

# Analysis of the Impact of FDI on Economic Growth Based on Cobb-Douglas Production Function

Youzhe Wang<sup>1</sup>, Jingtao Zhang<sup>2</sup>, Yue Teng<sup>3</sup>, Huaiyuan Zhang<sup>2,\*</sup>

<sup>1</sup>School of Business, Guilin University of Electronic Technology, Guilin, China

<sup>2</sup>School of Law, Zhongnan University of Economics and Law, Wuhan, China

<sup>3</sup>School of Accounting, Zhongnan University of Economics and Law, Wuhan, China

\*Corresponding author

**Abstract:** Since the reform and opening up, the scale of foreign direct investment (FDI) in China has been expanding, and along with the expansion of FDI, China's economic growth has become more and more favorable. In order to explore the effect of FDI on China's economic growth, this paper uses the time series data from 2000-2021, through ADF smoothness test, co-integration test, and also based on Cobb-Douglas production function to establish a regression model to analyze the effect of economic growth brought by FDI, and add other factors affecting economic growth, comprehensive analysis of foreign direct investment on economic growth. Then, we analyze the causal relationship between economic growth and FDI through Granger causality test. Finally, based on the empirical results, suggestions are given on how to make FDI better promote economic growth.

**Keywords:** Foreign Capital Utilization; Economic Growth; Cobb Douglas Production Function; Granger Causality Test

## 1. Introduction

Along with the implementation of the basic national policy of reform and opening up, the importance of foreign investment has been gradually paid attention to and the development of foreign investment policy system has been gradually improved. The use of foreign capital refers to a specific way to obtain foreign funds to develop the national economy, make up for the lack of domestic construction funds, improve productivity, promote the development of the national economy, and promote employment, mainly in the form of foreign direct investment (FDI) and absorption of foreign loans. FDI is a kind of investment in which investors of one country use their capital for production or operation in other countries and hold certain control over the operation and obtain profits and scarce production factors, which is one of the main forms of internationalization of contemporary capital and the most important means of economic and social growth in developing countries. It is one of the main forms of contemporary capital internationalization and one of the most important drivers of economic and social growth in developing countries.

In 2019, China's actual utilization of FDI foreign investment amounted to 138.135 billion U.S. dollars, and 40,888 new foreign-invested enterprises were established. It is obvious that FDI accounts for an increasing proportion of China's foreign trade, while China's gross domestic product (GDP) is also increasing year by year, so what exactly is the impact of FDI on China's economic growth? Is the form of foreign investment introduction directly related to China's GDP growth after years of development? In this paper, we do empirical analysis by time series data from 2000-2021 with FDI as the main focus, discuss the growth effect it brings to China's economy, study the relationship between FDI and economic growth, and then explore the factors affecting economic growth, and obtain the relationship between inter-provincial GDP and inter-provincial FDI by least squares regression using inter-provincial cross-sectional data in 2019 further illustrates the role of FDI in promoting economic growth.

## 2. Literature Review

Over the years, there have been many domestic and international studies on the impact of FDI on economic growth. Most scholars have concluded that FDI and economic growth are positively correlated, i.e., FDI promotes economic growth. Through theoretical analysis, Shen Kunrong et al.

