# Research on the Influencing Factors of China′s Commodity Import Based on Multiple Linear Regression Model

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## Abstract

**Since the reform and opening-up, China's economy has developed rapidly and the degree of foreign trade has been continuously improved. In order to better understand the regularity of China's commodity imports and the impact of slowing down the trade surplus, this paper judges the direction of each factor affecting the commodity imports through the relevant data of China's commodity imports and GDP from 2001 to 2020, and makes an empirical analysis. The multivariate linear regression model is established by the least squares method, and the model is tested and modified by statistical inference test, multicollinearity test, heteroscedasticity test and autocorrelation test. Finally, the model and corresponding conclusions are obtained, and suggestions and countermeasures are put forward according to the results.**

## Keywords

**Multiple Linear Regression Model; Commodity Imports; GDP; CPI.**

## 1. Introduction

### 1.1 The Research Background

Since the reform and opening-up, with the development of economy, people's living standards have been continuously improved. The main contradiction in China has been transformed into the contradiction between people's growing needs for a better life and unbalanced development. How to solve the current contradiction is a problem that the country has been thinking about. Measures such as Supply-side Structural Reform, Regional Coordinated Development Strategy and Rural Revitalization Strategy have been taken to promote economic development towards a high-quality stage. In recent years, great changes have taken place in China's commodity imports, which have been rising from 1,373.6 billion Yuan in 2001 to 14,087.3 billion Yuan in 2020, which has played a great role in China's economic development. In 2019, the Central Economic Work Conference proposed that one of the three plans to promote the new pattern of comprehensive opening-up is to pay more attention to imports.

Relevant data show that the balance of import and export in June 2019 is 42,752,564,000 US dollars, and from January to June 2019, the total balance of import and export is 184,995,676,000 US dollars, showing a trade surplus trend. In the six months of the first half of 2019, there was only a trade deficit in February, with a difference of -9,147,680,000 US dollars, which was mainly affected by Chinese traditional Spring Festival. On the whole, China's export volume still far exceeds the import volume, and the balance between import and export has been in a state of trade surplus for a long time. However, the long-term trade surplus may bring the expansion of foreign exchange reserves, bring greater pressure on currency appreciation, and give an excuse to international trade protectionism forces, arguing that the huge surplus reflects the undervalued currency. This increases the pressure of currency appreciation and financial risks, and increases the cost and difficulty for the reform of currency exchange rate mechanism.

### 1.2 The Significance of the Research

#### 1.2.1 Theoretical Significance

It is of great significance to analyze the influencing factors of China's commodity import and study the relationship between gross national product, consumer price index, exchange rate, commodity export volume and China's commodity import volume, so as to explore the regularity of China's commodity import volume growth and predict the development trend of commodity import volume, thus making commodity import volume a predictable economic variable.

#### 1.2.2 Practical Significance

Many people think that export trade has a greater impact on China's economic development. However, import trade also plays an irreplaceable role in a country's economic development. The increase of import volume and the opening degree of China's market can promote each other, and play a positive role in establishing an efficient system, maximizing economic benefits and promoting China's economic growth. Therefore, analyzing the influencing factors of commodity imports can not only promote the implementation of government policies, but also promote the sustainable development of economy. By studying the influencing factors of commodity imports, this paper puts forward how to expand imports and reduce the negative economic impact caused by excessive trade surplus.

### 1.3 Research Summary

The predecessors have made a series of achievements in exploring the influencing factors of China's commodity imports. J. Wang analyzed the current situation of China's import and export trade under the background of Sino US trade war and put forward corresponding strategies to strengthen the diversification of import and export trade markets and promote the development of multilateral trade; Optimize the structure of import and export trade and improve the import and export trade system. Starting from the dependence on import and export and the elasticity of import GDP growth, J.Q. Chen came to the conclusion that the increase of China's import volume played an extremely important role in GDP growth. D. Han chose national income and exchange rate as the main influencing factors in turn, thus knowing that national income is one of the main influencing factors of import volume, but for exchange rate, it has relatively weak influence on import and export volume. P.P. Li, H. Chen and J.H. Mou established multiple linear regression models to judge the direction of each factor affecting the import value of goods and make empirical analysis.

### 1.4 Research Ideas and Methods

In this paper, firstly, we find out the influencing factors of China's commodity imports by means of theory, select the sample data, and then use EVIEWS software to establish a multiple linear regression model by the least squares method. Then, we carry out economic significance test, statistical inference test and econometric test on the model, constantly revise the model according to the test results, and finally get the main factors affecting China's commodity imports. Finally, according to the results, we put forward countermeasures and suggestions.

