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An Empirical Analysis on the Factors Influencing Actual Utilization of Foreign Capital in China

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***Abstract***

With the scale of actual utilization of foreign capital in our country appears to be increasing year by year with the increase of reform and opening up. Based on the data published by the National Bureau of Statistics from 1999 to 2018 on the actual use of foreign capital, we selected several reasonable indicators as the main influencing factors from an economic perspective, and constructed a econometric model. This paper examines and analyzes the factors affecting the actual use of foreign capital in China, and puts forward corresponding policy suggestions according to the empirical results.

***Key words: Actual Utilization of Foreign Capital; Service Trade; Influencing Factor; Multiple Linear Regression***

**Introduction**

Since the 70th anniversary of the founding of new China, the actual utilization of foreign capital in China has been tortuous and extraordinary. From the stagnation of foreign capital utilization before the reform and opening up to a series of major opening-up measures such as relaxing market access and exploring the construction of free trade port, the total utilized foreign capital in China has been increasing each year, and China gradually transforms from a large global capital attraction country to a strong one. According to a report by the Beijing Municipal Bureau of Commerce, Beijing made a “good start” in the utilization of foreign capital in January 2019, reaching 1.69 billion US dollars with 5% year-on-year growth. Today, with the drastically changing domestic and foreign environment, the opening up of China is closely centered on the service sector. In 2018, the actual utilization of foreign capital in Chinese service industry accounted for 69% of the country’s total utilization of foreign capital with the amount up to 93.12 billion US dollars. The service sector has become the focus of China’s expansion of opening up, and an opening-up pattern centered on service trade is gradually taking shape [1]. In the early stage of the reform, China’s economy developed at a high speed with the help of foreign capital. Now China’s economy is developing rapidly and steadily with various industries gradually running on the right track and the growth rate of foreign capital utilization slowing down. China’s opening up presents a new pattern of moving from institutional opening to structural opening which is mainly concentrated in the service industry utilizing huge amounts of foreign capital. Grasping the development trend of foreign capital utilization plays an important role in the development of China’s service industry. Therefore, it is of great practical significance to understand the influencing factors of China’s actual utilization of foreign capital. To sum up, based on the selected five legitimate economic variables and by adopting EViews 9 software, this article makes a deeper analysis of the influencing factors, so as to further understand the actual level and grasp the actual situation of foreign capital utilization in China at this stage, and provide relevant policy suggestions for the new pattern of China’s opening up.

1 **Review of Relevant Literature**

Whether the introduction and utilization of foreign capital would pose a positive impact on a country’s economy has always been a global controversial hotspot issue, from which many theories closely related to the utilization of foreign capital have been derived. In terms of demand preferences, the “two-gap theory” (proposed by Chenery, H. B. et al. [1]) named after the two major gaps in saving and foreign currency has become the most common theory to explain the utilization of foreign capital in developing countries for its explicit illustration of a country’s demand preference for foreign capital, which emphasizes that a country’s introduction of foreign capital is to make up for the economic backwardness caused by lack of capital and highlights the role of the introduction of foreign capital in a country’s economic growth. It should be noted that this theory cannot fully explain the demand preference of foreign capital in our country for the inexistence of these two gaps in China [2]. In terms of influencing factors of foreign capital utilization, life cycle theory, multifactor theory and resource opportunity theory have been recognized by more scholars for their discussion on the influencing factors of foreign capital utilization from aspects such as enterprise, environment and cycle.

Based on the corresponding theories, many foreign and domestic scholars have studied and discussed the utilization of foreign capital from different angles. As for the economic effects brought about by the utilization of foreign capital, Chinese scholars mainly study and discuss from aspects such as macro environment and micro factors. In terms of macro environment, Lu Jinyong (2019) divided the process of utilizing foreign capital in the seventieth anniversary of the founding of new China into six stages, and summarized that the utilization of foreign capital generated positive effects in eight aspects, including export of goods, economic construction, upgrading of industrial structure and establishment of market economy system, etc. However, in the process of exploring the utilization of foreign capital, there are also problems such as the investment environment pollution, sharp decline of domestic local brand market, and improper control of the industrial opening range [3].However, foreign scholars Mody and Murshid (2011) concluded that the economic impact of foreign capital utilization on a country would have completely different effects with the change of a country’s economic fluctuation level after studying multiple countries based on the threshold effect [4]. In terms of micro factors, the research of Chen Xiuying, Liu Sheng and Gu Naihua (2018), starting from the supply side of the service industry and by adopting Malmquist-Luenberger index method and spatial panel econometric model, found that the regional service efficiency of technological progress plays a prominent role in promoting the transformation and upgrading of foreign capital utilization in the eastern region of China [5]. Zhang Biao (2019) discovered that the total utilized foreign capital and the gross domestic product in China are Granger reasons of each other through the Granger causality test [6]. Wu Shengxian and Fang Hua (2013) deduced that RMB exchange rate, consumer price index and household consumption level have a significant impact on the actual utilization of foreign capital through quantitative analysis [7]. Luo Mingran (2019) drew a different conclusion that export change rate, GDP and exchange rate movement have a significant impact on the total utilized foreign capital by constructing an error correction model [8].