(1999) obtained the global trend of FDI and the structure and characteristics of FDI absorption in China, and analyzed the source, mode, enterprise size, industrial distribution of FDI and market orientation of FDI, and finally used relevant data during 1983-1997 to conduct econometric tests using a multivariate lagged distribution model, which showed that each additional US\$100 million of FDI would bring a supply effect of RMB 7.219 billion and a GDP growth of RMB 7.88 billion. The authors also used inter-provincial cross-sectional data to build a linear model using data from 29 provinces, cities and autonomous regions in China for 1996 as a sample analysis, and concluded that each USD 10,000,000 of FDI would bring RMB 499,000,000 of GDP, i.e., the authors conducted empirical tests in four aspects: time series of growth effects, regional growth effects, trade growth effects, and enhancement of comprehensive factor productivity. The positive relationship between foreign direct investment and GDP, regional GDP, and integrated factor productivity of trade was obtained<sup>[1]</sup>. The causal relationship between FDI and economic growth is derived using Granger causality test analysis, and the results show that the growth rate of FDI constitutes a major factor in economic growth rate in Granger sense and vice versa. XLi, XLiu (2004) duo used data from 84 countries from 1970-1999 to determine that there is a strong intrinsic relationship, arguing that FDI not only promotes economic growth directly by itself, but also indirectly through other interaction conditions<sup>[2]</sup>. Penhfei Liu (2020) et al. examined the impact of FDI on China's economic growth based on vector autoregressive model, VAR model, using time series data over the period 1981-2018 and concluded that FDI has a China's economic growth and conclude that there are multiple other factors driving China's economic growth in a positive and sustained manner. Accordingly, policy implications on how to sustain and promote the existing positive impact of FDI inflows on China's economy are proposed<sup>[3]</sup>. Based on the time series data from 2000-2015, Song Yingying (2017) did an empirical analysis of the economic growth effect of FDI using the Cobb Douglas production function model and showed that there is a long-term stable relationship between FDI inflows and GDP growth, and based on the findings also proposed countermeasures on how to better use FDI to promote economic development<sup>[4]</sup>. Liu Wenyong et al. (2006) also construct a model based on the Cobb Douglas production function and argue the impact of FDI on China's economic development, and draw analytical conclusions from several aspects such as capital-economic growth effect, employment-economic growth effect, employment effect, export effect, and technological progress effect, and argue that FDI has both contributed to China's economic growth and posed certain threats, thus giving policy recommendations<sup>[5]</sup>. Based on co-integration test, unit root test, Granger causality test impulse response analysis, Liu Liangwei et al. (2015) made an empirical analysis of the relationship between FDI, domestic investment and GDP based on the time series data from 1978-2013, and concluded that the trend of the impact of FDI on China's economic growth is upward and then downward, with an inverse trend, and the impact of domestic investment on China's economic growth is first up and then flat, and gives corresponding policy recommendations based on the findings. This paper explores the relationship between FDI and economic growth through empirical analysis based on the time series data from 2000-2021, and gives corresponding policy advice based on the findings, and puts forward suggested measures on how to better utilize foreign investment and use FDI to promote the development of China's national economy<sup>[6]</sup>.

### 3. History of FDI Development and Current Situation of Actual Utilization of FDI

The influx of foreign capital has promoted job market expansion, technological innovation and healthy competition in the market economy. The entry of foreign capital has enabled the spread of advanced foreign technologies in Chinese provinces, which in turn has led to technology localization and promoted industrial restructuring and further upgrading of the value chain in Chinese provinces. Looking at the history of foreign investment utilization in China since the reform and opening up, the development of FDI can be summarized into four stages.

The first stage: 1978-1987, when China's reform and opening-up policy led to the emergence of FDI, was the initial stage of utilizing foreign investment and developing FDI. 1979, China passed the first law on foreign-invested enterprises, the Law of the People's Republic of China on Chinese-Foreign Equity Joint Ventures, and afterwards provided a series of By 1987, the cumulative actual utilization of foreign direct investment in China reached 10.618 billion U.S. dollars, and the average annual utilization of foreign direct investment reached about 1.062 billion U.S. dollars, during this period, China chose the foreign borrowing method for more utilization of foreign investment, and the proportion of foreign direct investment to the actual utilization of foreign investment was less than 28%, which This is because during this period, China had just started to open up to the outside world, the investment environment was relatively insufficient, the experience of using foreign investment was weak, and foreign investors had many concerns about investing in China.

The second phase: 1988-1995, this phase is the slow growth phase of China's utilization of foreign investment and continuous development of FDI. During this period, China introduced many regulations and measures to guide and encourage foreign investment, such as the Provisions on Encouraging Foreign Investment, etc., and a new wave of opening up to the outside world was set off by the Southern Talk, which led to new progress in the utilization of foreign investment. The cumulative effect of these events led to a significant improvement in the foreign investment environment and a change in the structure of foreign investment, which in turn led to a significant increase in the scale of capital attraction. The actual amount of FDI utilized in China during this period reached US\$124.25 billion, with an average annual FDI utilization of US\$15.531 billion, a more than tenfold increase compared to the average annual FDI utilization in the previous period, and China has been the largest FDI inflowing country among developing countries since 1993.

The third stage: 1996-2000, is the stage of high growth of China's adjustment of the policy of utilizing foreign investment and increasing FDI. In this stage, instead of blindly expanding the scale of FDI, China attaches importance to both quantity and quality, and the amount of FDI further expands, the cumulative actual utilization of FDI during this period reached USD 213.48 billion, and the average annual utilization of FDI The total amount of actual FDI utilized during the period reached USD 2134.8 billion, and the average annual amount of FDI utilized further increased to USD 42.696 billion.

