# An Empirical Analysis of the Influencing Factors of China's Direct Investment in Central and Western Asia under the COVID-19 Epidemica

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*Abstract: Under the new crown epidemic, the Sino-US trade friction has made China's foreign trade and investment in trouble. The research on the factors affecting China's direct investment in Central and Western Asia is of great significance for China to break through the economic blockade and participate in the layout of the global value chain. This paper takes China's direct investment in nine countries in Central and West Asia as a sample, selects a total of 7 indicators from three aspects of expected return, investment cost, risk and uncertainty, and creates a multiple linear regression model for empirical analysis. The results show that the market demand scale and resource endowment level of the host country have a significant positive promoting effect, while the number of laborers in the host country has a significant negative inhibitory effect. Finally, some suggestions are put forward for China's foreign investment in order to promote the decision-making of enterprises and governments.*

*Keywords: new crown epidemic, Sino-US trade friction, global value chain, the Belt and Road, Central and Western Asia, China's foreign direct investment*

## 1. Introduction

In today's world, the global spread of the new crown pneumonia epidemic has led to the rise of trade protectionism, the reconstruction of the global value chain, the deterioration of the US and some countries' attitudes towards China's trade, and the severe trade control. Since the "Belt and Road" initiative was put forward, China has been very optimistic about the economic development potential of Central and Western Asia and has continued to export capital to it. According to the 2019 Annual Bulletin of China's Foreign Direct Investment, the stock of China's direct investment in Central and West Asian countries has continued to grow over the years. By the end of 2019, the amount had reached US$38 billion .

Direct investment in Central and West Asia is an effective way for China to break out of the current trade shackles created by the United States in the northwest direction, and it is also an important means and method to participate in the layout of the global value chain [1]. Analyzing the influencing factors of China's foreign direct investment in Central and Western Asia will help enterprises to speed up the pace of "going out", adjust the direction of investment and operation in a timely manner, and then help China "take root" in the global value chain and improve its position in the construction of the global value chain and role [2] .

## 2. Literature review

Many scholars at home and abroad have conducted in-depth research on the influencing factors of foreign direct investment. Dunning 's eclectic theory of international production divides enterprises' foreign investment motivation into four types: market-oriented, resource-acquisition, efficiency-seeking, and strategic asset-seeking. The investment-inducing factor combination theory divides the determinants of foreign direct investment into direct inducing factors represented by various production factors and

other indirect inducing factors. This coincides with the research results of domestic scholars. From the perspective of total factor productivity, Wang Guijun and Zhang Hui show that China's direct investment in developed countries has the motivation to acquire advanced technology and management experience [3]. Based on the extended gravity model, Chen Sheng and Guo Yong concluded that the main influencing factors of China's investment in underdeveloped countries are market size and labor factors [4].

Through the above research, we conclude that the factors affecting China's foreign direct investment mainly include market potential, natural endowment, industrial base, etc., but these indicators are only self-sufficient in the supply and demand of both investors and show the nature of investment in seeking higher profits. And although there are many studies on the influencing factors of China's foreign direct investment, there are few studies focusing on Central and Western Asia. Therefore, on the basis of existing research, this paper innovatively divides the explanatory variables into three aspects: expected return, investment cost, risk and uncertainty. Multiple regression method is used to empirically analyze the influencing factors of China's foreign direct investment .

## 3. Study Design

### 3.1. Indicators and sample selection

#### 3.1.1. Selection of explanatory variables

theme of this paper is the influencing factors of China's direct investment in Central and West Asia . Considering that the investment results have a certain time lag, the stock index can more objectively reflect the location preference of China's direct investment, so the direct investment stock is set as explanatory variables [5] .

#### 3.1.2. Selection of explanatory variables

This paper comprehensively considers the internal and external factors affecting China's foreign direct investment, and selects seven indicators including the host country's per capita GNP and the host country's labor force from three aspects: expected return , investment cost , risk and uncertainty . , in order to explore the influencing factors of China's foreign direct investment, the specific indicators are shown in Table 1 .

