

Research on the Relationship between Government Procurement Scale and Economic Growth Based on VAR Model

—Take Yunnan Province as an example

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Abstract—The government procurement system is an important part of the national fiscal system. The government procurement system has played an increasingly important role in stimulating economic growth and promoting the expansion of industry scale. Based on this, this paper collects the time series data of Yunnan government procurement scale and regional GDP from 1997 to 2016, and establishes a VAR model with government procurement and GDP. With the help of unit root test, Granger causality test, impulse response analysis and variance decomposition, the dynamic relationship between them was studied. The results show that the scale of government procurement in Yunnan Province has a certain role in promoting the GDP of Yunnan Province.

Keywords—government procurement; regional economic development; VAR model; impulse response; Yunnan

I. INTRODUCTION

Since the financial crisis, various countries have adopted expansionary fiscal policies in order to stimulate economic growth and strengthen their intervention in their own economies, which was hoping to promote the recovery of the domestic economy and employment growth. As an important part of a country's fiscal policy, government procurement, with the help of its unique advantages in the scale of purchase, has exerted many other policy effects beyond the financial savings. Western government procurement practices have confirmed that policy functions are of great significance to a country's economic and social development, and government procurement has also been upgraded from simple fiscal expenditure measures to policy tools that embody the country's policy intentions [1]. The so-called policy is a code of conduct and action guidelines adopted by the ruling party and the government to regulate and guide relevant organizations, groups, and individuals. It is a universal, authoritative, and mandatory political program that includes not only laws, regulations, and regulations. Including government plans, head instructions, conference decisions, etc. [2]. The government procurement system is an important tool for many countries in the world to play the role of the government in regulating

economic functions, embodying the country's strategic intentions, and promoting independent innovation. It is also an important policy tool for supporting domestic companies' innovation from the demand side. Since the scale and characteristics of demand are the major determinants of regional competitiveness and innovation dynamics, the government is a major customer of national defense, education, or health care. The government can act as a pilot user to bear the cost of learning and new product improvement, enabling innovative companies. It rapidly reduces costs, and at the same time achieves a strong promotion of the economy and promotes the rapid development of the economy [3].

The government procurement system is an important part of the national fiscal system. As an important means of government public expenditure, government procurement scale, procurement standards, and procurement methods all have an important impact on economic development. Changes in its scale will have a direct impact on total social demand, and thus affect the operation of the entire national economy; And its structural changes will also affect the changes in product structure, industrial structure, and regional economic structure, leading to a guiding and demonstrative effect on economic development. The origin of government procurement in developed countries is in Europe and America and it is not only a management system that regulates the procurement behavior of public agencies, but also an effective regulation and control method for the government under market economy conditions. China's economy has entered the new normal, and the policy's role of government procurement cannot be ignored.

For the evaluation of government procurement performance, some domestic scholars have also done relevant researches. Huang Shunjun [4] and Zhu Ming [5] have theoretically discussed the influence of government procurement on expanding domestic demand and stimulating investment; Zhou Guoqiang, Lei Yu [6], Chen Wei [7] qualitatively discussed the problems in government procurement performance and proposed policy recommendations; Wang Zhi used the cointegration test to verify the long-term stable equilibrium relationship between

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government procurement expenditure and GDP [8]; Wang Zhi and Wang Zongjun used fuzzy mathematics to measure the macroscopic performance of government procurement in China from the total amount [9]; Pan Bin and Zhang Derang discussed the multiplier effect of pulling GDP and the crowding out effect on investment and net exports [10][11]. And it was seemed that it was worked from two perspectives that government procurement measured the macroeconomic performance of the economy as a whole. In addition, Yan Zheng, Wu Can, Xu Jian and Yan Fei studied the macroscopic performance of Chinese government procurement from five dimensions: GDP, supporting domestic enterprises, stimulating investment, stimulating consumption, and promoting employment. Empirical analysis showed that in terms of government procurement, there are various pulling effects on various sectors of the national economy, which have stimulated the overall economic growth and promoted employment while effectively supporting the development of domestic enterprises.