The fourth stage: 2001 to present, this stage is the stage of adjusting and developing the policy of utilizing foreign capital, promoting the integration of China's investment market with the international one, and adjusting and developing FDI. Since China joined the WTO in 2001, China has gradually improved its market access policy, broadened investment areas, strengthened investment protection, adjusted relevant industrial policies and regional policies, and reduced government intervention. As shown in Table 1 below, from 2000 to 2021, the amount of foreign direct investment utilized by China has changed. From the trend line, it can also be seen that the amount of foreign direct investment actually utilized by China is increasing year by year. From 2000 to 2021, the actual use of foreign direct investment increased year by year. Through collecting the changes of GDP during this period, we also found that the data increased year by year. Therefore, the following empirical analysis is conducted to explore the impact of foreign direct investment on economic growth.

In addition, this paper additionally collates the FDI data of the middle, west and east regions in 2021, as well as the data of the amount of FDI received by the primary, secondary and tertiary industries in China in 2021, so as to facilitate the later paper to roughly judge the imbalance of regional development and industrial development of FDI in China. According to the economic region division of China's relevant documents, China can be divided into three regions: central, east and west. Here, the author does not count the data of special administrative regions because the data of special administrative regions are more difficult to obtain. The central region includes: Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, Hunan; the eastern region includes: Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Hainan; the western region includes: Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Shaanxi, Tibet, Gansu, Qinghai, Ningxia, Xinjiang; according to China's national economy industry division The primary industry includes agriculture, forestry, animal husbandry and fishery; the secondary industry includes: mining, manufacturing, electricity, heat, gas and water production and supply, construction; the tertiary industry is other than the primary and secondary industries.

The results are shown in Table 1 below.

*Table 1: Regional Distribution of Foreign Direct Investment Enterprises and Actual Use of Foreign Capital*

Number of FDI enterprises and regional distribution of actual FDI use in 2021		
Region	Number of enterprises (home)	Actual amount of foreign investment used (USD billion)
Eastern Region	517380	70320
Central Region	60021	9338
Western Region	49822	8740
Total	627223	88398

From the above table 1, we can see that the amount of foreign investment in China is more distributed in the eastern region, and the difference between the central and western regions and the eastern region is large. Forming a relatively large regional distribution imbalance, which, in the author's opinion, is both a major problem and a major opportunity. The western region belongs to the region to be developed, there are many projects to be developed, which requires the government and investors,

etc. To promote the projects and resources in the western region, taking into account the FDI under the premise of quality, expand the scale of FDI, implement policies with regional tendency, gradually balance the imbalance of FDI in central, eastern and western regions, and gradually realize the balance of regional FDI.

Table 2: FDI absorption statistics of primary, secondary and tertiary industries in 2021

	Actual amount of foreign investment used (USD billion)
Primary Industry	5.6
Secondary Industry	433.1
Tertiary Industry	952.7
Total	1391.4

From the above table 2, we can see that most of the foreign investment in China is concentrated in the secondary and tertiary industries, and the amount absorbed by the secondary industry is much higher than that of the secondary industry, which is more than twice the amount absorbed by the secondary industry. This indicates that there is still an industrial imbalance in China's FDI financing.

#### 4. Research Design and Theoretical Model

##### 4.1 Model design

This paper uses the Cobb Douglas production function -  $Y = AK^\alpha L^\beta$  as the basis for the model. Where Y represents total output, which is measured by gross domestic product (GDP) in this paper; A represents the level of technology, which in this paper represents total factor productivity; K is total capital, which in this paper is divided into actual capital acquired with FDI and other capital, where KFI represents actual capital acquired with FDI and KDI represents other capital; L is total labor.  $\alpha$  and  $\beta$  are the elasticity coefficients of capital and labor. The Cobb Douglas production function obtained after combining the two types of capital is:  $Y = AKFI^{\alpha_1} KDI^{\alpha_2} L^\beta$  The following equation is obtained after logarithizing it.

$$\ln y = A + \alpha_1 \ln k_{FI} + \alpha_2 \ln k_{DI} + \beta \ln L \quad (1)$$

Since Y is measured by GDP, LNY is directly expressed by LNGDP, and after considering other influencing factors on economic growth, two variables, IE, the total amount of imports and exports, and the level of marketization, are proposed to be considered comprehensively. Therefore, the final model constructed in this paper is.

$$\ln GDP = A + \alpha_1 \ln k_{FI} + \alpha_2 \ln k_{DI} + \beta \ln L + \gamma \ln IE + \delta \ln M + \varepsilon \quad (2)$$

$\alpha_1$ ,  $\alpha_2$ ,  $\beta$ ,  $\gamma$ , and  $\delta$  denote the elasticity coefficients of KFI, KDI, L, IE, and M, respectively, and  $\varepsilon$  denotes the follower error term.