*Table 1: Indicators of Influencing Factors of China's Outward FDI*

| target layer | first-level indicator | Secondary indicators | Second-level index quantification method | Symbolic representation |
|---|---|---|---|---|
| China's foreign direct investment Influencing factors | expected profit | Economic development potential | GNP growth rate of host country | X 1 |
| | | Market demand scale | GNP per capita of host country | X 2 |
| | Cost of investment | natural endowment level | Host country natural resource rents as a share of GDP | X 3 |
| | | Quantity of labor supply | The number of working people in the host country | X 4 |
| | | level of industrialization | Host country industrial growth as a share of GDP | X 5 |
| | Risk and Uncertainty | level of opening | Import and export volume of goods and services in the host country as a percentage of GDP | X 6 |
| | | Financial Fraud Risk Level | Host Country Information Disclosure Index | X 7 |

(1) Expected income

Generally speaking, direct investment is positively correlated with expected income, and the expected income of the host country increases, and the foreign investment will also increase. The growth rate of the host country's gross national product can represent its economic development potential, the growth rate increases, the economic development improves, and the expected income increases accordingly, which in turn affects the amount of direct investment. The per capita GNP of the host country is an important indicator to measure the scale of its market demand. China's direct investment in Central and West Asia needs strong market demand as support. The increase of per capita GNP will also increase market demand, which will ultimately give direct investment volume. affect.

(2) Investment cost

Generally speaking, direct investment is negatively correlated with investment cost. The higher the investment cost in the host country, the smaller the room for China to obtain profits, which ultimately

leads to the reduction of direct investment. The proportion of the host country's natural resource rent in GDP reflects its natural endowment level. The larger the index, the richer the natural resources and the lower the cost of resource investment, which is conducive to attracting foreign investment. The number of laborers in the host country shows the richness of its labor factors, the labor supply increases, the price decreases, and the investment cost also decreases accordingly, which ultimately affects the amount of direct investment. The ratio of the host country's industrial growth to GDP can reflect its level of industrialization. Generally, the larger the ratio, the better the industrial base and the easier it is to accept foreign investment.

(3) Risks and uncertainties

Risks and uncertainties often run through the whole process of China's foreign direct investment and have a direct impact on it. The proportion of the host country's import and export of goods and services to GDP reflects its level of opening to the outside world. If this indicator increases, it will reduce the difficulty for Chinese capital to enter its market, and the amount of direct investment will increase accordingly. The host country information disclosure index can measure the degree of protection of corporate investors, the closer the index is to 10 , so this paper uses the ratio of the host country information disclosure index to 10 to quantify its financial fraud risk.

### 3.1.3. Sample selection

According to the " 2019 Annual Bulletin of China's Foreign Direct Investment", 70.59% of China 's direct investment in West Asia has flowed into the United Arab Emirates, Israel, Qatar, and Saudi Arabia. From 2010 to 2019 , China's direct investment stock in the above - mentioned four countries in West Asia and five countries in Central Asia: Kazakhstan, Uzbekistan, Turkmenistan, Tajikistan, and Kyrgyzstan was used as a sample, and a time series model was established for empirical analysis.

### 3.2. Data sources and processing

The data sources for this article are the 2019 Annual Bulletin of China's Foreign Direct Investment and the World Bank database. Since data on Tajikistan's imports and exports of goods and services as a share of GDP in 2015 and 2016 are missing, the arithmetic mean of 2014 and 2017 data is used instead.

### 3.3. Model settings

According to the above index selection and sample processing, this paper creates a multiple linear regression model through Eviews :

$$LOG(Y) = \beta_0 + \beta_1 X1 + \beta_2 LOG(X2) + \beta_3 X3 + \beta_4 LOG(X4) + \beta_5 LOG(X5) + \beta_6 X6 + \beta_7 X7 + \varepsilon$$

## 4. Empirical analysis and testing

### 4.1. Regression results

*Table 2: Model running results*

| Variable | Coefficient | Std Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -165.1234 | 36.77202 | -4.490463 | 0.0028 |
| X1 | -0.029849 | 0.038390 | -0.777525 | 0.4623 |
| LOG(X2) | 23.40680 | 2.913509 | 8.033888 | 0.0001 |
| X3 | 0.195081 | 0.069141 | 2.821509 | 0.0257 |
| LOG(X4) | -0.579855 | 0.143438 | -4.042558 | 0.0049 |
| LOG(X5) | -11.13452 | 4.956306 | -2.246537 | 0.0595 |
| X6 | 0.025975 | 0.025418 | 1.021915 | 0.3408 |
| X7 | -0.020177 | 0.025103 | -0.803779 | 0.4480 |
| R-squared | 0.995347 | Mean dependent var | | 12.88274 |
| Adjusted R-squared | 0.990695 | S.D. dependent var | | 1.899152 |
| S.E. of regression | 0.183199 | Akaike info criterion | | -0.251966 |
| Sum squared resid | 0.234932 | Schwarz criterion | | 0.125661 |
| Log likelihood | 9.889742 | Hannan-Quinn criter. | | -0.255988 |
| F-statistic | 213.9342 | Durbin-Watson stat | | 3.027457 |
| Prob(F-statistic) | 0.000000 | —— | | |

Taking China's direct investment stock (LOG(Y)) in nine countries in Central and West Asia as the

dependent variable and 7 quantitative indicators as independent variables, a multiple linear regression model was created using Eviews software. The results are shown in Table 2.

