Does Foreign Direct Investment Affect Economic Growth in Hainan Province--Equilibrium Analysis Based on Time Series

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Abstract-In 1988, the Communist Party of China allowed Hainan to build a province and establish a Special Economic Zone. In the past 30 years, Hainan Province has witnessed the economic development rapidly and enhanced the financial system. Therefore, in the framework of establishing Hainan Free Trade Area, it is particularly important to consider whether foreign direct investment has a positive effect on the economic growth of Hainan Province. This article researches the relationship between FDI and economic increase in Hainan from 1988 to 2018.It adopts the ADF unit root proof, the granger causality proof and the cointegration proof to conduct empirical research, selects the spillover effect of foreign direct investment and Cobb Douglas production function as theoretical models and reaches the conclusion that FDI has positive accelerating effect in the short-term and long-term accumulation. The article will put forward policy advice for accelerating the economic growth of Hainan Province, including increasing foreign direct investment, introducing and cultivating high-tech talents and increasing openness.

Keywords-foreign direct investment; spillover effect; economic growth; Hainan Province

1 INTRODUCTION

In the era of economic globalization, foreign direct investment (also called FDI) plays an important role. Since 1990, in order to solve the problem of insufficient domestic funds, foreign direct investment has effectively stimulated the economic growth of various countries. FDI can be regarded as the carrier of capital stock and related technologies, which can promote the economic growth through various channels. However, several financial crises in Latin America also reflect another problem. With the continuous expansion of the scale of FDI, many developing countries and regions have the problem of "foreign capital dependence", which will seriously hinder the economic development of the host country.

At present, Hainan Province is built on a Free Trade Zone around the whole island. It is necessary to introduce foreign direct investment to play its positive spillover effect, so as to promote the economic growth and upgrade industrial structure. In the "413 speech", general secretary Xi Jinping pointed out that Hainan should actively attract foreign capital and introduce advanced technology and management experience of multinational companies to enable them to fully participate in the construction of Free Trade Area. The implementation of the foreign capital management system of national treatment before entry and a negative list should not only make the entry of foreign capital more convenient, but also protect the legitimate rights of foreign capital in terms of intellectual property rights. On the other hand, Hainan should

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strengthen the links with the countries and regions along the "One Belt and One Road", make good use of the opportunity for the construction of Free Trade Area and conduct the deep level and multi field cooperation in culture, education, agriculture and tourism. So that Hainan will become an important open gateway to the Pacific and Atlantic Ocean.

With the continuous deepening of global trade and the continuous improvement of the level of globalization, foreign direct investment plays a more and more important role in the economic development of the home country and the host country. The domestic and foreign literatures mainly focus on the impact of foreign direct investment on the economic growth at the national level. However, in recent years, the Party Central Committee has paid more attention to the economic development of Hainan Province and built the whole island into a Free Trade Zone. Hainan is also in an important position of the "Maritime Silk Road". Therefore, it is very necessary to study the impact of foreign direct investment on the economic growth of Hainan Province.

This paper studies the impact of foreign direct investment on the economic growth in Hainan Province and analyzes it from two aspects. They are the direct impact of FDI and the indirect impact through spillover channels. These studies enrich the theoretical system of the impact of foreign direct investment on the economic growth. In addition, taking Hainan Province as an example for empirical analysis, it is concluded that foreign direct investment plays a positive role in promoting the economic growth, which can provide reference for the relevant decisions of Hainan Provincial Government on foreign direct investment. Therefore, it has the great theoretical and practical significance to study whether foreign direct investment has a positive effect on the economic growth of Hainan Province.

According to the endogenous economic growth theory, foreign direct investment may directly affect the economic growth, may indirectly affect the economic growth through the channel of spillover effect or the above two situations occur at the same time. In order to clarify the correlation between the economic growth and FDI in Hainan Province, this paper makes an empirical analysis and constructs a long-term equilibrium model and a short-term error correction model. The models can not only get the long-term equilibrium relationship between the economic growth and other variables, but also get the impact of the long-term equilibrium state on the short-term fluctuations.