##### 4.2 Data sources and processing

In this paper, we use GDP to measure Y, and use 1999 data as the base period to obtain real GDP. KFI denotes the amount of actual utilization of foreign direct investment, and KDI denotes other capital, and the specific value is obtained by subtracting the amount of actual utilization of foreign direct investment from the total social fixed asset investment in that year. L is the amount of labor input, and the specific value is expressed in terms of total employment per year in 10,000 people. IE is the total import and export, and M represents the level of marketization, and the specific value is obtained by the number of private and individual enterprises employed/total number of employed. All the above data, except M and L, are unified in billions of yuan through the current year's exchange rate, and all data are obtained from the China Statistical Yearbook. Because the values of GDP, L, KDI, KFI, IE are large, in order to reduce the absolute value of the data, to facilitate the calculation and do econometric analysis, so the data of these variables are logarithmic, to get LNGDP, LNL, LNKDI, LNKFI, LNIE.

The descriptive statistics of the variables of interest are presented, and the results are shown in the following Table 3 Descriptive statistics of variables, The results are shown below.

For the empirical test of cross-sectional data in 2021, here the data are all obtained from the China Statistical Yearbook, through the introduction of real foreign direct investment in 31 provincial or

municipal units as explanatory variables, and the real GDP of inter-provincial or municipal units as explanatory variables, all in billion yuan.

Table 3: Descriptive statistics of variables

	LNGDP	LNKDI	LNKFI	LNIE	LNLM	LNL
Mean	12.3837	12.13779	8.682709	11.94292	-1.542403	11.23643
Median	12.448	12.40202	8.745387	12.15746	-1.780073	11.23805
Maximum	13.13793	13.36412	9.097421	12.66232	-0.647983	11.25984
Minimum	11.49533	10.29372	8.113028	10.5783	-2.279846	11.1856
Std. Dev.	0.532694	1.075556	0.310452	0.66839	0.524347	0.021354
Skewness	-0.226035	-0.408597	-0.439132	-0.90771	0.297681	-0.83391
Kurtosis	1.736665	1.730196	2.028925	2.521125	1.796314	2.913251
Jarque-Bera	1.500319	1.900172	1.428614	2.937561	1.502764	2.324293
Probability	0.472291	0.386708	0.489531	0.230206	0.471714	0.312814
Sum	247.674	242.7558	173.6542	238.8585	-30.84806	224.7287
Sum Sq. Dev.	5.391486	21.97958	1.831233	8.488165	5.223854	0.008664

### 5. Empirical Analysis

Since this paper is an empirical analysis based on time series data from 2000-2021, the history and current status of the time series data are required to be representative and continuous, so it is necessary to do a smoothness test on the variable series to prove that the fitted curve we derived from the time series data is in line with the future development trend. In this paper, through Eviews11 software, the graphical method is first used to in this paper, we use Eviews11 software to first analyze each time series of variables by graphical method, and then choose ADF unit root to test the smoothness of variables. The results of the graphical analysis and smoothness test done for the six variables in this paper are shown in Figure 1 below.

