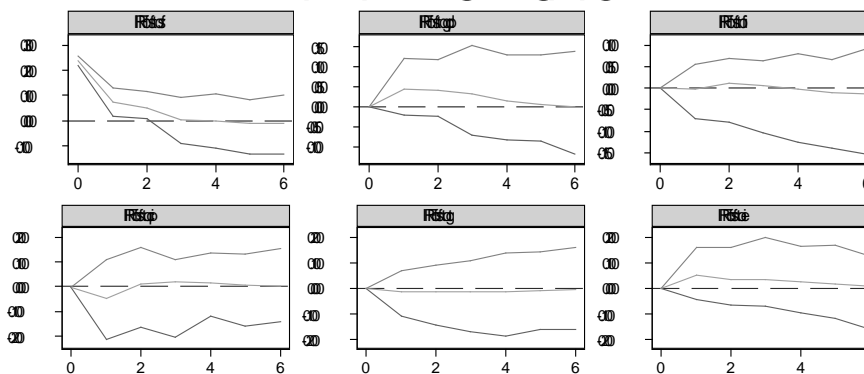


Figure 2. Impact response of social financing variables to other indicators

As can be seen from figure 2, after a positive impact on the social financing scale of the current period, a small negative impact will be generated on the Gross domestic product. With the extension of time, this impact will gradually turn to a positive and progressively increase, but then slowly drops to a stable position after reaching the peak around the fourth period. This indicates that the scale of social financing may have a negative effect on the growth of real economy at the beginning, and gradually play a significant positive role in promoting economic growth as time goes by, which indicates that social financing has a certain time lag in stimulating economic growth. It can also be found that the real economy has a larger positive impulse response in the initial stage on the fixed asset investment, and gradually decreases with time. In the impact response chart of GDP on cpi, the change of cpi will have a positive impact on GDP at the beginning, and the impact will first increase, then decreases, and finally approaches 0 and becomes stable.

In figure 3 demonstrate that the scale of social financing will react to the change in GDP, which was shown in the first phase. And this is a positive effect, which steadily increases with time until it reaches the peak around the second phase, and then gradually decreases to 0 and becomes stable.

3.3.5 Analysis of variance

To further clarify the contribution of social financing scale and other variables to the growth of real economy, the data's variances were analyzed. Partial results of anova were extracted as shown in table 5. From the variance decomposition results of social financing scale and GDP, the contributions of social financing scale and real economic growth to themselves are gradually reduced. The impact of social financing on the growth of the real economy fluctuated slightly in the early stage and gradually stabilized after the sixth stage, reaching a maximum of 3.8% in the seventh stage. The contribution of the other five indicators to economic growth was 0 at the beginning of the forecast, and then gradually increased. Among them, cpi contributed the most, with the maximum disturbance intensity of 6.3%.

Table.5. Panel VAR variance analysis results (unit %)

variable	s	lnsf	lngdp	lnfi	cpi	lngt	lnei
lnsf	1	1.000	0.000	0.000	0.000	0.000	0.000
lngdp	1	0.032	0.968	0.000	0.000	0.000	0.000
lnsf	4	0.823	0.061	0.002	0.035	0.008	0.070
lngdp	4	0.020	0.834	0.034	0.063	0.001	0.049
lnsf	6	0.805	0.062	0.004	0.038	0.010	0.080
lngdp	6	0.035	0.822	0.031	0.057	0.006	0.048
lnsf	7	0.802	0.062	0.006	0.038	0.011	0.081
lngdp	7	0.038	0.817	0.035	0.055	0.007	0.048
lnsf	10	0.798	0.062	0.011	0.038	0.011	0.080
lngdp	10	0.037	0.803	0.048	0.053	0.009	0.048

4. Conclusion

Based on the VAR model of panel data, this paper empirically analyzes the impact of the scale of social financing at the provincial level on the growth of real economy in China from 2008 to 2017. The test results show that:

(1) The scale of social financing, fixed asset investment and consumer price index are all promoting factors for the growth of real economy, among which the scale of social financing has a short-term negative impact on the economic development at the initial stage, and then becomes a positive. Moreover, the scale of social financing has a lag period of two years for economic development. The change of the scale of social financing can not only affect the economy in the current year, but also affect the economy in the next two years. In addition, the impact of a social financing shock on the growth of real economy will weaken to a stable degree with the increase of time.

(2) The scale of social financing is the financial manifestation of the development of the real economy. From the above analysis, the current impact of the real economy can be obtained, which will also trigger a positive response in the scale of social financing show, that is, increasing first and then decreases until becomes stable. In other words, the scale of social financing will change due to the development of the real economy, which is the financial performance of the development of the real economy.

Acknowledgements

This work is supported by the National Social Science Fund of China (19BJY242).

References

- [1] Francisco A., Eduardo C., Arturo G. Financial Development and TFP Growth: Cross-Country and Industry Level Evidence [R]. Inter-American Development Bank, 2009
- [2] FAN Xue-jun, Financial System and Economic Growth: An Empirical Test from China [J]. Journal of Financial Research, 2006, 3: 57-66
- [3] YANG Song, HUANG Ting-ting, Regional Financial Development and Economic Growth in China: An Empirical Analysis Based on OLG Theory with Production and Panel Data [J]. Journal of Nanjing Audit University, 2019, 16 (02): 68-79.
- [4] Levine R., Zervos S. Stock Markets, Banks, and Economic Growth. American Economic Review, 1998, 88 (3): 537-558.

- [5] Cheng X., Degryse H. The Impact of Bank and Non-Bank Financial Institutions on Local Economic Growth in China [J]. *Journal of financial services research*, 2010, 37: 179-199.
- [6] SHENG Song-cheng, Social Financing Scale and Monetary Policy Transmission [J], *Journal of Financial Research*, 2012, 10: 1-14.
- [7] Subject Group of the PBC Jinan Branch, Study on the Compatibility of Regional Aggregate Financing to the Real Economy with Economic Development——Taking Shandong Province as an Example [J], *Journal of Financial Development Research*, 2016 (9): 29-36
- [8] Subject Group of the PBC Shijiazhuang Branch, Analysis of Social Financing Scale in Hebei Province [J], *Hebei Finance*, 2014 (11): 17-19
- [9] LI Qiang, XU Kang-ning Financial Development, Real Economy and Economic Growth—Empirical analysis based on provincial panel data [J] *Shanghai Journal of Economics*, 2013, 25 (09): 3-11+57.
- [10] Douglas Holtz Eakin, Whitney Newey, Harvey S. Estimating Vector Autoregressions with Panel Data [J]. *Econometrica*, 1988, 56 (6): 1371-1395