## 2. Theoretical Model

### 2.1 Analysis of Influencing Factors

#### 2.1.1 The Level of Domestic Economic Development

The development of foreign trade has an important influence on a country's economic growth, and the amount of commodity imports belongs to the content of foreign trade. According to the information inquiry, there are many factors affecting foreign trade, the most important of which is the international economic form and the domestic economic development level. Gross domestic product (GDP) is an important indicator of economic growth, showing the level of a country's productivity and having an important impact on a country's imports. The larger the value of GDP, the higher the level of economic development, the strengthening of people's purchasing power for goods and the increasing demand for imported goods.

#### 2.1.2 Exchange Rate

The exchange rate will have a significant impact on a country's import and export. The rise of RMB's foreign currency exchange rate will lead to the increase of RMB's purchasing power. At the same time, people's desire to buy more goods will increase the total amount of imports. On the contrary, the decrease of exchange rate will lead to the decrease of total import.

#### 2.1.3 Price

H-O Theorem can be expressed as a country exporting its relatively rich and cheap factor-intensive products and importing its relatively scarce and expensive factor-intensive products. The root cause of international trade lies in the different factor endowments of different countries, and the difference of relative prices among countries is the basis of international trade. The higher the price level, the lower the purchasing power of money, thus reducing the demand for imported goods.

#### 2.1.4 Export Volume

Import and export constitute China's foreign trade, and the total amount of import and export is an important index to measure the level of a country's foreign trade, and the export amount will affect the import amount to a certain extent.

#### 2.1.5 Other Factors

There are many factors that affect China's commodity imports, and other factors, such as urban and rural residents' savings, foreign exchange reserves, anti-dumping rates, etc. will also affect the import volume.

### 2.2 Variable Selection

In this paper, GDP is selected as the index of national economic development level and the explanatory variable X1; Selecting CPI as the index of price level and the explanatory variable X2; Select commodity export value as the explanatory variable X3; Select the exchange rate of RMB to US dollar as the exchange rate index and the explanatory variable X4; China's imports of goods are selected as the explained variable Y. Other factors are considered as random error items in the model.

### 2.3 Data Collection

By searching the National Bureau of Statistics, China Economic Information Network, China Statistical Yearbook and other data, this paper selects some data from 2001 to 2020, including China's commodity import value (Y), GDP (X1), CPI (X2), commodity export value (X3) and RMB-USD exchange rate (X4) from 2001 to 2020. Relevant data are as follows:

Table 1. Relevant economic data from 2001 to 2020

| Year | Commodity import value(Y) | GDP( X1) | CPI( X2) | Commodity export value(X3) | RMB-USD exchange rate(X4) |
|---|---|---|---|---|---|
| 2001 | 13736.46 | 90564.4 | 432.2 | 164176.7 | 827.83 |
| 2002 | 18638.81 | 100280.1 | 434 | 153309.4 | 827.84 |
| 2003 | 20159.18 | 110863.1 | 437 | 138419.3 | 827.7 |
| 2004 | 24430.27 | 121717.4 | 433.5 | 141166.8 | 827.7 |
| 2005 | 34195.56 | 137422 | 438.7 | 143883.8 | 827.7 |
| 2006 | 46435.76 | 161840.2 | 455.8 | 137131.4 | 827.68 |
| 2007 | 54273.68 | 187318.9 | 464 | 129359.3 | 819.17 |
| 2008 | 63376.86 | 219438.5 | 471 | 123240.6 | 797.18 |
| 2009 | 73296.93 | 270092.3 | 493.6 | 107022.8 | 760.4 |
| 2010 | 79526.53 | 319244.6 | 522.7 | 82029.69 | 694.51 |
| 2011 | 68618.37 | 348517.7 | 519 | 100394.9 | 683.1 |
| 2012 | 94699.5 | 412119.3 | 536.1 | 93627.14 | 676.95 |
| 2013 | 113161.4 | 487940.2 | 565 | 77597.89 | 645.88 |
| 2014 | 114801 | 538580 | 579.7 | 62648.09 | 631.25 |
| 2015 | 121037.5 | 592963.2 | 594.8 | 49103.33 | 619.32 |
| 2016 | 120358 | 641280.6 | 606.7 | 36287.89 | 614.28 |
| 2017 | 104336.1 | 685992.9 | 615.2 | 26947.87 | 622.84 |
| 2018 | 104967.2 | 740060.8 | 627.5 | 22024.44 | 664.23 |
| 2019 | 124789.8 | 820754.3 | 637.5 | 20634.44 | 675.18 |
| 2020 | 140873.7 | 900309.5 | 650.9 | 16159.77 | 661.74 |