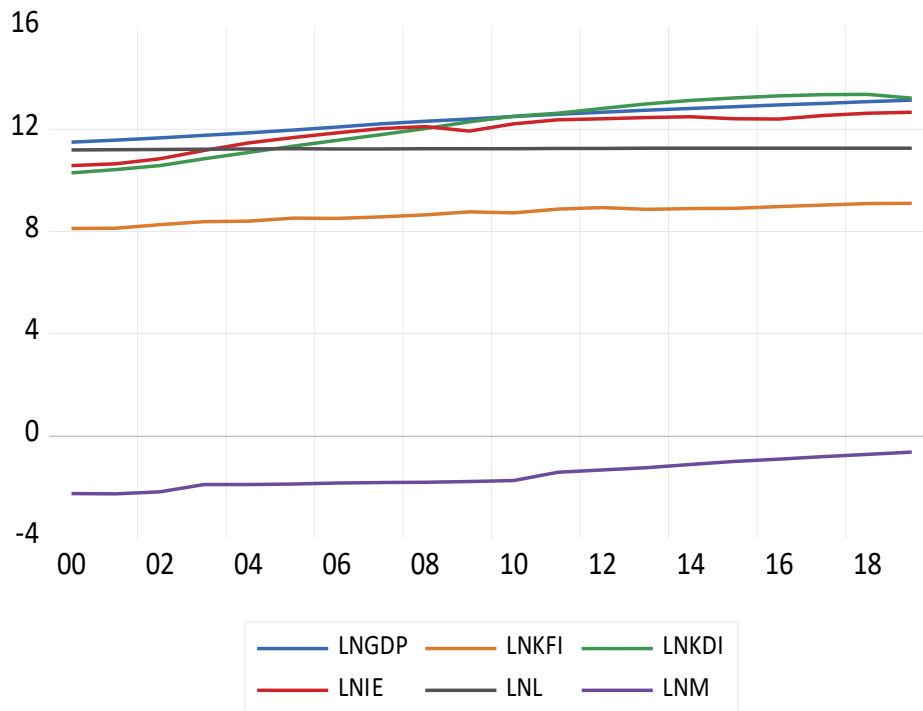


Figure 1: Graphical test of smoothness

As shown in Figure 1, the overall trend direction of LNGDP, LNL, LNKDI, LNKF, LNIE, and LNM is consistent and strongly correlated between 2000 and 2021, and from this graphical representation, we can initially determine that there is a correlation between China's economic growth (measured by GDP) and foreign direct investment, other investment, marketization level, total import and export, and labor volume. Next is the result of ADF smoothness test, as Table 4 Results of smoothness test of variables Shown.

Table 4: Results of smoothness test of variables

Variable Name	Test form (C,T,K)	ADF statistics	Threshold value			P-value	Stability
			1%	5%	10%		
LNGDP	(C,T,4)	1.001872	-4.532598	-3.673616	-3.277364	0.9996	Unstable
LNGDP'	(C,T,4)	-3.540423**	-3.831511	-3.02997	-2.655194	0.0182	Smooth and stable
LNK <sub>FI</sub>	(C,T,4)	-2.123994	-4.532598	-3.673616	-3.277364	0.5010	Unstable
LNK <sub>FI</sub> '	(C,T,4)	-6.126467***	-4.571559	-3.690814	-3.286909	0.0006	Smooth and stable
LNL	(C,T,4)	-2.816726	-4.532598	-3.673616	-3.277364	0.2086	Unstable
LNL'	(C,T,4)	-5.437001***	-4.80008	-3.791172	-3.342253	0.0037	Smooth and stable
LNK <sub>DI</sub>	(C,T,4)	3.761685	-4.616209	-3.710482	-3.297799	1.0000	Unstable
LNK <sub>DI</sub> '	(C,0,0)	-3.310037**	-3.831511	-3.02997	-2.655194	0.0289	Smooth and stable
LNIE	(C,T,4)	-1.26757	-4.532598	-3.673616	-3.277364	0.8647	Unstable
LNIE'	(C,T,4)	-3.935337**	-4.571559	-3.690814	-3.286909	0.0323	Smooth and stable
LNM	(C,T,4)	-1.832087	-4.532598	-3.673616	-3.277364	0.6488	Unstable
LNM'	(C,T,4)	-4.201089**	-4.571559	-3.690814	-3.286909	0.0199	Smooth and stable

As shown in the table above, (C, T, K) denotes the constant term, trend term, and lag period, respectively. \*\*\* denotes the rejection of the original hypothesis that the time series is a non-stationary series at 1% significant level, \*\* denotes the rejection of the original hypothesis that the time series is a non-stationary series at 5% significant level, and \* denotes the rejection of the original hypothesis that the time series is a non-stationary series at 10% significant level. The ADF smoothness test is first done for the first LNGDP indicator, and the ADF statistic can be derived as significantly higher than the critical values at 1%, 5%, and 10% significant levels with a constant term and trend term and a lag period of 4 periods, so the time series LNGDP is considered as a non-stationary time series at this moment. The ADF statistic obtained by doing the first order difference treatment on the time series variables and performing the test shows that the series is stable at the 5% significant level and is denoted by LNGDP'. ADF smoothness test is done for LNKFI , LNL, LNIE, and LNM, and the ADF statistic can be derived with a constant term and trend term and a lag period of 4 periods which is significantly higher than the critical values at 1%, 5%, and 10% significant levels, so the time series LNKFI , LNL, LNIE, and LNM are considered as non-stationary time series at this moment. They are treated with first-order differences to obtain the LNKFI ' , LNL', LNIE', and LNM' time series, and the ADF test is performed, and the test statistic shows that in the presence of a constant term and a trend term with a lag of 4 periods, LNK FI', LNL' are smooth at 1% significant level, and LNIE', LNM' are smooth at 5% significant level. In particular, the time series LNKDI , with a constant term and trend term, and a lag period of 4 periods, yields an ADF statistic significantly higher than the critical values at the 1%, 5%, and 10% significant levels, so the series is considered non-stationary, and the ADF statistic in the case with a constant term, no trend term, and a lag period of 0 is -3.310037, which is stationary at the 5% significant level. The above tests found that the six time series used in this paper are all smooth time series and the regression will not have pseudo-regression phenomenon.