Scholars at home and abroad have different views on the economic benefits brought by the utilization of foreign capital to a country. In order to eliminate the inaccuracy caused by the changes in the international macro environment, this article collects the data around the year when China joined the WTO and discusses the influencing factors that affect China’s actual utilization of foreign capital after China’s accession to the WTO.

2 **Model Setting and Data Description**

***2.1 Setting of Model Parameters***

According to the relevant literature consulted, five selected explanatory variables are introduced to analyze their impact on the actual utilization of foreign capital. The model is set as follows:

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Where the independent variables and the dependent variables are presented in a linear relationship;  is the amount of actual utilization of foreign capital without other influencing factors;  are the slope coefficients;  is stochastic error term, and other factors affecting  are included.

***2.2 Parameter Interpretation***

(1) Explanatory Variable

Y: actual utilization of foreign capital (billion yuan). In economics, the actual foreign payment received after concluding a contract with a foreign investor is called the actual utilization of foreign capital. After the reform and opening up, China’s rich labor market has been opened to the outside world. The advantages of the manufacturing industry have attracted more foreign investors to invest and build factories in China with constant foreign capital flowing in. After China’s accession to the WTO, the total utilized foreign capital has been increasing more rapidly. The actual utilization of foreign capital promoted China’s economic development to a certain extent. Understanding the influencing factors of China’s actual utilization of foreign capital has certain practical significance for China to improve the level of foreign capital utilization and promote the transformation and upgrading of foreign capital utilization.

(2) Explained Variables

X1: RMB exchange rate (USD=100). RMB exchange rate refers to the ratio of RMB to foreign currency. Generally, the lower exchange rate of RMB leads to the external devaluation of RMB, the reduced cost for foreign investors to buy the same amount of Chinese goods, and increased foreign investment and more foreign capital inflow at the same time. It can be seen that the change of RMB exchange rate could not only attract foreign capital for China but also affect the total utilized foreign capital in China. The total utilized foreign capital will also increase accordingly when enough foreign capital is attracted, and for the certain degree of connection between the two, RMB exchange rate is taken as a variable.

X2: gross domestic product (billion yuan). As the main index reflecting the level of national economic development, gross domestic product (GDP) measures the economic conditions of Chinese residents. Under the trend of global free trade, China’s increasing GDP has stimulated the enthusiasm of Chinese citizens for foreign consumption to a certain extent. In addition, with the facilitation of foreign capital inflow, the amount of actual utilization of foreign capital in China has also increased to some extent.

X3: consumer price index. Through consumer price index (CPI), which is closely related to a country’s currency exchange rate and largely affects the changing value of a country’s currency, a certain country’s inflation and deflation can be perceived. With the fluctuation of a country’s CPI, the inflow of foreign capital is also partly influenced. Thus, CPI is introduced into the model as a variable to further analyze its influence.

X4: household consumption level (RMB). As one of the criteria reflecting the living standard of the residents, household consumption level is repeatedly discussed by scholars. Wan Xiaojing (2006) exerted SPSS to calculate the correlation coefficient from the perspective of statistics, and the empirical results showed a positive correlation between the actual utilization of foreign capital and household consumption level under specific conditions [9]. When the household consumption level rises, the household consumption demand and the domestic market demand climbs up, the attraction to foreign capital increases correspondingly, thus increasing the total utilized foreign capital in China. Since they are positively related, household consumption level can be introduced for examination and analysis.