The marginal contribution of this paper has two points. Firstly, in the previous research, there is little literature on the economic growth of Hainan Province. This paper analyzes the economic growth of Hainan Province in detail from the perspective of foreign direct investment. Secondly, this paper not only studies the direct impact of foreign direct investment on the economic growth of Hainan Province, but also studies the indirect impact of foreign direct investment on the economic growth of Hainan Province through the channel of spillover effect.

2 LITERATURES REVIEW AND THEORETICAL ANALYSIS

The impact of FDI on the economic growth of the host country has attracted the attention of many economists. It is considered to be an important part of the impact of the spillover effect. The literatures on this issue are rich and diverse. This section will sort out the relevant literatures and lead to the research perspective of this paper.

2.1 The Spillover Channels of FDI

Under the framework of the endogenous economic growth theory, the spillover effect of FDI on the host country is becoming more and more important. FDI flowed mainly through the following five spillover channels. They are demonstration effect, labor flow, export, competition and the forward and backward relationship between foreign and domestic enterprises. The spillover effect of FDI from the perspective of demonstration effect [1]. He pointed out that the demonstration effect may be the most obvious spillover channel and the domestic companies (imitation) will not rashly introduced a new technology unless the multinational companies (demonstration) have successfully used the technology in the market. Glass and Saggi analyzed the spillover effect of FDI from the perspective of labor mobility [2]. Through the research, it was proved that the workers who had previously worked in the multinational companies could understand specific technologies and implement them in the domestic companies. However, Sinani and Meyer emphasized the negative effect that the multinational companies may attract high-tech talents from the domestic companies by providing higher wages [3]. Greenaway and others emphasized the positive effect of transnational corporations on promoting the export capacity of domestic enterprises through some studies [4]. The domestic companies can take the "free ride" of transnational corporations in terms of the distribution network, infrastructure and market researches. The spillover effect of FDI from the perspective of competitive effect and believed that it has two sides [5]. On the one hand, it can encourage the domestic companies to make effective use of existing resources and technologies and increase their creativity and competitiveness. On the other hand, it can lead to poor performance of the domestic companies because the multinational companies occupy a large share of the market. The last channel refers to the relationship established between the domestic companies and the multinational companies in the local market. These multinational companies are suppliers of the domestic companies, which is called upstream relationship and beneficial to the domestic companies. There is another case where these multinational corporations are the customers of the domestic companies, which is called downstream relation and has interests for the domestic companies. These studies have deepened the understanding of FDI spillover effect.

2.2 The Impact of FDI On Chinese Economy

In the 1980s, China established four Special Economic Zones (Shenzhen, Zhuhai, Shantou and Xiamen) to open their doors. These cities attracted the overseas investors and obtained the advanced technology so as to achieve economic growth. Quibria pointed out that the success of the “four Asian dragons” was inseparable from the overseas investment, so overseas investment became a hot topic discussed by developing countries at that time [6]. And China was the developing country that received the most foreign investment in the 1990s, which brought a lot of opportunities and benefits to the fledgling China [7]. Hongguang Sui and Yanhua Liu found that FDI can significantly improve the quantity and quality of economic growth of the host country [8]. And the government could effectively use the foreign investment and prevent the emergence of dependence on the foreign capital. The spillover effect of FDI has a conspicuous positive impact on the China's economy [9]. Lijun Ma also found that the spillover effect of FDI is conducive to the China's economic growth, but the obstruction of technologies spillover channels caused by "lock-in effect" will weaken its contribution to the economic growth [10]. Guicai Li and Di Lu decomposed the total factor productivity of Chinese industrial enterprises [11]. This paper pointed out that the change of total factor productivity of Chinese industrial

enterprises mainly comes from the scale effect, not from the technologies spillover of the foreign investment.