Table 5: Correlation analysis results

	LNGDP	LNK <sub>FI</sub>	LNK <sub>DI</sub>	LNIE	LNL	LNM
LNGDP	1.000000	0.986211	0.991977	0.953693	0.950590	0.958668
LNK <sub>FI</sub>	0.986211	1.000000	0.982765	0.965668	0.963395	0.937862
LNK <sub>DI</sub>	0.991977	0.982765	1.000000	0.964721	0.958674	0.929747
LNIE	0.953693	0.965668	0.964721	1.000000	0.958492	0.870978
LNL	0.950590	0.963395	0.958674	0.958492	1.000000	0.911597
LNM	0.958668	0.937862	0.929747	0.870978	0.911597	1.000000

From the Table 5 The correlation analysis shows that LNGDP is correlated with the other five items, and the development trend has strong consistency, and the correlation coefficients are all above 0.95, indicating that LNGDP is strongly correlated with the other five items, which means that China's economic growth is correlated with foreign direct investment (FDI), other investment, import and export situation, marketization situation, and labor volume.

From the above ADF smoothness test, it can be seen that the six time series are smooth after differencing, and the next step is to do cointegration test on LNGDP and LNKFI to prove that there is a long-term equilibrium relationship between the variables. In this paper, the EG cointegration test is used to complete this step, and the cointegration regression analysis is performed first, and the cointegration regression results are as follows (see table 6).

Table 6: Co-integration regression results

Variables	Coefficient value	Standard error	T-statistic	P-value
C	-2.309202	0.581485	-3.971216	0.0009
LNKFI	1.692203	0.066930	25.28325	0.0000

$$\text{That is: } \text{LNGDP} = -2.309202 + 1.692203 \text{LNKFI} \quad (3)$$

From the cointegration regression, the adjusted  $R^2 = 0.9726$ , which is close to 1, indicating that the overall fit of the model is good. Next, the residual series of this regression is then subjected to the ADF smoothness test. The ADF value of the residual series is  $-3.074$ , which is less than the critical value of  $-2.6923$  at the 1% significance level, and therefore the residual series is a smooth time series, which means that there is a long-term stable proportional relationship between GDP and KFI, that is, foreign direct investment (FDI) is a major factor that can promote China's economic growth a major factor.

The next step is to do a regression analysis based on the model to explain in detail the effect of FDI on China's economic growth. The least squares estimation of it yields the following results in Table 7.

Table 7: Regression results of FDI on China's economic growth

Parameters	Estimated value	Standard error	T-statistic	P-value
A	49.89373	19.75475	2.525658	0.0242
$\alpha_1$	0.334197	0.197393	1.69305	0.1126
$\alpha_2$	0.306585	0.050362	6.087569	0
$\beta$	-3.959526	1.807097	-2.191098	0.0459
$\gamma$	0.065819	0.068575	0.959811	0.3534
$\hat{I}$	0.277578	0.058367	4.755719	0.0003

As can be seen above, the model regression  $R^2$  is 0.995956, the overall fit of the model is high, F-statistic value = 689.6658, Prob (F-statistic) = 0, which indicates that the probability of error in the judgment of the significant influence of the independent variables on the dependent variable overall is 0.0000, which means that the five independent variables have an impact on the economic growth of China. Specifically, the coefficient of LNKFI is 0.3341, which means that a 1% increase in FDI (foreign direct investment) will drive GDP growth of 0.3341% when other factors do not change, and the coefficient of LNKDI is 0.3065, which means that a 1% increase in other investment will drive GDP growth of 0.3065% when other factors do not change, by The coefficient of LNL is  $-3.9595$ , indicating that a 1% increase in labor will lead to a 3.9595% decrease in GDP when other factors do not change, which is obviously different from the traditional economic growth theory that labor is a factor of production and has a positive effect on economic growth. This is obviously contrary to the traditional economic growth theory that labor is a factor of production with positive effect on economic growth and can promote economic growth. The author believes that this may be related to the effective boundary of labor employment rate, that is, the author believes that there is an effective threshold value in the labor employment market, when this value is exceeded there may be a certain negative effect on economic growth, which will slow down the economic growth rate, and there may also be a part of the reason from the structural contradiction factors of labor force, such as the imbalance and mismatch between supply and demand in the labor market, and the imbalance between the quality skills of workers and the skills of job demand. The mismatch between the quality skills and job demand skills may lead to the fact that even if the number of employed people increases, it does not have a positive effect on economic growth. The key to a positive impact on the economy lies in the application of human capital, more solid and efficient human capital, people with rich knowledge and flexible use of skills can often trigger innovation, promote technological innovation and technological progress, which can lead to the new economic growth theory mentioned that The coefficient of LNIE is 0.0658, i.e., when other factors do not change, a 1% increase in total imports and exports will lead to a 0.0658% increase in GDP, i.e., China's economic growth and total imports and exports show a positive influence relationship. Similarly the coefficient of LNM is 0.2775, which means that a 1% increase in the level of marketization will lead to a 0.2775% increase in GDP, which also has a positive influence effect on economic growth.