X5: total export (billion yuan). Trade between countries has become more convenient and freer under the general trend of economic globalization. Since the reform and opening up, China’s total exports of goods have been rising perpendicularly. A large part of the increase in total exports is attributed to the fact that foreign investors take advantage of China’s abundant labor force to set up factories in China to process and manufacture products and export them. When China’s total export increases, the total utilized foreign capital also grows to a certain extent.

***2.3 Data Description***

In order to ensure the accuracy of the verification, this article collates and sorts out the public data released by the National Bureau of Statistics of China on the total utilized foreign capital in China from 1999 to 2018 and the influencing factors, as shown in Table 2, and sets up an econometric model based on this data for linear regression analysis.

TABLE 1 SUMMARY OF VARIABLE DATA FROM 1999 TO 2018

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Year** | **Y** | **X1** | **X2** | **X3** | **X4** | **X5** |
| 1999 | 4359.26 | 100 | 90564.4 | 100 | 3346 | 16159.77 |
| 2000 | 4913.72 | 100.01 | 100280.1 | 101.8 | 3721 | 20634.44 |
| 2001 | 4111.35 | 99.87 | 110863.1 | 104.8 | 3987 | 22024.44 |
| 2002 | 4553.26 | 99.87 | 121717.4 | 101.3 | 4301 | 26947.87 |
| 2003 | 4646.70 | 99.87 | 137422 | 106.5 | 4606 | 36287.89 |
| 2004 | 5303.11 | 99.85 | 161840.2 | 123.6 | 5138 | 49103.33 |
| 2005 | 5226.71 | 91.34 | 187318.9 | 131.8 | 5771 | 62648.09 |
| 2006 | 5570.37 | 69.35 | 219438.5 | 138.8 | 6416 | 77597.89 |
| 2007 | 5956.89 | 32.57 | 270092.3 | 161.4 | 7572 | 93627.14 |
| 2008 | 6615.41 | -33.32 | 319244.6 | 190.5 | 8707 | 100394.94 |
| 2009 | 6271.13 | -44.73 | 348517.7 | 186.8 | 9514 | 82029.69 |
| 2010 | 7366.63 | -50.88 | 412119.3 | 203.9 | 10919 | 107022.84 |
| 2011 | 7601.87 | -81.95 | 487940.2 | 232.8 | 13134 | 123240.56 |
| 2012 | 7151.68 | -96.58 | 538580 | 247.5 | 14699 | 129359.25 |
| 2013 | 7352.62 | -108.51 | 592963.2 | 262.6 | 16190 | 137131.43 |
| 2014 | 7353.23 | -113.55 | 641280.6 | 274.5 | 17778 | 143883.75 |
| 2015 | 7864.41 | -104.99 | 685992.9 | 283 | 19397 | 141166.83 |
| 2016 | 8369.36 | -63.6 | 740060.8 | 295.3 | 21285 | 138419.29 |
| 2017 | 8847.22 | -52.65 | 820754.3 | 305.3 | 22935 | 153309.43 |
| 2018 | 8931.24 | -66.09 | 900309.5 | 318.7 | 25002 | 164176.68 |

Note: The measurement units of variables in the table are different. The three index units with larger amounts are set at 100 million yuan. The data in the table have been converted according to the exchange rate of the same period. The amount of household consumption level is relatively small, and the unit is set as RMB. The unit of RMB exchange rate and consumer price index is percentage. In order to enhance the reliability of the test, 1999 is taken as the benchmark, the initial value of each variable is set to 100, and the variables of subsequent years are correspondingly indexed, thus making the two variables unified in measurement standards.

3 **Demonstration and Analysis**

***3.1 Overall Correlation Analysis***

With EViews 9, the panel trend chart of different indexes changing with years was observed to roughly judge the correlation between various indexes. The results are shown in Fig. 1.

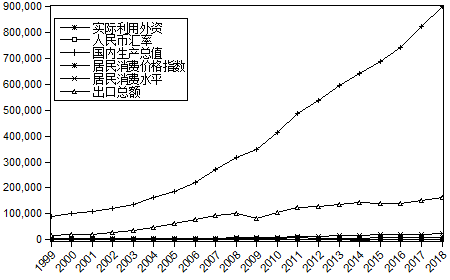


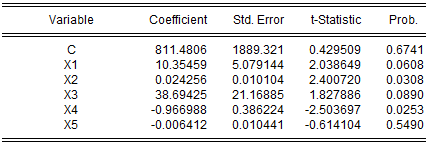
FIG. 1 TREND CHART OF TOTAL UTILIZED FOREIGN CAPITAL AND ITS INFLUENCING FACTORS

Due to the relatively small data of RMB exchange rate, GDP and CPI, it is difficult to see the correlation degree in the figure. In order to further analyze the correlation between the indexes, multiple linear regression analysis is carried out with 1999-2018 as the time range [10].

