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AN EMPIRICAL ANALYSIS OF THE RELATIONSHIP BETWEEN FIXED-ASSETS INVESTMENT AND ECONOMIC GROWTH IN GUANGDONG PROVINCE

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ABSTRACT

The relationship between fixed-assets and economic growth has always been one of the hot topics discussed in economics, and the research on them has great practical significance. Therefore, based on the two sets of time series data of Guangdong Province's GDP and fixed-asset investment from 1990 to 2018, this paper establishes a VaR model and uses co-integration test, Granger causality test and impulse response function for empirical analysis to study Guangdong's relationship between investment in fixed-assets and economic growth. The research results show that there is no long-term equilibrium relationship between fixed-asset investment and economic growth in Guangdong Province. However, fixed-asset investment is the Granger cause of economic growth, that is, fixed-asset investment has a one-way effect on economic growth, and it can significantly stimulate the economy increase. At the same time, a standard shock to the growth rate of fixed-asset investment has a large impact on GDP, which also shows that fixed-asset investment has a certain role in promoting economic growth.

Keywords: Fixed-asset investment; economic growth; cointegration test; Granger causality test；impulse response function

1. INTRODUCTION

Economic growth refers to the continuous increase in the national income level of a country or region. We usually use gross domestic product (GDP) to measure a country or region's economic development scale and growth rate. Regardless of whether it is a capitalist or a socialist country, its national income and the country's political and economic status are closely related to the speed of economic growth. Economic growth plays a pivotal role in the development of the country and the improvement of people's living standards. In 2020, the menacing new crown pneumonia epidemic has swept

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across the country and brought a serious impact on my country's economic development. Fighting the epidemic and maintaining stable economic growth have become the top priority of the country's work. From the perspective of macroeconomics, economic growth is the core goal of economic policy, and it is related to the development and lifeline of every country and nation.

Many factors determine economic growth, such as the amount of labor, the amount of investment, and the level of productivity. However, in the modern business cycle theory, investment fluctuations have always been considered as the main cause of economic fluctuations (Kydland and Prescott, 1982) . Therefore, investment, as the main driving force of economic growth, plays an irreplaceable role. As of 2020, in response to the negative impact of the new crown pneumonia epidemic on the national economy, the country has adopted a series of proactive fiscal policies and monetary measures, the purpose of which is to alleviate the impact of the epidemic on economic development and effectively promote stable economic growth. Among various policies and methods, the policy of increasing investment in fixed-assets is particularly eye-catching.

Over the years, many scholars at home and abroad researched the relationship between fixed-asset investment and economic growth. They generally agree that there is an interdependent relationship between fixed-asset investment and economic growth.

In the existing research on the relationship between fixed-asset investment and economic growth, Qin Chuan (2006) conducted an empirical analysis of the relationship between fixed-asset investment and GDP in Jiangxi Province from 1980 to 2004 through the ECM model, and found that increasing investment in fixed-assets It can effectively stimulate the economic growth of Jiangxi Province and promote its development. Guo Guofeng and Liu Menghui (2006) used my country’s inter-provincial annual parallel data research from 1985 to 1998 to conclude that fixed-asset investment in the whole society has a positive effect on economic growth,

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and it is statistically significant, but this promotion has a regional effect difference. Chen Zhaoxu et al. (2005) used Granger causality test and impulse response function to conduct an empirical analysis on the relationship between my country’s fixed-asset investment scale and GDP since 1992, and concluded that rapid economic growth directly led to the investment rate The conclusion that capital formation does not significantly promote economic growth. Wang Tianying (2004) measured the coefficient of fixed-asset investment in my country from 1981 to 2002, and the results showed that: from 1981 to 2002, my country’s fixed-asset investment had a lagging effect on GDP, and the lag period was about one year.