### 2.4 Select the Model

In order to understand the relationship between China's commodity imports and GDP, commodity exports, CPI and exchange rate, a multiple linear regression model is established. Firstly, the model is set as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \mu_i$$

# 3. The Empirical Analysis

## 3.1 Model Estimation

### 3.1.1 Analysis of Correlation Chart and Trend Chart

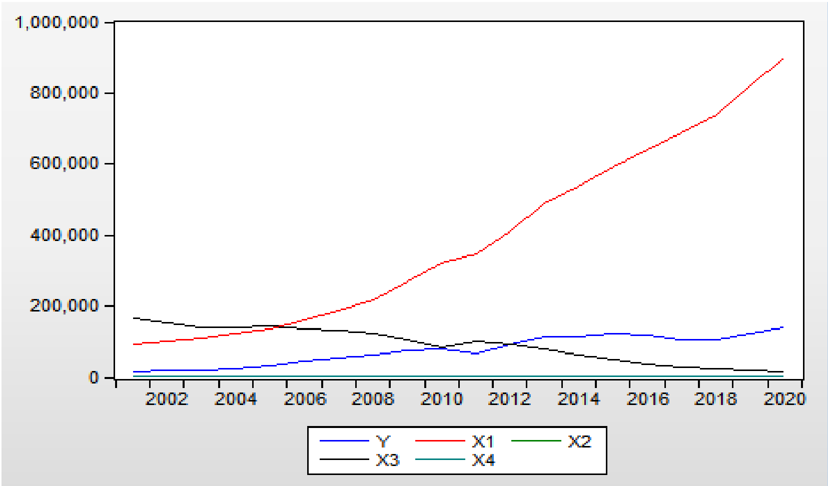



Figure 1. Trend chart

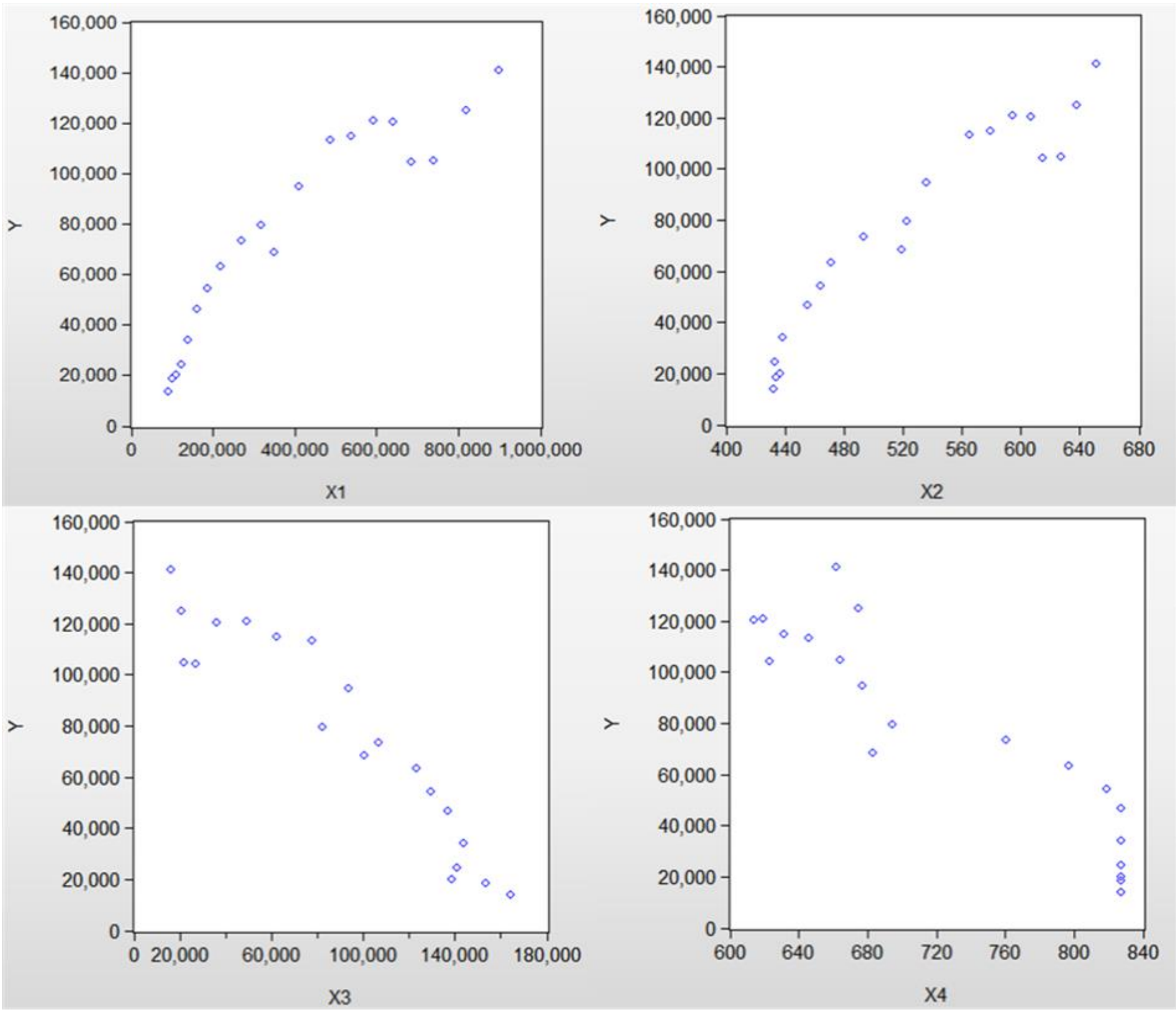



Figure 2. Correlation Chart

It can be concluded from the correlation graph and trend graph that the explanatory variables X1, X2, X3 and X4 are linearly related to the interpreted variable Y .

### 3.1.2 Least Squares Estimation

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -417710.0 | 461714.6 | -0.904693 | 0.3799 |
| X1 | -0.094123 | 0.148046 | -0.635771 | 0.5345 |
| X2 | 998.1114 | 749.2253 | 1.332191 | 0.2027 |
| X3 | 0.346010 | 0.421525 | 0.820854 | 0.4246 |
| X4 | -34.01183 | 150.7730 | -0.225583 | 0.8246 |

| | | | |
|---|---|---|---|
| R-squared | 0.932062 | Mean dependent var | 76785.63 |
| Adjusted R-squared | 0.913946 | S.D. dependent var | 40861.03 |
| S.E. of regression | 11986.60 | Akaike info criterion | 21.83328 |
| Sum squared resid | 2.16E+09 | Schwarz criterion | 22.08222 |
| Log likelihood | -213.3328 | Hannan-Quinn criter. | 21.88188 |
| F-statistic | 51.44762 | Durbin-Watson stat | 0.736017 |
| Prob(F-statistic) | 0.000000 | | |

Figure 3. Least squares estimation

After fitting the data with EVIEWS software and establishing a multiple linear regression model, we found that the explanatory variables and constants did not pass the t-test, which may be due to the unreasonable setting of the model. Therefore, we refer to the relevant research, transform the model form, and establish a logarithmic model:

$$lnY = \beta_0 + \beta_1\, lnX_1 + \beta_2\, lnX_2 + \beta_3\, lnX_3 + \beta_4\, lnX_4 + \mu_i$$

where $\mu_i$ is a random error term.