***3.2 Quantitative Analysis of Influencing Factors of Actual Utilized Foreign Capital from 1999 to 2018***

(1) Least Square Estimation (OLS Estimation)

TABLE 2 REGRESSION RESULTS ESTIMATED BY LEAST SQUARE METHOD



From Tab. 2, a regression analysis model can be proposed:

Y=811.4806+10.3546X1+0.02426X2+38.6942X3-0.9670X4-0.0064X5

R2=0.971352 DW=2.195532 F=94.93776 prob(F)=0.000000

The estimated model parameters were observed and evaluated. X1, X4 and X5 failed in the sign test, which is theoretically meaningless. Among the five explanatory variables, only X2 and X4 have significant t-test results. R2=0.971352, F=94.93776, the model has high interpretability and high closeness of fit. To sum up, the model needs to be further checked by multicollinearity test.

(2) Multicollinearity Test

① Simple Correlation Coefficient Test

Sample data were adopted to execute cor command to preliminarily judge the correlation of each index, and the results are shown in Tab. 3.

TABLE 3 CORRELATION MATRIX OF EACH INDEX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **cor** | **Y** | **X1** | **X2** | **X3** | **X4** | **X5** |
| **Y** | 1.000 000 | -0.884 974 | 0.966 804 | 0.974 663 | 0.955 435 | 0.967 214 |
| **X1** | -0.884 974 | 1.000 000 | -0.863 868 | -0.916 107 | -0.839 858 | -0.920 136 |
| **X2** | 0.966 804 | -0.863 868 | 1.000 000 | 0.991 227 | 0.998 249 | 0.952 378 |
| **X3** | 0.974 663 | -0.916 107 | 0.991 227 | 1.000 000 | 0.984 324 | 0.973 848 |
| **X4** | 0.955 435 | -0.839 858 | 0.998 249 | 0.984 324 | 1.000 000 | 0.936 390 |
| **X5** | 0.967 214 | -0.920 136 | 0.952 378 | 0.973 848 | 0.936 390 | 1.000 000 |

Except the correlation coefficient between Y and X1, the net value of correlation coefficient between each index is high with small difference, and the model has high probability of multicollinearity. To further analyze the relationship between variables, auxiliary regression model was adopted to further test and optimize.

② Farrar-Glauber Test (Auxiliary Regression Model Test)

The auxiliary regression model was constructed to calculate the variance inflation factor VIF=1/(1-R2) and the tolerance TOL=1/VIF to further test the existence of multicollinearity, and the results in Tab. 4 were obtained.

TABLE 4 AUXILIARY REGRESSION MODELS AND TEST INDEXES OF EACH VARIABLE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Model** | **R2** | **F-statistic** | **Concomitant probability of F** | **VIF** | **TOL** |
| X1=f(X2,X3,X4,X5) | 0.9751 | 146.8495 | 0.000000 | 40.16064257 | 0.0249 |
| X2=f(X1,X3,X4,X5) | 0.9993 | 5520.911 | 0.000000 | 1428.571429 | 0.0007 |
| X3=f(X1,X2,X4,X5) | 0.9982 | 2128.504 | 0.000000 | 555.5555556 | 0.0018 |
| X4=f(X1,X2,X3,X5) | 0.9993 | 5814.232 | 0.000000 | 1428.571429 | 0.0007 |
| X5=f(X1,X2,X3,X4) | 0.9821 | 205.9202 | 0.000000 | 55.86592179 | 0.0179 |

In the above-mentioned auxiliary regression model, prob (F)=0, the variance inflation factor of the auxiliary regression model of parameters is much larger than 10, and its tolerance value is extremely small, which is used as the basis for judging the multicollinearity of the model.

③ Stepwise Regression Method

The correlation coefficient (0.974663) between Y and X3 (CPI) is the largest, thus, a simple linear regression model of the two was first established. Based on the model, regression analysis of other explanatory variables was gradually introduced [11]. The regression analysis results are shown in Tab. 5.