Finally, Granger causality tests were conducted for LNGDP and LNKFI to test whether there is causality in the long-term stable relationship between the variables. Based on the AIC and SC minimization criterion, the time series data with a lag of 1 period were selected for the test and the

results at a significance level of 10% are shown in Table 8 below.

Table 8: Granger causality test results for the variables

Original hypothesis	Lag Period	F-statistic	Probability	Conclusion
LNGDP is not the Granger reason for LNK <sub>FI</sub>	1	5.93753	0.0269	Rejection
LNK <sub>FI</sub> is not the Granger reason for LNGDP	1	3.95075	0.0642	Rejection

The results of Granger causality test show that there is a two-way Granger causality between LNGDP and LNKFI with a lag of 1 period, which means that FDI is a Granger cause affecting GDP and GDP is a Granger cause affecting FDI.

FDI affects China's GDP is empirically tested by the majority of scholars. Firstly, FDI enters the Chinese market, bringing capital capital, expanding the investment market, enriching the variety of investors, and driving economic growth from the capital side. Secondly, the entry of FDI brings more technological innovation, and with the increase of FDI, more and more foreign investors turn their attention to the Chinese market. Introducing new technologies from abroad with the increase of FDI, more and more foreign investors will turn their attention to the Chinese market and introduce new technologies from abroad to enter the Chinese market and integrate with the technological structure of China's provinces and regions, with technological progress and technological innovation. According to the new economic growth theory, it can naturally drive the growth of GDP. Lastly, based on the employment effect, the increase of FDI makes the number of new foreign-invested enterprises in China also increase. According to the information of the Ministry of Commerce, by the end of 2019, the cumulative number of foreign-invested enterprises established in China exceeded 1 million, reaching 1001377, which in turn also provides a lot of jobs for China's population employment. GDP is the Granger cause of FDI, in layman's terms, can be seen as GDP growth, national Economic growth, investment environment is better, the country's development posture is good, it can attract more foreign investors to enter the Chinese market, so economic growth also has a positive effect effect on FDI.

In addition to this, this paper also uses interprovincial cross-sectional data for 2021 to establish a linear regression model with the amount of foreign direct investment in different provinces as the explanatory variable and the GDP of different provinces as the explanatory variable to illustrate the direct relationship between interprovincial GDP and interprovincial FDI, and the empirical evidence finds that each unit increase in interprovincial FDI leads to 0.801324 unit increase in interprovincial GDP, and the variable is significant,  $R^2 = 0.68659$ , which is a good fit for cross-sectional data, indicating that an increase in interprovincial FDI does lead to an increase in interprovincial economic growth, i.e., an increase in GDP.

## 6. Conclusions and Recommendations

### 6.1 Conclusion

This paper finds that the time series used in this paper is a smooth series through ADF smoothness test, and after conducting cointegration analysis, it is found that there is a relatively stable positive relationship between GDP and FDI in the long run. According to the regression analysis based on the model established by the Cobb Douglas production function, it can be concluded that FDI can indeed promote China's economic growth, and a 1% increase in FDI (foreign direct investment) will drive GDP growth by 0.3341% when other factors do not change. In addition, this paper also conducted Granger causality test, through which it was found that there is a two-way Granger causality cause between GDP and FDI, that is, the change of GDP will affect FDI, and the change of FDI will also affect GDP. In addition to discussing the effect of FDI on economic growth, this paper also included other variables that may have an impact on economic growth in the model based on many scholars' tests, including Other investment, specifically other investment other than foreign investment, total import and export, labor volume, and marketization level, and the effect of these factors on economic growth is explained by model regression in turn, that is, a 1% increase in FDI (foreign direct investment) will drive GDP growth of 0.3341% when no change in other factors occurs, and a 1% increase in LNKDI ( Other investment) increase by 1% will drive GDP growth by 0.3065%, when other factors do not change, LNL (labor volume) increase by 1% will drive GDP decrease by 3.9595%, when other factors do not change, LNIE (total import and export) increase by 1% will drive GDP



increase by 0.0658%, and LNM (level of marketization) increase by 1% will drive GDP increase by 0.2775%. Other investment, total import and export, and marketization level all have positive promotion effect on economic growth, while there is a negative effect effect of labor volume and economic growth. The author explains this place by analyzing the structural contradictory factors of labor market and the effective boundary of employment volume, that is, I think this result is influenced by the effective boundary of labor employment rate and the structural contradictory factors of labor force.