Meanwhile, Liu Xianghong (2013) conducted an intuitive analysis and empirical research on the relationship between fixed-asset investment and economic growth in Dalian from 1981 to 2012. The results show that fixed-asset investment has a long-term pulling effect on economic growth, and generally lags 1-2 years. Fu Dongdong (2016) used Ningbo's fixed-asset investment and regional GDP data from 1985 to 2014, and conducted an empirical analysis of the relationship between the two through the VAR model, and concluded that Ningbo's economic growth is affected by the fluctuations of fixed-asset investment and its own fluctuations. It has a dual effect, and the conclusion that economic growth itself and fixed-asset investment positively affect sustained economic growth. De Long and Summers (1992) found that the formation of fixed-assets (the share of fixed-asset investment in GDP) in the United States and other countries has a significant positive correlation with per capita GDP, that is, the amount of fixed-asset investment and economic growth are in the same direction Change, and the greater the investment in fixed-assets, the faster the economic growth rate. Rui Wang et al. (2020) analyzed the relationship between China's fixed-asset investment and industrial structure based on econometric methods such as the VAR model and Granger causality test. They found that there is a lag relationship between fixed-asset investment and industrial value added, and both have a positive impact on each other. Xiao Kong et al. (2019) analyzed whether China used a deficit policy and strong government fixed-asset investment to stimulate economic growth. The analysis using co-integration model and impulse response function proved that government fixed-asset investment can promote China's economic growth.

Moreover, Wu Youqun and Wang Yubing et al. (2016) used co-integration test, Granger causality test, vector autoregressive model, impulse response, and variance decomposition methods based on time series data from 1990 to 2013 to assess the relationship between fixed asset investment and economic growth in Anhui Province The relationship of dynamic measurement analysis. The results found that there is a long-term equilibrium relationship between fixed asset investment and economic growth in Anhui Province, and fixed asset investment is the Granger cause of economic growth. Liu Yue (2014) used Tianjin's social fixed asset investment and regional GDP data from 1978 to 2012, and used co-integration test, error correction model, Granger causality test and other econometric methods to invest in Tianjin's fixed assets Empirical analysis of the relationship between economic growth and economic growth. The results show that there is a long-term stable relationship, a short-term dynamic equilibrium mechanism and a two-way Granger causality between Tianjin's fixed asset investment and economic growth.

Last but not least, Cheng Gui and Tao Zengqiang et al. (2019) took the county economy of Gansu Province as the research object, selected the annual county data of the province from 2000 to 2016, and used the PVAR model to conduct an empirical analysis of the relationship between the county economy and fixed asset investment in Gansu Province. The research results show that expanding the scale of fixed asset investment is conducive to promoting county economic growth, which in turn can drive the growth of fixed asset investment. Chen Shaolin (2012) uses the relevant data of my country from 1978 to 2010, based on the VAR model, to quantitatively study the dynamic effects of Chinese household consumption, fixed asset investment, and exports on economic growth since the reform and opening up. The results show that fixed asset investment is the leading factor of my country's economic growth, and its changes will have a lasting pulling effect on economic growth; residential consumption and exports can drive my country's economic growth in the short term, but the long-term effect is not significant. Zhang Bin (2011) constructed a co-integration and ECM model through an empirical analysis of the relationship between fixed asset investment and GDP in Guizhou Province from 1990 to 2009. The results show that there is a positive correlation between GDP growth and fixed asset investment growth in Guizhou Province, and the impact is significant.

Guangdong Province is located in the eastern coastal area of my country. It has unique geographical advantages and the support of the state's financial policy. Therefore, it is of great significance to study the economic development of Guangdong Province. Since the reform and opening up, the economic level of Guangdong Province has been developing rapidly. As an important means to realize the rapid economic growth of Guangdong Province, investment in fixed-assets has undoubtedly played a pivotal role. This paper has similarities with previous studies, and also focuses on analyzing the factors that affect regional economic development. The difference is that this paper takes Guangdong Province, the eastern coastal province as an example, and also considers the specific way in which fixed-asset investment affects economic growth. Therefore, this paper takes Guangdong Province as the research object, and conducts an empirical analysis of the relationship between fixed asset investment and economic growth from 1990 to 2018 based on time series data.

2. DATA SOURCE AND PROCESSING

The data in this article are selected from the "Guangdong Province Statistical Yearbook" and the National Yearbook Report of China's Economic and Social Big Data Research Platform. The data includes the annual data of Guangdong Province's regional GDP and fixed-asset investment from 1990 to 2018. In order to ensure the

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unity of the data and facilitate processing and analysis, we choose 100 million yuan as the variable unit. At the same time, in order to eliminate the heteroscedasticity in the time series, the natural logarithm of gross domestic product (GDP) and fixed-asset investment (FI) is used for measurement. Logarithmic transformation of the variables will not change the cointegration relationship of the original sequence after transformation.