TABLE 5 INTEGRATION TABLE OF VARIABLE REGRESSION ANALYSIS BY STEPWISE REGRESSION METHOD

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Model** | **X1** | **X2** | **X3** | **X4** | **X5** | **2** |
| Y=f(X4) | \_ | \_ | \_ | 0.207103  13.73152 | \_ | 0.908015 |
| Y=f(X4 X1) | -4.963723 -2.478059 | \_ | \_ | 0.156101  6.369930 | \_ | 0.928449 |
| Y=f(X4 X2) | \_ | 0.021689  4.631136 | \_ | -0.599399  -3.435872 | \_ | 0.956935 |
| Y=f(X4 X3) | \_ | \_ | 21.58017  3.592948 | \_ | -0.027519 -0.414813 | 0.944641 |
| Y=f(X4 X5) | \_ | \_ | \_ | 0.087543  2.773294 | 0.018182  4.044864 | 0.950369 |
| Y=f(X4 X5 X1) | -0.448976 -0.186188 | \_ | \_ | 0.088513  2.688931 | 0.017333  2.667657 | 0.947381 |
| Y=f(X4X5 X2) | \_ | 0.015846  1.765512 | \_ | -0.422580  -1.454830 | 0.006153  0.766745 | 0.955865 |
| Y=f(X4 X5 X3) | \_ | \_ | 7.58763  0.708534 | 0.038267  0.499752 | 0.013131  1.551263 | 0.948871 |

Note: The top and bottom figures in the table represent parameter estimates and t-statistic respectively.

After stepwise regression, the following model results are obtained:

Y = 3776.7154 + 0.08754X4 + 0.01818X5

R2=0.955593 DW=1.421526 F=182.9126 prob(F)=0.000000

(3) Heteroskedasticity Test

The stochastic error term should satisfy , otherwise the obtained parameter estimates would be unbiased but invalid, and there is heteroscedasticity. The diagnostic results obtained through relevant tests are shown in Tab. 6.

TABLE 6 HETEROSCEDASTICITY TEST RESULTS

|  |  |  |  |
| --- | --- | --- | --- |
| **Heteroskedasticity Test** | **F-statistic** | **Obs \*R-squared** | **Prob.Chi-Square** |
| White | 1.084150 | 5.582430 | 0.3490 |
| Glejser | 1.071283 | 2.238536 | 0.3265 |
| Harvey | 2.036552 | 3.865689 | 0.1447 |

White: P=0.3490>0.05, nR2=5.582430>λ2α=0.05(n); Glejser: P=0.3265>0.05, nR2=2.238536>λ2α=0.05(n); Harvey: P=0.1447>0.05，nR2=3.865689>λ2α=0.05(n); There is no heteroscedasticity in the model.

(4) Autocorrelation Test

① D.W. inspection (Durbin-Watson inspection)

TABLE 7 D.W. INSPECTION RESULTS

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n=20, k=2, DW=2. 107274, significance level . Based on D.W. Table, dL (lower limit) = 1.10, dU (upper limit) = 1.54; According to the obtained data, DW value is between dU (1.54) and 4-dU (2.46), so H0 is accepted and there is no first-order autocorrelation.

② Autocorrelation Test—Partial Correlation Coefficient Test

In order to improve the accuracy and authenticity of model prediction, high-order autocorrelation test was performed by partial correlation coefficient test method.

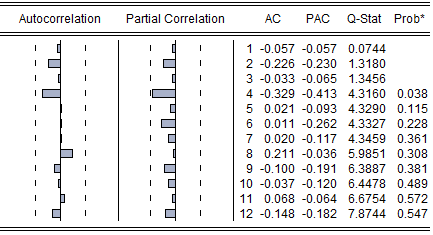


FIG.2 PARTIAL CORRELATION COEFFICIENT TEST RESULTS (LEFT UNCORRECTED, RIGHT CORRECTED)

The results of left and right residual autocorrelation and partial correlation coefficient were observed. The histogram of left partial correlation coefficient stepped out of confidence belt segment, and the model has third-order autocorrelation. On the right are the test results after correction test by generalized difference method (GLS), and autocorrelation no longer exists.

