Research on the Relationship between China's fixed asset investment in the whole society and its influence factors

Lihui Wang
School of Economics and Management, Zhejiang Sci-Tech University, Hangzhou, Zhejiang province, 310000, China
wlh310033@163.com

Abstract. Vector Autoregression Model (VAR) is applied to study the relationship between China's fixed asset investment in the whole society and its influence factors in this paper. The main influencing factors of fixed asset investment studied in this paper are the ratio of money supply to GDP, total import and export and total population. The conclusion is that the ratio of money supply to GDP and the total population at the end of the year have significant negative impacts on fixed asset investment in the whole society. The fixed asset investment in the last period has a significant positive effect on the fixed asset investment in the current period, which indicates that the investment of fixed assets in the whole society has certain inertia and stickiness. In terms of granger causality, the ratio of money supply to GDP, the total population at the end of the year and total import and export are granger reasons for the fixed asset investment in the whole society.

1. Introduction
Many scholars have studied the fixed asset investment from different perspectives (Lou, Y.L., 2015; Li, Y.J. et al., 2016; Yang, Z. and Qiu, H.L., 2014; Li, G.Y. and Sui, J., 2016). Kong, X. (2017) Used a co-integration model to study the relationship between investment and economic growth. Kong, X. (2017) demonstrated that investment in fixed assets was the key factor in promoting economic growth in recent decades of China. Li, Z.B. and Yang D.P. (2015) used VAR model to study the relationships between fixed asset investments, foreign trade and economic growth in Ningbo.

Based on the existing literature research, this paper studies the relationship between the fixed asset investment in the whole society and its influence factors in China from 1980 to 2016.

2. Model, Index and Data
Vector Autoregression Model (VAR) is applied to study the relationship between China's fixed asset investment in the whole society and its influence factors in this paper. Fixed asset investment in the whole society in this paper is expressed by FI. The total social fixed asset investment in this paper is represented by the actual total social fixed asset investment. Nominal total social fixed asset investment is deflated by GDP deflator to get the actual total social fixed asset investment. The ratio of money supply to GDP is expressed by M. Money supply in this paper equals to the sum of M0 and ‘Financial institutions deposits from various funds’ from 1980 to 1989 and M2 from 1990 to 2016. Total import and export is expressed by TIE. Total import and export in this paper is represented by the actual total import and export. Nominal total import and export is deflated by GDP deflator to get the actual total import and export. Total Population is expressed by TP. Data in this paper are derived from the CSMAR database and the website of the National Bureau of Statistics of the People’s Republic of China.
3. Empirical Analysis Results

3.1 Stationary Test

ADF method is used to test stationarity of each indicator in this paper. The results of the stationary test are shown in table 1.

| Test sequence | Test form (C,T,K) | ADF test statistic | The critical value of each significant level | Test result |
|---------------|------------------|--------------------|---------------------------------------------|-------------|
| FI (N,N,0)    |                  | 13.11945           | -2.630762 -1.950394 -1.611202               | Unstationary |
| DFI (C,T,0)   |                  | -3.595694 **       | -4.243644 -3.544284 -3.204699               | Stationary  |
| M (C,T,0)     |                  | -2.567904          | -4.234972 -3.540328 -3.202445               | Unstationary |
| DM (C,N,0)    |                  | -5.594427***       | -3.632900 -2.948404 -2.612874               | Stationary  |
| TIE (C,N,0)   |                  | 0.233436           | -3.626784 -2.945842 -2.611531               | Unstationary |
| DTIE (C,N,0)  |                  | -4.650363 ***      | -3.632900 -2.948404 -2.612874               | Stationary  |
| TP (C,T,9)    |                  | -7.036703***       | -4.339330 -3.587527 -3.229230               | Stationary  |
| DTP (C,N,9)   |                  | -6.014770***       | -3.711457 -2.981038 -2.629906               | Stationary  |

3.2 Lag Test

All the indicators are 1 stage single integration according to table 1. Therefore, this paper constructs VAR model to analyze the difference of these indicators. The optimal lag period is showed in table 2.

| Lag | LogL | LR | FPE | AIC | SC | HQ |
|-----|------|----|-----|-----|----|----|
| 0   | -773.3184 | NA | 3.39e+15 | 47.11021 | 47.29160 | 47.17124 |
| 1   | -677.2666 | 162.9971* | 2.67e+13* | 42.25858* | 43.16555* | 42.56375* |
| 2   | -665.2275 | 17.51134 | 3.56e+13 | 42.49864 | 44.13119 | 43.04794 |
| 3   | -657.4021 | 9.485436 | 6.61e+13 | 42.99406 | 45.35220 | 43.78750 |

3.3 VAR Model

There are five criteria in the lag length test. These criteria are LR, FPE, AIC, SC and HQ. According to table 2, the optimal lag period is 1 stage in the all five criteria. Therefore, this paper chooses 1 stage lag to construct the VAR model. The test results of the VAR model are shown in table 3. The standard errors are showed in the parentheses and the T statistics are showed in the brackets.

3.4 Granger Causality Tests

The granger causality tests of DFI, DM, DTIE and DTP of 1 lag are shown in table 4. In terms of granger causality, the ratio of money supply to GDP, the total population at the end of the year and total import and export are granger reasons for the fixed asset investment in the whole society.