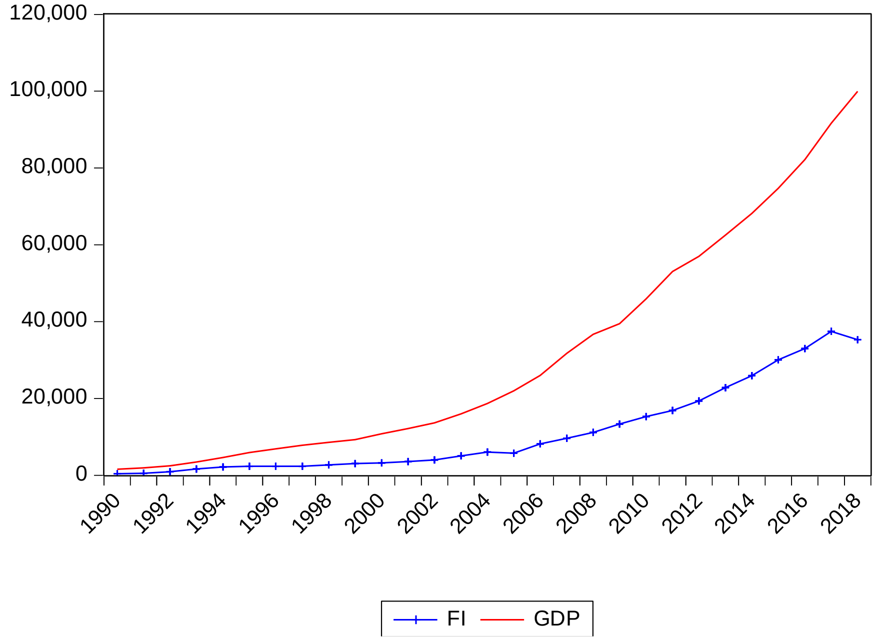

Fig.1 Variable trend chart

From the variable trend chart in Figure 1, we can see that from 1990 to 2018, the regional GDP and total fixed asset investment in Guangdong Province have basically the same trend over time, almost all of which are increasing year by year. This shows that the continuous increase in investment in fixed assets has played a certain role in promoting economic growth, and economic growth has also driven the increase in investment in fixed assets, and there is a close relationship between the two.

3. MEASUREMENT RESULTS AND EMPIRICAL ANALYSIS

3.1 Stationarity test

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Assuming that each value of the time series is randomly obtained from a probability distribution, if the time series satisfies the mean, variance, and covariance are constants independent of time t, and the covariance is only related to the time interval, then the time series is called It is (wide) stable. Only a stable time series can be subjected to quantitative analysis, otherwise there will be spurious regression.

The ADF test is the most commonly used unit root test, so this paper uses the ADF test method to test the original time series. The ADF test is given by Said and Dickey (1984), for p-order autoregressive AR(p): $y_t = \phi_1 y_{t-1} + \ldots + \phi_p y_{t-p} + \varepsilon_t$, through difference operation and equivalent transformation, we can get: $\nabla y_t = \rho y_{t-1} + \beta_1 \nabla y_{t-1} + \ldots + \beta_{p-1} \nabla y_{t-p+1} + \varepsilon_t$. The ADF unit root test method is used to test the stationarity of the time series. The original hypothesis is that the time series has unit-roots. If the original hypothesis is rejected, the time series is considered to be stationary, otherwise the time series is considered to have unit-roots. The test results are shown in Table 1 (the confidence level is 95%).

Table 1 ADF inspection results

variable	Inspection form （c,t,k）	ADF test value	1% test value	5% test value	10% test value	test results
lnGDP	（1,1,8）	0.7321	-4.4983	-3.6584	-3.269	unstable
lnFI	（1,1,0）	-3.3437	-4.324	-3.5806	-3.2253	unstable
DlnGDP	（1,1,7）	-4.512	-4.4983	-3.6584	-3.269	stable
DlnFI	（0,0,2）	-3.3675	-2.6607	-1.955	-1.6091	stable

It can be seen from Table 1 that at a significance level of 5%, the ADF test values of lnGDP and lnFI are both greater than the test value of 5%, and the null hypothesis cannot be rejected, that is, there is a unit root, which is considered unstable. For the

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first-order difference of the time series, the ADF test values of DlnGDP and DlnFI are both less than 5% of the test value, or even less than 1% of the test value, thus rejecting the null hypothesis. The time series after the difference is considered to be stable. They are one The order single-integration sequence can be tested for co-integration.