### 3.1.3 Analysis of Correlation Chart and Trend Chart

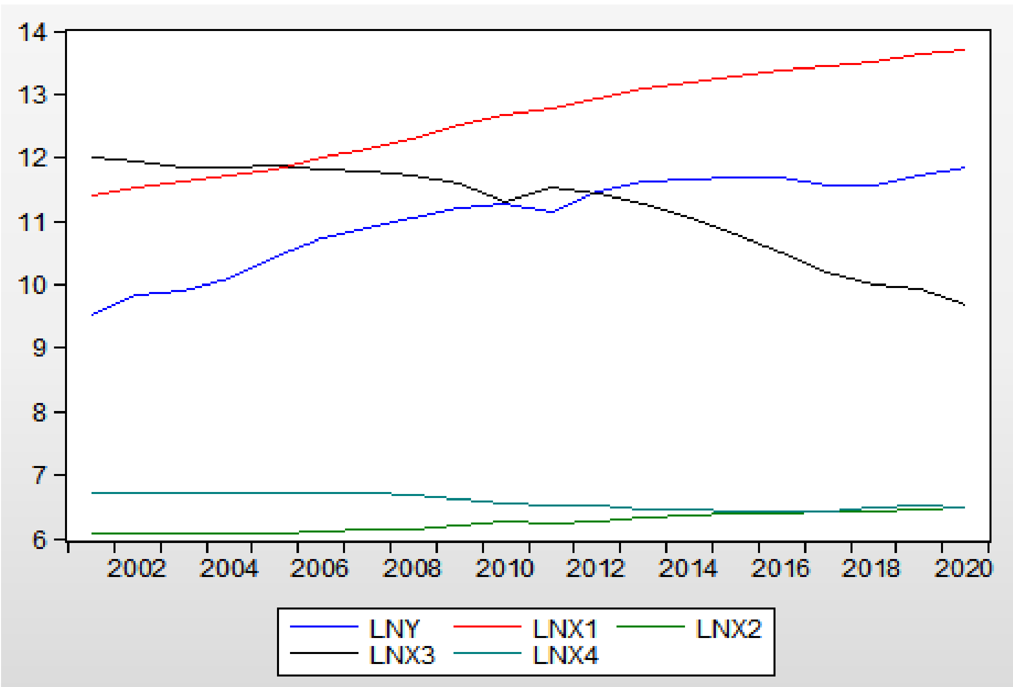



Figure 4. Trend chart

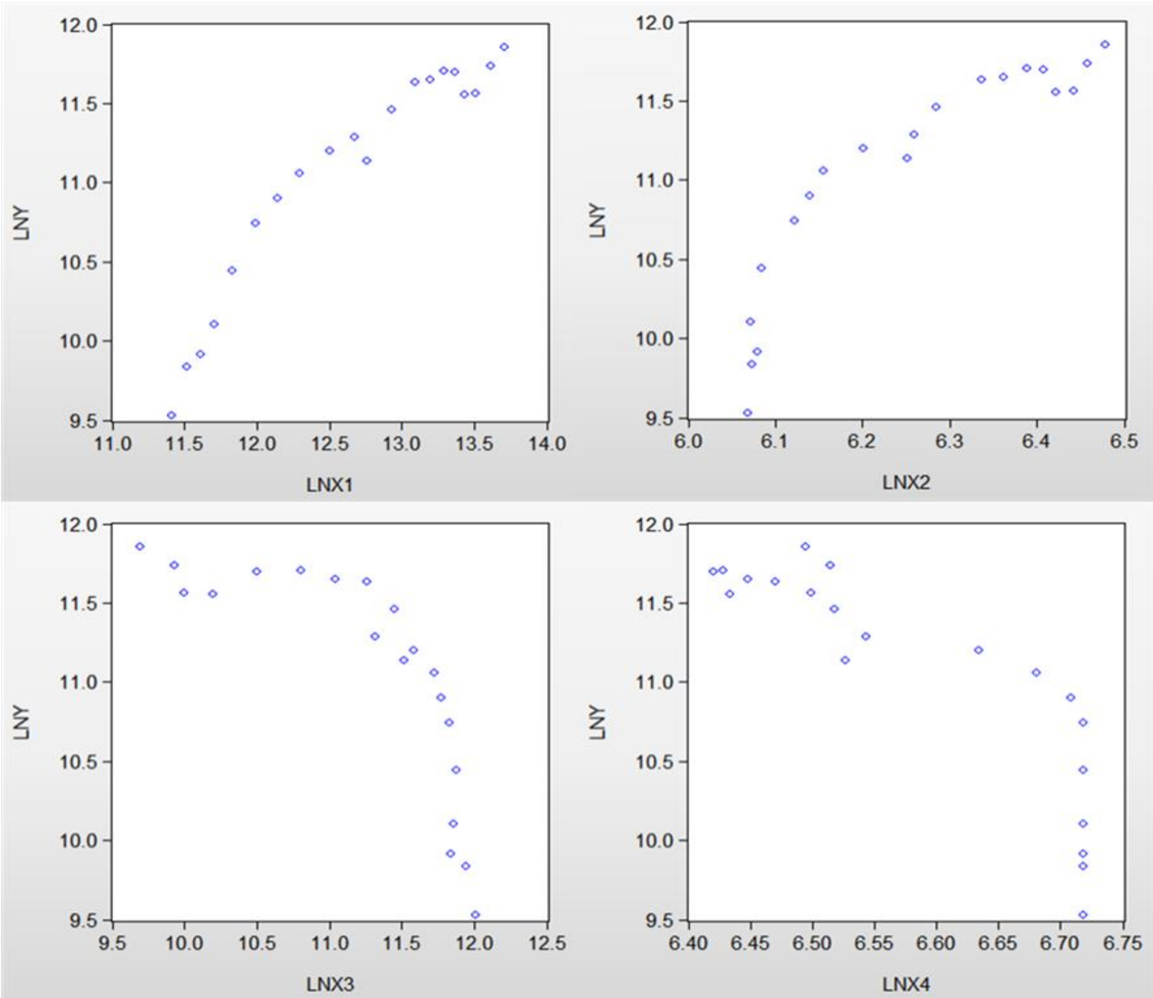



Figure 5. Correlation Chart

According to the correlation graph and trend graph, the explanatory variables X1, X2, X3, X4 and the interpreted variable Y are generally linearly non-correlated.

#### 3.1.4 Least Squares Estimation

Use EVIEWS software to get the following results:

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -12.74109 | 23.31206 | -0.546545 | 0.5927 |
| LNX1 | 2.076559 | 0.298018 | 6.967889 | 0.0000 |
| LNX2 | -2.869569 | 2.880738 | -0.996123 | 0.3350 |
| LNX3 | 0.457274 | 0.213233 | 2.144482 | 0.0488 |
| LNX4 | 1.577646 | 1.050814 | 1.501356 | 0.1540 |

| | | | |
|---|---|---|---|
| R-squared | 0.979738 | Mean dependent var | 11.04987 |
| Adjusted R-squared | 0.974334 | S.D. dependent var | 0.722441 |
| S.E. of regression | 0.115739 | Akaike info criterion | -1.262647 |
| Sum squared resid | 0.200931 | Schwarz criterion | -1.013714 |
| Log likelihood | 17.62647 | Hannan-Quinn criter. | -1.214053 |
| F-statistic | 181.3225 | Durbin-Watson stat | 1.673333 |
| Prob(F-statistic) | 0.000000 | | |

Figure 6. Least squares estimation

$$lnY = -12.7411 + 2.0766\,lnX_1 - 2.8696\,lnX_2 + 0.4573\,lnX_3 + 1.5776\,lnX_4$$

Se =(23.3121) (0.2980) (2.8807) (0.2132) (1.0508)

t =(-0.5465) (6.9679) (-0.9961) (2.1445) (1.5014)

$R^2 = 0.9797$ $\overline{R^2} = 0.9743$ F=181.3225 DW=1.6733

## 3.2 The Model Test

### 3.2.1 Economic Significance Test

The symbols and sizes of LNX1, LNX2, LNX3 and LNX4 coefficients are all in line with the actual situation and pass the economic significance test.

### 3.2.2 Statistical Inference Test

#### 3.2.2.1 Goodness of Fit Test

$R^2$=0.9797, which is close to 1, indicating that the model has high goodness of fit.

