Analysis on the Influencing Factors of the Total Amount of Foreign Capital Actually Utilized in Shanghai

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Abstract: The active introduction of foreign capital helps to make up for the lack of regional construction funds, speed up the technological reform of new and old enterprises, and promote industrial upgrading. In this context, the study of the factors affecting Shanghai's actual utilization of total foreign investment is of great significance to the economic development strategy of the Yangtze River Delta and other places. This paper selects the latest development of the actual utilization of foreign capital in Shanghai from 1981 to 2020, and makes an empirical analysis on its influencing factors by applying multiple regression model. The results show that the actual use of foreign capital is mainly affected by per capita GDP, GDP growth rate, exchange rate and per capita disposable income, among which per capita GDP and disposable income have a greater impact on the actual utilization of foreign capital.

Keywords: Actual use of foreign capital; Modified model

1. Introduction

With the reform and opening-up, China's economy has grown rapidly, and the field of opening-up has been expanded. Foreign investment refers to a series of investment activities carried out by foreign investors in their own country. The absorption and utilization of foreign capital plays an important role in developing countries. With the development of economic globalization, the relationship between countries has become increasingly close, and the study of foreign investment is of great significance to the national economic development.

In the process of China's economic development, investment, import and export have made great contributions, especially in the coastal areas. As the city with the largest economy in China, Shanghai's GDP has been growing rapidly since 1981, and its connection with the world has become increasingly close. With the development of Shanghai's economy, the import and export volume and the actual utilization of foreign capital have also been increasing day by day. In 2020, actual utilization of foreign investment in The Yangtze River Delta exceeded US $80 billion, accounting for 53.9% of China's total. Shanghai actually utilized over US $20 billion of foreign capital, up 6.2% year on year, ranking first in China and hitting a new record high.

Foreign capital is a powerful catalyst to accelerate economic development. How to introduce and utilize it reasonably is the focus of economic work. Shanghai, as a fast-growing city in China, it is of obvious practical significance to study the influencing factors of the utilization of foreign capital and degree of its influence, and it is of important reference significance to adjust the economic development strategies of other provinces and cities in China, such as the Yangtze River Delta.

2. Reviews of articles

In recent years, many scholars have studied the influence of actual use of foreign capital. In terms of the specific content, it focuses on the calculation of the influencing factors between the actual utilization of foreign capital and local economic growth and studies the contribution of foreign capital to economic growth through different calculation models. Liu Tinglan (2016) conducted an analysis on the relationship between the utilization of foreign capital and economic growth in Hebei Province. Mao Xiangshi(2020) analyze the impact of FDI location distribution in Yunnan Province, showing that the market size and industrial agglomeration have a significant positive correlation with the distribution of foreign investment. Zhou Ling (2021) analyzes factors that influence the regional gap in China's foreign trade from different levels, and concluded that the regional disparity of FDI is the dominant factor to

accelerate the gap in China's regional foreign trade level. Jia Shijiang (2020) analyzed the situation of industries that attract FDI in Vietnam and study the influencing factors. It is concluded that the quality of Vietnam's labor force, degree of openness and infrastructure construction has significant positive effects on Vietnam's FDI attraction.

In terms of research methods, Li Chunhua (2012) used Koyck mode to analyze the impact of the actual total amount of foreign investment on the industrial structure of Chongqing. Zheng Qinyue (2020) used PCA to extract indicators that might affect foreign trade in Sichuan Province, and used them as explanatory variables for regression analysis. Jiang Shuai (2021) made an analysis of the influencing factors of China-Pakistan trade and studied the factors influencing the trade by using the stochastic frontier gravity model.

To sum up, there are many studies on the influencing factors of foreign investment. Based on the existing literature, we can see that the existing literature only chose some factors when selecting the influencing factors, however, it is a complicated process to study the influencing factors of the actual use of foreign capital. The influence factor has diversity, so only selecting parts to make the research is not comprehensive and results of studies are not universal. Therefore, this paper further builds an index system, selects influencing factors from multiple angles, and verifies the validity and relevance of factors from economic and statistical significance through multiple linear regression.