Foreign direct investment can significantly promote Chinese economic growth. From a regional perspective, foreign direct investment plays an obvious role in promoting the economy of the eastern region, but not the central and western regions [12]. Cheung & Ping pointed out that a large amount of FDI may expand the gap between the rich and the poor in the Chinese eastern and western regions [13]. A large of FDI also weaken the creativity of domestic enterprises, excessively increase the foreign exchange reserves and hinder the Chinese economic development. Meanwhile, Nee and Opper also revealed FDI has the different effects on economic growth in the Chinese different regions [14]. From the research results, FDI greatly promoted Chinese economic development and improved the market efficiency by increasing technologies, capital and human resources in the market. However, the positive effect was limited to the regions with a number of foreign direct investment flowed. It led to huge differences in economic and production income between the central and western regions and the eastern region.

2.3 The Theoretical Analysis

When discussing the impact of FDI on the economic growth of the host country, the authors of the early literatures believed that FDI only directly affected the income of the host country, but didn`t affect the economic growth rate of the host country. The endogenous economic growth theory was put forward by Romer, Grossman and Helpman. This theory pointed out that the technological innovation and progress are the factors that promote the countries' sustained economic growth. The countries could promote their economic growth through the flow and diffusion of innovative knowledge. Therefore, Stólinger proposed that the ability of a country to produce the technical knowledge not only depended on its own R&D level, but also depended on the other countries` spillover of technical knowledge [15]. Lee concluded that FDI is one of the main ways of the international technological spillover through the research [16]. Many developing countries introduced the foreign capital. And the host countries promoted the economic growth by obtaining the technical support from the foreign enterprises and imitating their advanced production processes. Therefore, the paper puts forward the research hypothesis. The research hypothesis is foreign direct investment not only directly affects the economic growth of Hainan Province, but also indirectly affects the economic growth of Hainan Province through the spillover effect of FDI.

3 EMPIRICAL RESEARCH

3.1 The Data and Variable Description

The data in this paper comes from Hainan statistical yearbook and Bank of China. The time-series data from 1988 to 2018 are selected for analysis. FDI is interpreted as the impact of foreign direct investment on the economic growth, which is expressed by the actual utilization of the foreign capital in Hainan Province over the years. The absorptive capacities of regional FDI include labor (L), capital (K) and openness (OPEN). They are expressed by the total number of employees, the total investment in the fixed assets and the total import and export volume of international trade in Hainan Province over the years. These variables affect economic growth

through the spillover channels of FDI. At the same time, the logarithm form of each variable is taken, so that the regression model with higher fitting can be obtained and the heteroscedasticity can be eliminated to a certain extent. FDI can not only affect the cities that received FDI, but also the surrounding cities can be affected to varying degrees [17]. It is called the spillover effect in the inter region. Haibo Chen and Yue Zhang also studied the impact of foreign direct investment on the economic growth in the cities of Jiangsu Province and concluded that foreign direct investment in these cities can not only directly promote their economic growth, but also indirectly drive the economic development of the adjacent cities [18]. Because Hainan Province is located in Hainan Island and separates from other provinces and cities by Qiongzhou Strait, the spillover effect in the inter region is very small and negligible. This paper only considers the spillover effect in Hainan Province.

3.2 The Unit Root Test

Because the time-series data we get are usually non-stationary. They often lead to bias and inconsistency in the regression results. In order to reduce the effectiveness of the statistical conclusion, this paper uses the ADF unit root test to test the stationarity and the single integer order of each time-series data. The results show that FDI, GDP, K, L and OPEN don`t reject the original hypothesis at the significance level of 5% and indicate that they have unit roots and are non-stationary time-series data. Then, the first-order difference is made for these variables and the unit root test is carried out for the variables after the difference. The results show that they reject the original hypothesis when the significance level is 5% and indicate that they have no unit roots. Therefore, the variables after the first-order difference are stationary time-series data.

3.3 The Granger Causality Test

The granger causality test is not to test the real economic causality, but to analyze the statistical causality between the economic variables. According to the basic principle of the granger causality test, the first-order difference of the original time-series data are needed to obtain a stable time series and the lag models are established respectively. The lag order of all variables is 4. At the significance level of 5%, FDI and K are the granger causes of GDP, which shows that foreign direct investment and the fixed asset investment can promote the economic growth of Hainan Province, while L and OPEN are not the granger causes of GDP. Therefore, the number of employees and the degree of opening may have little impact on the economic growth of Hainan Province. These conclusions will be verified again in the short-term error correction model.