### 4.2. Economic significance test

The running results of the model show that China's direct investment stock in the nine countries in Central and West Asia is positively related to the host country's per capita GDP, the host country's natural resource rent as a proportion of GDP , and the import and export of goods and services as a proportion of GDP . Gross growth rate, the number of labor force in the host country, the proportion of industrial growth in the host country to GDP, and the information disclosure index of the host country are inversely related .

Generally speaking, an increase in the growth rate of gross national product represents a good prospect for economic development, which will lead to an increase in the stock of foreign direct investment; an increase in the number of laborers will reduce labor costs, thereby increasing the stock of foreign direct investment; the proportion of industrial growth value in GDP It is beneficial to improve the level of industrialization and promote the increase of foreign direct investment; and the information disclosure index should also have a positive relationship with the investment stock, but the regression result is the opposite. Therefore, it is speculated that the model may have econometric problems, and the model needs to be revised .

### 4.3. Statistical tests

### 4.3.1. Goodness of fit test

$R^2 = 0.9953$ It is close to 1, indicating that the model has a high goodness of fit, that is, 99.53 % of the changes in China's OFDI stock can be explained by the model.

### 4.3.2. F test

$F = 213.9342$ is greater than the critical value of 3.79, and its probability value is 0, so the null hypothesis is rejected, indicating that the total influence of the seven explanatory variables on the explained variables is significant, and the model passes the F test.

### 4.3.3. t test

At the significance level α=0.05, if the absolute value of the estimated parameter t statistic is greater than the critical value 2.3646 and the probability is less than 0.05,the null hypothesis is rejected, indicating that the explanatory variable is significant to the explained variable influence. According to the model results, a large number of explanatory variables failed to pass the test .However, according to qualitative analysis, all explanatory variables can be considered important, and the model has a high goodness of fit. The joint significance of all explanatory variables is also high after the F test, but there are a large number of parameters that fail the t test. We speculate The model is likely to have severe multicollinearity.

### 4.3.4. VIF test

For the above multiple linear regression model, we use the variance inflation factor method to test its multicollinearity. Generally, when the variance inflation factor of an explanatory variable V IF > 10, it can be concluded that the model has serious multicollinearity. After inspection, the VIF values of LOG(X2), X3, LOG (X4), LOG(X5), and X7 are all greater than 10, so the equation has serious multicollinearity, see Table 3 for details.

*Table 3: Variance inflation factor test results*

| Variable | Coefficient variance | Uncentered VIF | Centered VIF |
| --- | --- | --- | --- |
| LOG(X2) | 8.4885 | 344248.6000 | 24.9087 |
| X3 | 0.0048 | 1474.5760 | 116.7348 |
| LOG(X4) | 0.0206 | 793.2919 | 10.3200 |
| LOG(X5) | 24.5650 | 160470.7000 | 125.8979 |
| X7 | 0.0006 | 1127.9150 | 40.7253 |

### 4.3.5. Stepwise regression method correction

In order to solve the multicollinearity of the regression model, this paper adopts the stepwise regression analysis method to make corrections. First, the explanatory variable and the explanatory

variable with the highest degree of correlation are established to establish a univariate model, and then the other explanatory variables are introduced into the model in turn, and the economic and statistical significance is carried out. Finally, choose a relatively optimal model from it. The stepwise regression results are shown in Table 4.