3.2 Cointegration test

Engle & Granger (1987), Stock (1987), Johansen (1988) and other scholars through the statistical procedures of cointegration analysis or the characteristic performance of asymptotic distribution, make cointegration analysis one of the general methods of time series analysis, which usually use the least square method is used for analysis. The basic idea of cointegration theory is that if multiple unit root sequences have a "common random trend", these variables can be combined linearly to eliminate this random trend. Since two first-order single-integration sequences have at most one co-integration relationship, the co-integration relationship reflects the long-term equilibrium relationship between variables. Therefore, the E-G two-step method is used to test the two variables lnGDP and lnFI, and the results are shown in Table 2. Since the original hypothesis is that the time series are not cointegrated, it can be seen from Table 2 that the P value corresponding to E-G tau-statistic is 0.3454 greater than 5%. The original hypothesis is not rejected, indicating that there is no long-term equilibrium relationship between the two series.

Table 2 Cointegration test

Dependent	tau-statistic	Prob.*	z-statistic	Prob.*
lnGDP	-2.4021	0.3454	-9.0244	0.3598
lnFI	-2.5456	0.2857	-9.5587	0.3222

3.3 Granger causality test

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Granger causality test can empirically test the direction of influence between variables. The following formula shows the general Granger causality test formula. In the following formula, t represents time, k represents the maximum lag of the variable, and ε represents the random disturbance term in the model.

$$\mathrm{Ln}Y_t = A_{10} + \sum_{i=1}^{k} A_{1i} LnY_{t-1} + \sum_{i=1}^{k} B_{1i} LnX_{t-i} + \varepsilon_{1t}$$
$$\mathrm{Ln}X_t = A_{20} + \sum_{i=1}^{k} A_{2i} LnX_{t-1} + \sum_{i=1}^{k} B_{2i} LnY_{t-i} + \varepsilon_{1t}$$

When the data is a time series, the Granger causality between the two economic variables X and Y is defined as: If the past information of the two economic variables is included, the forecast effect of the economic variable Y is better than that of only Y The forecast of Y based on the past information of Y, that is, if the economic variable X is believed to help explain the future changes of Y, then X is considered to be the Granger cause of Y.

From the following analysis, we can see that although there is no long-term equilibrium relationship between the two variables, the variables are of the same order and single integral. Therefore, to determine whether there is Granger causality between the two-time series, Granger causality test is performed on the difference of the variables. According to the VAR order criterion, it can be determined that the lag order should be 1, and the results are shown in Table 2.

The results show that at the 5% significance level, when the null hypothesis is "DlnGDP is not the Granger cause of DlnFI", the P-value is 0.8534. The null hypothesis is not rejected, and lnGDP is not the Granger cause of lnFI; and when the null hypothesis is " When DlnFI is not the Granger cause of DlnGDP", the P value is 0.0008, rejecting the original hypothesis, and thinking that lnFI is the Granger cause of lnGDP, that is, there is a one-way causal relationship between regional GDP and fixed-asset investment. Investment in fixed-assets has a significant effect on stimulating economic growth.

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Table 3 Granger causality test

Lag order	H0	F statistic value	Prob.
1	DlnGDP is not the Granger reason for DlnFI	0.03487	0.8534
	DlnFI is not the Granger reason for DlnGDP	14.5858	0.0008

3.4 VaR model

The VAR model embeds the variables to be studied and determines its lag value to analyze the dynamic relationship between the variables. The formula of the VAR model is as follows: $Y_t=\Phi_1 Y_{t-1}+\ldots+\Phi_p Y_{t-p}+DX_t+\varepsilon_t$, $t=1,2,\ldots,T$, Y_t is the k-dimensional endogenous column vector, X_t is the n-dimensional exogenous variable, p is the lag order, and Φ_1, Φ_2, Φ_3, …, Φ_p and D need to be estimated the coefficient matrix, ε_t is the k-dimensional disturbance term. According to the lag length information criterion, the optimal lag order is selected, and the VAR model is established. The lag length information criterion selects the lag 1 order. Therefore, the VAR(1) model is established as follows.