Some scholars believe that corporate innovation is the main driver of economic growth, both in the public sector and in the private sector [12]. In order to promote economic growth, Government procurement is the effective transformation of enterprise innovation. Apostolos Serletis and Asghar Shahm oradi conducted empirical studies by using the method of industrial agglomeration to show that government procurement and economic growth have an alternative role [13]. Fleissig and Rossana analyzed the impact of government spending on consumption based on a large number of functional measurement scales [14]. In addition, since the 1970s, scholars have demonstrated through a great deal of empirical evidence that government procurement is an additional manifestation of economic growth that promotes corporate innovation. Jakob Edler and Luke Georghiou also analyzed government procurement as an important tool for innovation policy, and considered the importance of government procurement as an innovative policy strategy which was widely used in European countries [15]. Fu Xiaodong used the IS-LM economic analysis method to show that the macroeconomic effects of government procurement was big, and the government procurement multiplier and the investment multiplier were equal, which was showed that the government procurement was the effectiveness of macroeconomic regulation and it was greater than taxes and transfer payments [16]. In general, the research on the mechanism of government procurement and economic growth still has some deficiencies, especially on how government procurement directly affects economic growth.

Regarding the research on the Chinese government's fiscal expenditure and economic growth, Ma Yuyou believed that there is a significant positive correlation between the two [17]. Zhang Mingxi and Chen Zhiyong also found that China's public expenditure has a positive correlation with economic growth and the marginal productivity of fiscal expenditure is significantly greater than one [18]. Sun Qunli used the cointegration analysis as a method to study the short-term and long-term effects of government investment and government consumption on economic growth based on data from 1978 to 2003 in China, and concluded that among the government investment, government consumption and economic growth,

there is a long-term equilibrium and stability relationship [19]; In the short term, government investment that lags behind in two periods is the cause of economic growth; while in the long term, government consumption is positively related to economic growth, and government investment is negatively related to economic growth. It can be seen that government expenditure has no direct effect on the economic benefits, which further confirms that as part of government expenditure, it is particularly important to study the effect of government procurement scale on regional economies.

II. STATIONARITY TEST

This article plans to use government procurement scale to measure the actual investment in government procurement, and use GDP to measure the economic growth. In the early stage, the unit root test is performed on the data, and the data passed through the Granger causality test is put into the VAR model for impulse response and variance decomposition.

The VAR model is a vector autoregressive model, which is mainly applicable to estimating the dynamic relationship of joint endogenous variables without prior constraints. The dynamic impact of the detection system is the system impact caused by the prediction of interlinked time series systems and the analysis of random disturbances [20].

A. Stability Test

This paper uses ADF (Augmented Dickey-Fuller) unit root test method to test the stability of the considered time series and establish a model :

$$\Delta y_t = \gamma y_{t-1} + \alpha + \delta_t + \beta_i \sum_{i=1}^p \Delta y_{t-i} + \varepsilon_t$$

The original hypothesis $H_0: \delta = 0$ of the test is that the sequence is not stable and the original sequence has a unit root. If the null hypothesis is accepted, the sequence y_t has a unit root and is non-stationary. The results of the ADF test for the stability of the time series A2(GDP) and F2(the government procurement scale)by using the Eviews 8.0 software are shown in table 1.

TABLE I. ADF TEST

Data	T test	P value
A2	-1.053384	0.9108
F2	1.22302	0.9997
DA2	-4.132635	0.0004
DF2	-6.654159	0.0006

From the table 1, it can be found that after the second-order differential, the P value of A2 and F2 rejects the original hypothesis, which is indicating that the data is stable.

B. Granger Causality test

This test method is mainly used to analyze the causal relationship between economic variables. In the case of time series, the Granger causality between the two economic variables X and Y can be interpreted as: If X is included in the past information of the variables X and Y, the variable X helps to explain the future changes of the variable Y, The variable X is considered to be the Granger cause of the variable Y. Bringing the data after the second difference into the model for the Granger causality test, as shown in Fig 1 , we can see that F2 is the Granger interpretation of A2 and A2 is not the Granger causality test. Because at this time, the p-value is 0.0079, rejecting the original hypothesis, we can see that F2 is the Granger cause of A2. That means that F2 can predict A2, but A2 is not predictive of F2. That is, the scale of government procurement is predictive of GDP.

Null Hypothesis:	Obs	F-Statistic	Prob.
DF2 does not Granger Cause DA2	16	7.77532	0.0079
DA2 does not Granger Cause DF2		1.48860	0.2678

Fig. 1. Granger causality test Multinational corporations use employment structure ratio

C. Stability Test

Next, in order to be able to test whether the model is stable, the stability of the model needs to be tested. As shown in fig 2, all unit roots fall within the unit, so the model is stable and the next step of impulse response and variance decomposition can be performed.