(5) Final Model

Through the construction of the model, sign test, first-level test and econometric test were carried out. The insignificant factors such as X1, X2 and X3 were excluded, and after modifying the autocorrelation of the model, the regression model between the final actual utilized foreign capital (Y), the household consumption level (X4) and the total export (X5) was obtained. The form of model function is as follows:

Y = 3701.0847 + 0.03299X4 + 0.02527X5

R2=0.980400 F=140.0594 DW=2.107274 prob(F)=0.000000

5 **Conclusions and Suggestions**

***5.1 Conclusions***

By selecting five reasonable economic indicators to build an econometric model, this article analyzes and tests the actual utilization of foreign capital in China, and obtains the final analysis result: the actual utilization of foreign capital in China is mainly affected by household consumption level and total export, and both of their influences are positive.

According to the model analysis, the influence of household consumption level on the actual utilization of foreign capital [12-15] is mainly realized by expanding the scale of the domestic demand market through the growth of household consumption demand and attracting the continuous inflow of foreign capital. At current stage, the global economy is affected to a certain extent by multi-country trade frictions and is in a weakened state. Although China’s total foreign capital attaction increased against the trend in 2018, the domestic consumer market was still influenced, with residents’ consumption desire dropping and consumption demand decreasing. At present, China is at a critical juncture of the transformation from institutional opening to structural opening. The new pattern of reform and opening up is gradually taking shape around the service sector, and the amount of foreign capital utilized by the service industry is relatively large. Therefore, it is urgent to stimulate household consumption and get rid of the bottleneck of sluggish consumption. Meanwhile, China’s manufacturing industry is developed, and its total exports of goods have always been among the top in the world, attracting strong foreign investment. However, a large proportion of export goods comes from the products manufactured by foreign investors in China. In the long run, the long-term absorption and retention of foreign capital in China should rely on comprehensive attraction to avoid foreign investors only exporting processed products by investing and building factories in China, and should attract foreign capital through multiple channels to ensure the healthy and sustainable development of foreign capital utilization.

At the same time, it should be pointed out that the five economic variables selected in the model all reflect the attraction of China’s comprehensive investment to a certain extent, among which RMB exchange rate and CPI can reflect the deflation degree of a country, while GDP can reveal the domestic political stability of a country, which will undoubtedly influence the attraction of foreign capital. The attraction of foreign capital, excluding these economic factors, is also related to the legal risks of the host country. A safe national environment is appealing to investors. This article adopts software to analyze based on economic variable data from an economic perspective and has certain limitations for not taking abstract factors into account. Therefore, whether the actual utilization of foreign capital is affected by other factors remains to be discussed. The following suggestions are based on the empirical results of this article and the current actual situation of foreign capital utilization.

***5.2 Suggestions***

(1) Increase residents’ income and stimulate demand growth.

To improve household consumption level and promote the utilization of foreign capital, government departments should start from increasing income and stimulating consumption. The premise of consumption is income. The income system of urban residents should be improved and their wages should be raised to increase the income of urban residents, while technological reforms on the basis of supporting rural industries should be carried out to fundamentally solve the problem of low income of rural residents to increase their income. Meanwhile, in terms of stimulating demand, the government could add a subsidy system to household basic products such as household appliances and appropriately reduce consumption tax to stimulate consumption.

(2) Improve the soft environment of investment and increase the investment stickiness.

China should innovate its investment methods, introduce foreign capital through multiple channels, guide the foreign capital utilization to stock investment, securities trading and other channels on the basis of foreign investment and construction of factories, accelerate the transformation and upgrading of foreign capital utilization, and promote the development of investment liberalization. Meanwhile, each region should combine the characteristic of regional industrial structure, improve the structure of the service industry chain with local characteristics, perfect the soft environment for investment, enhance the efficiency of regional services to attract high-quality foreign investment projects such as business services, logistics, finance and insurance, wholesale and retail to cultivate excellent modern service industry subjects, promote the healthy and rapid development of regional service industry, enable foreign capital to take root in China, promote the industrial development, and further optimize the utilization level of foreign capital to provide new impetus to our country’s structural opening.

**Fund Projects**

National college students' innovation and entrepreneurship training project "cross-border payment mode reform based on block chain technology" (201910378121), Anhui provincial teaching and research project "discipline competition under the background of big data on the cultivation of innovation ability of new economic and management talents" (project no.: 2018jyxm1305)

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