*Table 4: Stepwise regression results*

| Variable | Coefficient | Std.Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -202.4041 | 10.97129 | -18.44852 | 0.0000 |
| LOG(X2) | 22.74823 | 1.102920 | 20.62546 | 0.0000 |
| X3 | 0.041881 | 0.010860 | 3.856311 | 0.0027 |
| LOG(X4) | -0.265900 | 0.069733 | -3.813137 | 0.0029 |
| R-squared | 0.990775 | Mean dependent var | | 12.88274 |
| Adjusted R-squared | 0.988259 | S.D. dependent var | | 1.899152 |
| S.E. of regression | 0.205783 | Akaike info criterion | | -0.100811 |
| Sum squared resid | 0.465813 | Schwarz criterion | | 0.088003 |
| Log likelihood | 4.756079 | Hannan-Quinn criter. | | -0.102822 |
| F-statistic | 393.8061 | Durbin-Watson stat | | 2.445242 |
| Prob(F-statistic) | 0.000000 | — | — | — |

The revised regression equation is: $LOG(Y) = -202.404104999 + 22.748234018*LOG(X2) + 0.0418806302706*X3 - 0.265899709179*LOG(X4)$, the revised coefficient of determination is 0.9883, which is close to 1, indicating that the model The degree of fit is very high, the F value is equal to 3 93.8061, and the accompanying probability P=0.0000, indicating that the overall significance test of the equation adjusted by the stepwise regression method has passed. The t-test indicates that there are LOG( X2), X3, LOG(X4) that significantly affect the explained variables .

### 4.3.6. Heteroskedasticity test

If there is heteroskedasticity in the model, it will seriously damage the validity of the O LS estimator of the parameters, and affect the reliability of the equation t -test and F-test. Considering that the samples are time series data, this paper decided to use the ARCH test method to test the heteroskedasticity of the model. The results are shown in Table 5 . At the 95% confidence level, n $R^2$= 1.7702, the probability is 0.1834, which is significantly greater than 0.05, so there is no heteroskedasticity in the model, and the heteroscedasticity test is passed .

*Table 5: ARCH test results*

| Heteroskedasticity Test: ARCH | | | |
|---|---|---|---|
| F-statistic | 1.736931 | Prob.F(1,12) | 0.2121 |
| Obs*R-squared | 1.770194 | Prob. Chi-Square(1) | 0.1834 |

### 4.3.7. Autocorrelation test

If the model has autocorrelation, the validity of its estimation results will be greatly reduced. In this paper, the partial correlation coefficient method is used to test whether there is autocorrelation in the model. The final result is shown in Figure 1.
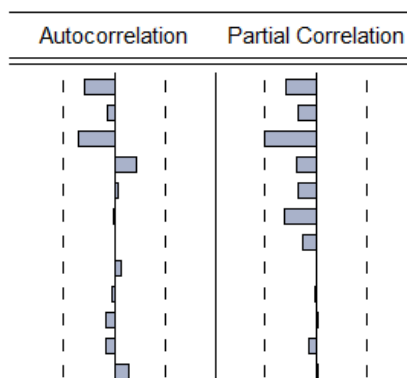


*Figure 1: Autocorrelation test results*

It can be seen from Figure 1 that the squares of the partial correlation coefficients of each period are all within the dotted line position, indicating that the model does not have autocorrelation , and the autocorrelation test has passed.

## 5. Conclusions and suggestion

According to the model results, the per capita GNP of the host country and the proportion of the host country's natural resource rent to GDP have a significant effect on China's direct investment stock in Central and Western Asia, which proves that China's investment in it has a strong market purpose and natural resource seeking. The number of laborers in the host country has a negative correlation with the amount of Chinese investment in it, which means that China's investment does not focus on labor-intensive industries, which is different from our traditional view. In order to help Chinese enterprises adjust the direction of investment and operation in a timely manner and provide reference for the government's macro-control, this paper puts forward the following suggestions:

China should play an economic leading role in foreign investment and achieve win-win development with the host country. At present, the spread of the new crown epidemic has brought many obstacles to international investment. Chinese companies directly invest in existing countries with larger markets, although they will bring more benefits in a short period of time, but if they invest in infrastructure construction, high-tech industries, etc. to promote its economic development, but also to expand its market demand, and ultimately obtain longer-term and far-reaching benefits.

Chinese enterprises should diversify their investment directions and accelerate the transformation of the way they participate in the global value chain. With the decoupling of Sino-US trade, it is difficult to export high-tech products. China's foreign direct investment should not only focus on the natural endowment level of the host country and produce low-value primary processed products, but should shift to the direction of high-tech industries and increase the added value of products. improve its international competitiveness.

The Chinese government can issue a series of supporting policies to improve the efficiency of enterprises' foreign investment. For example, in terms of capital, companies are allowed to apply for preferential loans to reduce their financing costs; in terms of production, priority is given to supplying equipment and raw materials to overseas investment companies to ensure their production capacity; in terms of personnel, the training of senior personnel and technical personnel of the company is strengthened and Provide subsidies to improve their innovation capabilities.

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