$$\begin{pmatrix} D\ln FI \\ D\ln GDP \end{pmatrix} = \begin{pmatrix} 0.0649 \\ 0.0402 \end{pmatrix} + \begin{pmatrix} 0.4699 & 0.0968 \\ 0.2329 & 0.4447 \end{pmatrix} \begin{pmatrix} D\ln FI_{t-1} \\ D\ln GDP_{t-1} \end{pmatrix} + \begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{pmatrix}$$

Then the exogeneity of the lag value of the variable is tested. Suppose the lag value of the variable in the VAR model has no significant effect on the explained variable. In that case, the establishment of the VAR model is questionable at this time. After testing, it can be seen that the first-order lag of DlnFI has a significant effect on DlnGDP, and the first-order lag of DlnGDP has no significant effect on DlnFI, which is in line with the results of the Granger causality test. At this time, the homogeneity test is passed. The results are shown in Table 4.

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Table 4 Exogenous test of variable lagged values

Excluded	Chi-sq	df	Prob.
DlnGDP	0.0349	1	0.8519
DlnFI	14.5858	1	0.0001

After the homogeneity test is passed, the stability test of the VAR model is carried out using the graphical method. As shown in Figure 2, the characteristic roots fall within the unit circle, indicating that the established VAR(1) model is stable and the model results are valid.

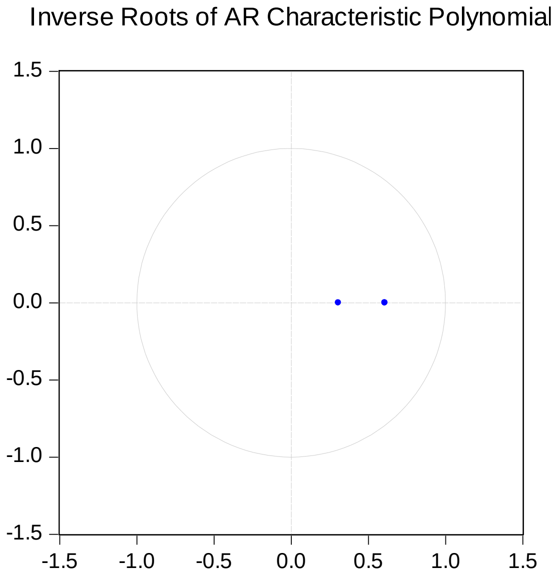

Fig.2 Characteristic root

3.5 Impulse response function

The impulse response function is mainly realized by iterative method. In the following VAR model, when $\varepsilon_{10}=1$ and $\varepsilon_{20}=0$, $DLNFI_0$, $DLNFI_1$, $DLNGDP_0$ and $DLNGDP_1$ can be obtained through iteration. The following data are all the response sequences of DLNFI and DLNGDP caused by DLNFI impact. At the same time, when $\varepsilon_{10}=0$ and $\varepsilon_{20}=1$, the corresponding shock reflection function can be obtained. The impulse

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response function reflects the response of endogenous variables to residual shocks. The impact on the current and future values of endogenous variables after a shock of the size of the standard deviation is applied to the random error.

As can be seen from Figure 3, the impact of a standard deviation shock from the growth rate of fixed-assets on the GDP growth rate has a response of 0.02 in the first period, reached the maximum in the second period, at 0.04, and then began to decline.

A standard deviation impact of GDP on itself. In the first period, the GDP growth rate rose to about 0.03, then began to decline, and gradually tended to zero after the fifth period.