4. Discussion

The research of existing literature on the investment of fixed assets was more about the impact of fixed assets on economic growth (Song, Y.L. et al., 2013). Huang, W.X. and Ma, H.Y. (2015) studied the relationship between real estate investment and economic growth which was based on input-output method and national economic accounting theory, and came to the conclusion that real estate investment had been influencing economic growth and fluctuations more evidently recently.
Some scholars had studied the influence factors of fixed asset investment. Li, B. (2017) analyzed influence factors of the fixed assets investment in Henan. Factors such as investment efficiency, financing channels and investment structure were deemed to have blocked the fixed assets investment in the Henan province (Li, B., 2017). Moon, J. and Sharma, A. (2014) investigated factors that affect investment in fixed assets in both the lodging and restaurant industries. Investment in fixed assets was found to be negatively influenced by financial leverage; however, liquidity ratio had a positive relationship to investments (Moon, J. and Sharma, A., 2014).

Based on the existing literature, this paper studies the influencing factors of fixed asset investment. The main influencing factors of fixed asset investment studied in this paper are the ratio of money supply to GDP, total import and export and total population.

### Table 4. Granger Causality Tests of DFI, DM, DTIE and DTP of 1 Lag

| Null Hypothesis                          | Obs | F-Statistic | Prob  |
|------------------------------------------|-----|-------------|-------|
| DM does not Granger Cause DFI            | 35  | 19.3275     | 0.0001|
| DFI does not Granger Cause DM            |     | 0.15623     | 0.6953|
| DTIE does not Granger Cause DFI          | 35  | 19.6685     | 0.0001|
| DFI does not Granger Cause DTIE          |     | 0.25902     | 0.6143|
| DTP does not Granger Cause DFI           | 35  | 7.74345     | 0.0090|
| DFI does not Granger Cause DTP           |     | 0.63210     | 0.4324|
| DTIE does not Granger Cause DM           | 35  | 6.74840     | 0.0141|
| DM does not Granger Cause DTIE           |     | 28.9421     | 7.0E-06|
| DTP does not Granger Cause DM            | 35  | 0.03975     | 0.8432|
| DM does not Granger Cause DTP            |     | 0.00052     | 0.9819|
| DTP does not Granger Cause DTIE          | 35  | 1.37010     | 0.2504|
| DTIE does not Granger Cause DTP          |     | 0.55524     | 0.4616|

5. Conclusions

From the perspective of the influencing factors of fixed asset investment in the whole society, the ratio of money supply to GDP has a significant impact on fixed asset investment in the whole society. The ratio of money supply to GDP is inversely related to the fixed asset investment in the whole society. The total population at the end of the year has a significant impact on the fixed asset investment in the whole society. The total population is negatively correlated with the assets investment. The investment of fixed assets in the last period has a significant positive effect on the investment of fixed assets in the current period, which indicates that the investment of fixed assets in the whole society has certain inertia and stickiness. The impact of total import and export on fixed asset investment is not significant. In terms of
granger causality, the ratio of money supply to GDP, the total population at the end of the year and total import and export are granger reasons for the fixed asset investment in the whole society.

Acknowledgments
I would like to express my gratitude to all those who help me during the writing of this thesis. My deepest gratitude goes first and foremost to my Reviewer. I would like to express my sincere thanks to the reviewers who take the valuable time to review the article. Also, I would like to express my heartfelt gratitude to my teachers who once supervised me. Last but not the least, my gratitude extends to my family who have been assisting, supporting and caring for me all of my life.

References
[1] Lou, Y.L. (2015) Study of Oriented Organization of Fixed Assets Investment Project Management Mode. In: Proceedings of the 1st International Symposium on Social Science. Wuhan. pp. 25-28.
[2] Li, Y.J., Abakr, Y.A., Qiu, Q., You, X.K., Zhou, J.P. (2016) Energy efficiency assessment of fixed asset investment projects – A case study of a Shenzhen combined-cycle power plant. Renewable and Sustainable Energy Reviews, 59: 1195–1208.
[3] Yang, Z., Qiu, H.L. (2014) Present situation, Forecasting and the analysis of fixed assets investment in Zhejiang province. Journal of Chemical & Pharmaceutical Research, 6(6):2049-2055.
[4] Li, G.Y., Sui, J. (2016) Research on the Effects of the Fixed Asset Investment on the Nonperforming Loans Ratio. In: Proceedings of the 22nd International Conference on Industrial Engineering and Engineering Management: Innovation and Practice in Industrial Engineering and Management. Guangzhou. pp. 99-108.
[5] Kong, X. (2017) Study on the effects of government fixed asset investment to economic growth in China: based on a co-integration model. Journal of Emerging Trends in Economics and Management Sciences, 8(3): 155-157.
[6] Li, Z.B., Yang D.P. (2015) The Study on the Influence of Fixed Asset Investment and Foreign Trade to the Economic Growth of Ningbo—Based on VAR Model. In: International Conference on Education Technology, Management and Humanities Science. Xi'an. pp. 271-275.
[7] Song, Y.L., Jiang Y.Y., Song, G.Y., Wang P. (2013) The Empirical Research on the Relationship between Fixed Assets Investment and Economic Growth. Research and Applications in Economics, 1(1): 1-5.
[8] Huang, W.X., Ma, H.Y. (2015) Research on the Influence of Real Estate Investment and Economic Growth in China. In: International Conference on Management Engineering and Management Innovation. Changsha. pp. 235-239.
[9] Li, B. (2017) Thinking and Measures of Fixed Assets Investment in Henan under the Background of Steady Growth and Trend. In: International Conference on Culture, Education and Financial Development of Modern Society. Moscow. pp. 622-625.
[10] Moon, J., Sharma, A. (2014) Factors Influencing Fixed Assets Investments in the U.S. Hospitality Industries. The Journal of Hospitality Financial Management, 22:75–88.