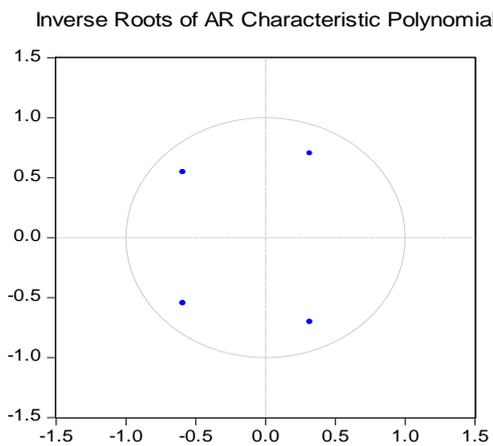


Fig. 2. Stability test

D. Impulse Response

The basic principle of impulse response is that when a variable fluctuates due to interference, it is not only the variable itself that is affected, but also the dynamic (hysteresis) structure of the VAR model. This interference is transmitted to other parts of the system' variables. In the process, shock or interference is called a pulse. The impulse response function (Impulse Response Function) is used to analyze the impact of

one standard deviation of the random disturbance on the current and future values of other variables, and the dynamic interactions and effects between the variables can be intuitively viewed [21] .

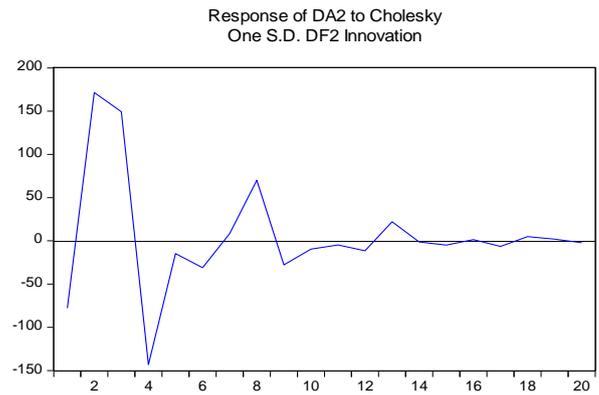


Fig. 3. Impulse response

It can be seen from the fig 3 that although the impulse responses of the previous periods have fluctuated, the impulse response gradually becomes stable as the number of lag periods increases. The impulse response of this model also proves the stability of the model.

E. Variance Decomposition

The purpose of variance decomposition is to decompose the variance components of the prediction variables of the exogenous variables within the VAR model into components that are related to each endogenous variable, and then analyze the endogenous variable changes based on the impact of endogenous variables. By contributing the value, the relative importance of the impact of each endogenous variable is evaluated [22] .

Perio...	S.E.	DA2
1	212.7317	13.39356
2	274.9957	16.95604
3	317.2088	27.81347
4	348.3236	29.63667
5	350.2900	29.85292
6	355.5653	29.38065
7	355.8679	29.91590
8	363.0818	30.41848
9	364.1454	30.41318
10	364.6235	30.50958
11	364.7532	30.55230
12	365.0563	30.59406
13	365.7617	30.59521
14	365.7693	30.61212
15	365.8300	30.63238
16	365.8330	30.63920
17	365.9113	30.63715
18	365.9453	30.63653
19	365.9515	30.64168
20	365.9582	30.64385

Cholesky Ordering: DA2 DF2

Fig. 4. Variance decomposition

As can be seen from the fig 4, in the phase of lag 1 and lag 2, the contribution of government procurement to GDP was only 13% and 16%. However, it is approximately 29% in the lag 3 to lag 5. Afterwards, the contribution value of government purchases to GDP has gradually increased, and is still staying at around 30%.

III. CONCLUSIONS

There is an interaction between the scale of government procurement and GDP in Yunnan Province, but it takes a long time to function. It may take two years or longer years for government procurement to play a significant role in promoting GDP. The promotion effect of the early stage was roughly 16%, but in the long run, the scale of government procurement has kept the pulling rate of GDP at around 30%. This shows that the scale of government procurement in Yunnan Province has a long-term effect on economic growth. This guides the direction of government procurement policies in Yunnan Province. The government still has to play a major role in the policy and further promote the economic development of the province.

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