## **6.2 Related Recommendations**

Foreign investors have invested in China in the form of cash, in-kind, intangible assets equity, etc. to open wholly foreign-owned enterprises, cooperative enterprises, etc., which is largely contributing to the growth of China's economy. Since China's accession to the WTO in 2001, China's foreign trade has increased significantly, and its ties with the international community have begun to strengthen gradually, with foreign investment increasing year by year. The SCO, which was established in 2001, is also a way to strengthen foreign exchange, promote mutual economic growth and win-win cooperation, and we should seize these opportunities to introduce more high-quality foreign investment, develop win-win cooperation with neighboring countries and partner countries, and create a better economic form. As of 2020, 138 countries and 31 international organizations have signed the agreement, and the Belt and Road agreement has brought about an increase in direct investment between the economies along the Belt and Road and China, and an increase in mutual dependence. In 2019, China's actual utilization of FDI reached US\$138.135 billion, with 40,888 newly established FIEs, of which the amount of FDI absorbed from countries along the Belt and Road reached US\$813.224 million. In short, China should seize the opportunity of the Belt and Road to increase more FDI, open up the domestic investment market, develop technology and economy. The following are some suggestions for foreign direct investment.

### **6.2.1 Focus on the quality of FDI and improve the environment for attracting investment.**

China's foreign direct investment has increased with the continuous improvement of China's international economic status and the continuous improvement of China's investment environment. While it is good to expand the scale of foreign direct investment, it is also necessary to consider the quality, that is to say, while focusing on the scale of FDI, we should pay attention to its quality, not to blindly expand it, but to fully utilize foreign capital from the capital investment structure, make use of FDI and improve the level of opening up to the outside world; consider Consider the capital structure, the structure of capital sources and the capital availability of input projects, etc., fully improve the existing environment for attracting foreign investment, and strive to maximize the utility of foreign investment.

### **6.2.2 Make full use of the open policy and implement a regional tilt policy.**

Since the reform and opening up of China in 1978, we have been insisting on opening up to the outside world, actively contacting and cooperating with other countries, and further developing foreign direct investment, but we still need to consider the regional investment problem of FDI, because the eastern region of China is better developed than the western region, as shown in the table above, the main investment areas of FDI in the central, eastern and western regions of China are also in the eastern region. In the next development of the central and eastern regions should continue to develop well and a certain scale of FDI introduction. The central and western regions to strengthen the regional tilt efforts to introduce more FDI into the western and central regions may be able to more greatly promote regional economic growth, and then overall more greatly promote national economic growth. So this requires the government to implement regional tilt policy to introduce more foreign investment into the central and western. It is necessary for the government to implement regional tilted policies to bring more foreign investment into the central and western regions, promote the development of the central and western regions. Secondly, we should promote contacts with border countries based on cooperation agreements such as "One Belt, One Road", actively cooperate, attract investment and seek win-win situation to promote China's economic development and the world's economic development.

### **6.2.3 Focus on legal, government and market management, and actively guide FDI investment.**

For the introduction of foreign investment, the introduction of foreign direct investment, more regulations are needed to protect the legitimate rights and interests of foreign investors, and the Foreign Investment Law of the People's Republic of China, adopted at the second session of the 13th National People's Congress in 2019, also proposes that China should take practical measures to encourage

foreign investment, regulate the management of foreign investment, optimize the foreign investment environment, make China's business environment more fair and transparent, and promote Building an open world economy. In addition to the provisions of the law, the government also needs to review the situation based on market players, introduce foreign investment into the market, manage the foreign direct investment market, monitor unlawful foreign investment, improve the efficiency of government investment, strengthen market supervision, promote the internationalization of investment, and improve the utilization rate of foreign investment. Finally, the ultimate cause of economic growth comes from technological progress, so China should also actively guide the investment of foreign direct investment, directing it to happy technology industries and potential industries, encouraging foreign investment into high-tech industries, promoting the integration of domestic and foreign industries, technological innovation, using foreign high technology to achieve innovation and localization of technology, so as to develop the economy and maintain the inflow of foreign direct investment to China's economy. The positive positive impact of FDI inflows on China's economy. Another comparison of the three major industries in terms of the amount of FDI introduced in 2019 from the previous article shows that there is a certain industry imbalance in FDI integration, and the investment in the tertiary industry is significantly larger than that in the primary and secondary industries. The government should implement policy guidance with guidance, focus on the investment orientation of FDI, and gradually balance the difference in the financing amount of the primary, secondary and tertiary industries.

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