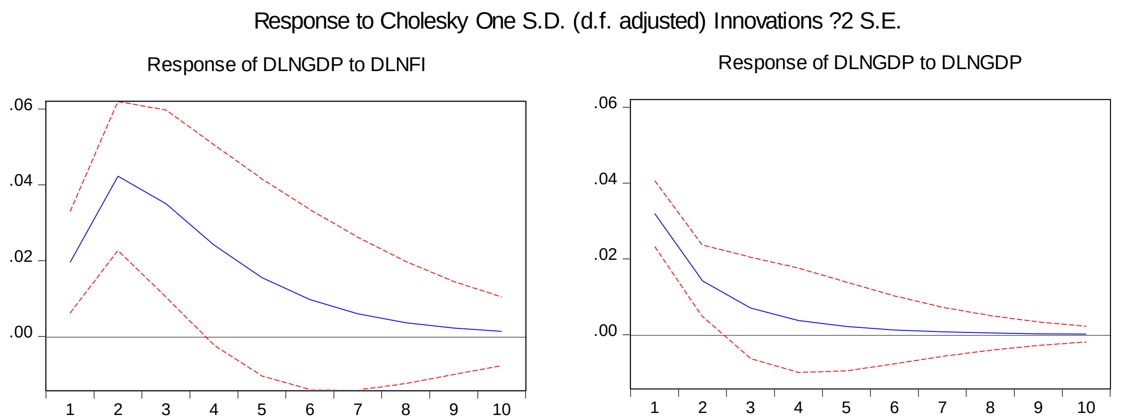

Fig.3 Impulse response function

4. CONCLUSIONS AND RECOMMENDATIONS

Through the following analysis, we can draw the following conclusions:

(1) Through the co-integration test, it can be seen that there is no co-integration relationship between Guangdong's GDP and fixed-asset investment from 1990 to 2018, that is, there is no long-term stable equilibrium relationship between economic growth and fixed-asset investment.

(2) The Granger causality test shows that there is a one-way causal relationship between fixed-asset investment and economic growth in Guangdong Province, that is,

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fixed-asset investment is the Granger cause of economic growth, which indicates changes in fixed-asset investment in Guangdong Province Can effectively infer and predict future economic growth. On the one hand, this shows that Guangdong Province, as a major economic province, still relies on fixed-asset investment for its economic development to a certain extent. At the same time, although Guangdong Province's economic development has entered the post-industrial development stage, its fixed-asset investment still drives economic growth.

(3) From the impulse response analysis of the VAR model, it can be seen that a standard shock of the growth rate of fixed-asset investment in Guangdong Province has a large impact on the regional GDP, indicating that fixed-asset investment has a certain role in promoting economic growth.

Based on the following conclusions, this article proposes several countermeasures for the development of fixed-asset investment and economic growth in Guangdong Province:

(1) To meet the economic development needs in Guangdong Province, improve the fixed-asset investment management system. Although there is no long-term equilibrium relationship between investment in fixed-assets and economic growth in Guangdong Province, increasing investment in fixed-assets in the short term can also promote economic growth to a certain extent. Therefore, the government can formulate different fixed-asset investment strategies following the different stages of economic development in Guangdong Province to promote the effective growth of the local economy.

(2) Focus on optimizing the investment structure of fixed-assets in Guangdong Province. While emphasizing the role of fixed-asset investment in promoting economic growth, the optimization of industrial structure and technological progress cannot be ignored, to achieve healthy, sustained, and high-quality economic development in the province. Optimizing the investment structure is an important link

in the adjustment of industrial structure. It is necessary to reasonably determine the three major industrial structures for investment. While giving priority to the development of high-tech industries and advanced service industries, appropriately increase the proportion of investment in the secondary industry in the total investment of the whole society, especially In an economically developed area like Guangdong, it is even more important to seize the opportunity to appropriately increase the proportion of investment in the secondary industry, gradually reduce the proportion of investment in the primary industry, adjust the investment structure within the primary industry, and increase restrictions on low levels. The increase in investment in crop production industries has increased the support and guidance for investment in high-tech industries. At the same time, effectively increase investment in the tertiary industry, moderately increase investment in basic industries such as transportation, information and communication, education, and public services, and increase investment in finance, banking, insurance, and various new service industries.

(3) Strengthen support for private investment and reduce dependence on bank loans. There is no two-way causal relationship between fixed-asset investment and economic growth in Guangdong Province. The possible reason is that Guangdong is located in the coastal area of the Pearl River Delta. Its economic growth mainly depends on its own consumer demand and foreign trade. To meet the needs of fixed-asset investment, private investment is relatively weak. At the same time, most of the sources of funds for investment in fixed-assets come from bank loans, which may also bring the risk of non-performing assets to banks. Therefore, the government can appropriately allocate funds to increase the investment in private fixed-assets and reduce the dependence of local investors on bank loans.