3. Model Construction

3.1. Model specification

This paper selects the annual data of the actual use of foreign capital in Shanghai from 1981 to 2020 as the foundation of the model, and selects the following factors:

(1) Per capita GDP (PGDP): GDP/population. Reflecting the level of economic development, is one of the factors to measure the living standards of its people.

(2) GDP growth rate (GR): It reflects the state of a country's economic development and measures a country's economic growth prospects

(3) Consumer Price Index (CPI): It reflects changes in the price level of commodities and services bought by consumers, which can represent the inflation rate.

(4) Currency exchange rate (ER): It reflects a country's trade policy and changes. Due to the diversity of exchange rates between countries, this paper takes 1 US dollar to RMB as the benchmark.

(5) Per capita disposable income (PCDI): It can be used to measure changes in the standard of living in a country.

(6) Total exports (Expo): the total value of goods exported by a country from home to abroad.

(7) Openness (Open): total imports and exports / GDP. It reflects the degree of opening to the outside world of national market economy.

In order to analyze the elastic relationship between the variables and reduce the influence of the Multicollinearity, the variables are converted logarithmically:

$$\ln Y = \ln(Y) , \quad \ln X_i = \ln(X_i) \tag{1}$$

Among them, Y means the total amount of foreign capital actually utilized in Shanghai, and Xi means the main influencing factors. A model is constructed as follows:

$$\ln Y = C + (\text{PGDP})\ln X_1 + (\text{GR})\ln X_2 + (\text{CPI})X_3 + (\text{ER})\ln X_4$$
$$+ (\text{PCDI})\ln X_5 + (\text{EXPO})\ln X_6 + (\text{OPEN})\ln X_7 \tag{2}$$

3.2. ADF Unit Root Test

In order to avoid pseudo-correlation or pseudo-regression caused by non-stationary time series, unit root test is carried out for each variable to ensure the stationarity of the variable. It shows that all variables reach stability at different levels after first-order difference, that is, all variables are I (1) sequences. Therefore, these variables satisfy the necessary conditions of cointegration test.

3.3. Cointegration Test

The establishment of regression models for non-stationary time series may lead to pseudo-regression problems, however, some linear combinations of some single integral sequences of the same order may be stationary sequences, that is, there may exist long-term equilibrium cointegration relations, this avoids the result of false regression. Based on the unit root test and the above model, this paper adopts Johansen likelihood ratio test to carry out co-integration test for each variable group.

The results show that at 95% confidence level, there are at least three co-integration relationships, which indicates there exists a long-term stable equilibrium relationship among them.

3.4. Multiple Regression

The regression results are shown in Table 1. From the overall model evaluation, the adjusted R^2 =0.9566, indicating that the model fits very well. Although the R^2 of the model is large, the T values of the total export amount and openness are not significant, possibly due to the existence of independent variables or the existence of Multicollinearity. Therefore, the multicollinearity test is performed on the model.

Table 1: Results of Multiple regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.81477	8.274956	-0.82354	0.4163
LNCPI	-1.62212	1.40394	-1.1554	0.2565
LNEXPO	-0.77665	1.011994	-0.76744	0.4484
LNER	3.808952	1.512163	2.518877	0.017
LNGR	0.346501	0.232285	1.491711	0.1456
LNOPEN	0.919568	1.217518	0.755281	0.4556
LNPCDI	5.625676	1.630552	3.450168	0.0016
LNPGDP	-3.47342	1.778333	-1.95319	0.0596

3.5. Multicollinearity

Firstly, the correlation coefficient between the variables is calculated according to the modified model, and the correlation coefficient matrix is obtained.

Secondly, the expansion factor method is used to test the preliminary modified model for the existence of Multicollinearity. It turns out that some variables have VIF values greater than 500, so the model can be considered seriously Multicollinearity.