3.4 The Cointegration Test

This paper studies the impact of multivariable on the economic growth. Because the time-series data of all variables are of the same order according to the ADF unit root test, Johansen cointegration test can be used. According to the information criteria AIC, SC and HQ, these result show that the optimal lag order of VAR model is 3, and the optimal lag order of Johansen cointegration test is 2.

3.5 The Long-Term Equilibrium Model and Short-Term Error Correction model

According to the cointegration test, there are three cointegration relationships at the significance level of 5%. It indicates that there is a long-term cointegration relationship between these

variables. The long-term equilibrium model can be constructed and the regression results are shown in the Table 1(1).

While obtaining the long-term equilibrium model, the cointegration test also provides the necessary conditions for establishing a short-term error correction model. We can obtain the short-term unbalanced model with ECM(-1) and the regression results are shown in the Table 1(2).

Table 1 The regression results of the long-term equilibrium model and short-term error correction model

variables	(1)	(2)
	LNMGDP	LNMGDP
LNMGDP(-1)	0.857309***	-0.062624
LNFDI	-0.046178	0.040457***
LNK	0.155007*	0.274718***
LNL	-0.357326	-0.330041
LNOPEN	-0.002241	0.004113
ECM(-1)		-0.760926***

According to the Table 1(1), under the significance level of 5%, only the coefficient of LNMGDP(-1) is significant. It shows that there is a strong positive correlation between the GDP lagging one year and the current GDP. In other words, the lagged foreign direct investment, the lagged human capital investment and the lagged openness have great impacts on the current GDP, while these variables in the current period have little impact on the current GDP.

According to the Table 1(2), under other conditions unchanged, when FDI increases by 1% compared with the previous year, GDP will increase by 0.040457%. And these two variables reject the original hypothesis at the significance level of 1%, indicating that there is a strong positive correlation between the economic growth and foreign direct investment in Hainan Province. Increasing the actual use of foreign direct investment in the short term will positively promote the economic growth of Hainan Province.

According to the short-term error correction model, the impact of the error term of the previous period on the current GDP fluctuation is significant and the significance level is 1%. It indicates that there is a strong negative correlation between the two variables. The absolute value of the coefficient of ECM(-1) is 0.7609026. It can be seen that the error term of the previous period has a large adjustment range on the current GDP fluctuation. It shows that the short-term non-equilibrium model deviates greatly from the long-term equilibrium model. Compared with the long-term equilibrium model, the short-term foreign direct investment and the whole social capital investment have a greater impact on the economic growth.

4 CONCLUSION

Firstly, Hainan should actively introduce the foreign capital and optimize the structure of foreign capital. From the above empirical conclusions, they can be seen that in the short-term error correction model, foreign direct investment plays a positive role in the economic growth of Hainan Province. Therefore, the relevant departments of Hainan Province should pay attention to the introduction of foreign capital in the short term, so as to ensure the quantity of foreign capital and promote the economic growth. Although foreign direct investment in the current

period is not significant in the long-term equilibrium model, it reflects the "accumulation" role of FDI in the model. That is, FDI in the previous period will promote the economic growth in the current period, so the introduction of FDI should be increased. With the acceleration of the process of exploring the construction of Hainan Free Trade Zone, the Hainan provincial government should not only focus on the quantity, but also focus on the quality.

Secondly, Hainan should introduce and cultivate high-quality talents and increase the degree of opening to the outside world. According to the "accumulation" effect of the human capital and the degree of openness on economic growth in the long-term equilibrium model, in terms of the human capital, Hainan Province should introduce more high-quality talents, improve the mechanism of introducing talents, broaden the channels of introducing the talents and strengthen the local talent training. Hainan Province also should retain the talents, make good use of the talents and contribute to the construction of Hainan's Free Trade Zone. In terms of openness, Hainan should take advantage of the opportunity of building a free trade zone to further increase the pace of openness to the outside world and strengthen the multi-level and multi field cooperation with the countries along the "Maritime Silk Road", especially with Southeast Asian countries.

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