(4) Optimize the investment environment and appropriately attract foreign capital. Capital is undoubtedly playing a great role in economic growth. A standard shock to the growth rate of fixed-asset investment in Guangdong Province has a relatively large

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impact on the regional GDP. It can be seen that fixed-asset investment is playing a role in promoting local economic growth in the short term. Therefore, the government can make use of the regional advantages of Guangdong Province, optimize the investment environment, attract foreign investment in fixed-assets in Guangdong Province, and create a good development space for the high-quality economic development of Guangdong Province.

5. REFERENCES

Chen Chaoxu, Zhang Wen, Zhao Yufei. (2005). An Empirical Analysis of the Relationship between my country's Fixed-assets Investment Scale and Macroeconomics. Industrial Technology Economy, China.

Chen Shaolin. (2012). The impact of household consumption, investment in fixed assets and exports on China’s economic growth: an empirical analysis based on the VAR model. Journal of Chongqing University of Science and Technology (Social Science Edition), China.

Cheng Gui, Tao Zengqiang, Fan Yuheng. (2019). An Empirical Analysis of the Influence of Gansu Province's Fixed Assets Investment on County Economic Growth. Accounting Research, China.

De Long，J.B and Summers，L.H. (1992). Equipment and investment and economic growth. Quarterly Journal of Economics, USA.

Engle, R. F., Granger, C.W.J. (1987). Co-Integration and Error Correction: Representation, Estimation, and Testing. Econometrica, USA.

Fu Dongdong. (2016). Research on the relationship between economic growth and fixed-asset investment in Ningbo City. Special Zone Economy, China.

Guo Guofeng, Liu Menghui. (2006). Inquiry into the relationship between fixed-asset investment and economic growth: evidence from parallel data. Statistical Research, China.

P-ISSN: 2655-3724 E-ISSN: 2720-9881
STATMAT (Jurnal Statistika dan Matematika), Vol. 3, No. 2, July 2021
Artikel ke-3, halaman 119 - 120

Johansen, S. (1988). Statistical analysis of cointegration vectors. Journal of Economic Dynamics and Control, USA.

Kydland F. and Prescott E. (1982). Time to build and aggregate fluctuations. Econometric, USA.

Liu Xianghong. (2013). An Empirical Analysis of the Relationship between Dalian's Economic Growth and Fixed-assets Investment Based on VAR Model. Liaoning Economy, China.

Liu Yue. (2014). An Empirical Study on the Impact of Tianjin's Fixed Assets Investment on Economic Growth. Bohai Economic Outlook, China.

Qin Chuan. (2006). An Empirical Analysis of the Relationship between Fixed-asset Investment and Economic Growth in Jiangxi Province. Finance and Economy, China.

Rui Wang, Zhongying Qi, Yumin Shu. (2020). Multiple relationships between fixed-asset investment and industrial structure evolution in China–Based on Directed Acyclic Graph (DAG) analysis and VAR model. Structural Change and Economic Dynamics, China.

Said S, Dickey D. (1984). Testing for Unit Roots in Autoregressive Moving Average Models of Unknown Order. Biometrica, USA.

Stock, J.H. (1987). Asymptotic Properties of Least Squares Estimatorsof Cointegrating Vectors. Econometrica, USA.

Wang Tianying. (2004). Research on the Lagging Effect of my country's Fixed-asset Investment on Economic Growth. Economic Issues, China.

Wu Youqun, Wang Yubing, Liao Xinlin. (2016). An Empirical Analysis of the Impact of Fixed Assets Investment on Economic Growth in Anhui Province. Journal of Anyang Institute of Technology, China.

Xiao Kong, Feng Feng. (2019). China's economic success: evidence regarding the role of fiscal policy. Review of Keynesian Economics, China.

P-ISSN: 2655-3724 E-ISSN: 2720-9881
STATMAT (Jurnal Statistika dan Matematika), Vol. 3, No. 2, July 2021
Artikel ke-3, halaman 120 - 120

Zhang Bin. (2011). The impact of investment in fixed assets in Guizhou Province on economic growth. China Economic and Trade Guide, China.