A stepwise regression deletion variable was used for the multicollinearity correction. The result shows that after the stepwise regression, the $\ln X_3$, $\ln X_6$ and $\ln X_7$ causing multicollinearity are finally eliminated, the R^2 is increased in the modified model. The fitting degree of the model is enhanced, and all the independent variables of the equation are significant.

The function of the total amount of actual use of foreign capital function should take $\ln Y = f(\ln X_1, X_2, \ln X_4, \ln X_5)$ as the optimum. The model after fixing the Multicollinearity problem is:

$$\ln Y = -4.941 + 3.792 \ln X_1 + 0.306 X_2 + 2.798 \ln X_4 + 4.608 \ln X_5 \qquad (3)$$

So far, the problem of the form of the relevant variables of the model has been basically solved. After modification, the ideal model is obtained, but the existing model still needs to tested.

3.6. Heteroscedasticity test

In regression models, one of the important assumptions is that the perturbations calculated by the regression function are of same variance. If the independent variable is heteroscedasticity, the variance will change with the calculated value. This leads to the fact that the estimation of the parameters of the least squares does not affect the unbiasedness of the model, but does not have the minimum variance property, which affects the validity of the model and the accuracy of the model prediction.

Although heteroscedasticity mostly appears in cross-section data, and the data of this experiment is

time series data, but because the data of this model is annual data with small sample size, the heteroscedasticity test cannot be ignored.

In this experiment, White test was used to judge the heteroscedasticity. The p-value of the test result was significant, so the null hypothesis was rejected and heteroscedasticity was considered in the independent variables of the model. The equation is obtained by using the reciprocal of the absolute value of the error.

$$\ln Y = -4.353 + 3.961 \ln(PGDP) + 0.32 \ln(GR) + 2.61 \ln(ER) + 4.769 \ln(PCDI) \qquad (4)$$

4. Analysis

Based on analysis of the coefficients of the above model, it can be concluded that:

(1) There is a positive correlation between the actual use of foreign capital and the per capita GDP.

For every 1% increase in per capita GDP, the total amount of foreign capital actually used in Shanghai will rise by 3.96%. Per capita GDP can measure citizens' living standard, reflect the state of the region's economic development. The rising per capita GDP shows that Shanghai has a broad market prospect and a good investment environment, thus effectively raising foreign investors' expectations of the future return of their investment, and then increasing the amount of foreign investment actually used.

(2) GDP growth rate is positively correlated with the actual use of foreign capital.

GDP growth rate reflects the economic development of the region. The high growth rate means the rapid development of the region. Since 2005, the GDP growth rate of Shanghai has always been in the forefront of China, thus absorbing a large amount of foreign investment, and the total amount of foreign capital actually utilized has also increased correspondingly, but the influence is weak.

(3) The exchange rate of currency has positive influence on the use of foreign capital.

The exchange rate coefficient shows that Shanghai's actual utilization of foreign capital will increase by 2.61% for every unit of exchange rate rise, that is, a unit of RMB depreciation. When RMB depreciates, the value of investment in terms of foreign investors increases, and therefore foreign investment increases. In order to make up for the loss caused by the devaluation, China has absorbed more foreign capital, which has led to an increase in the total amount of foreign capital actually used.

(4) Per capita disposable income has a positive impact on the use of foreign capital.

Per capita disposable income represents the living standards of residents in the region. With the increase of residents' disposable income, consumption increases and drives the region's economic development, making it a better investment option for foreign businesses. Therefore, as foreign investment increases, so does the actual utilization of foreign capital.

Through the econometric analysis, this model makes clear the factors that affect the total amount of foreign capital actually used in Shanghai. The introduction and absorption of foreign capital play an important role in China's development. It is helpful for managers to analyze and utilize the trend of foreign capital correctly, and it can also be used by decision-makers of national economy. By influencing these factors, policy makers can make macroeconomic regulation and control the use of foreign capital.

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