#### 3.2.2.2 F Test

Take the significance level α =0.05, F=181.3225, which is greater than the critical value, and the P value of 0.0000 is also significantly less than the significant levelαIt shows that the explanatory variables have a significant influence on the import value Y as a whole, and the model passes the F test.

#### 3.2.2.3 T Test

Given the significance levelα =0.05, look up the t distribution table with degree of freedom (n-k-1), and get the critical value $t_{\alpha/2}$ (n-k-1)=2.1315. By comparison, it can be concluded that both GDP and commodity exports have an impact on commodity imports. However, due to multicollinearity and other reasons, the T test of explanatory variables failed, so we tested the model by econometrics.

### 3.2.3 Multicollinearity Test

#### 3.2.3.1 Correlation Coefficient Test

| | LNX1 | LNX2 | LNX3 | LNX4 |
|---|---|---|---|---|
| LNX1 | 1.000000 | 0.988687 | -0.905744 | -0.925585 |
| LNX2 | 0.988687 | 1.000000 | -0.942084 | -0.927068 |
| LNX3 | -0.905744 | -0.942084 | 1.000000 | 0.775606 |
| LNX4 | -0.925585 | -0.927068 | 0.775606 | 1.000000 |

Figure 7. Correlation coefficient test

Because there are too many influencing factors, before estimating the model, we should first analyze the relationship between each factor and the explained variables and the correlation degree between each influencing factor, and use the correlation coefficient test method to judge whether the model has multicollinearity. It can be seen from the above table that the correlation coefficient between variables is very high, which proves that there is serious multicollinearity in explanatory variables.

#### 3.2.3.2 Auxiliary Regression Equation Test

When there are more than two explanatory variables and there is a complicated correlation between them, we can test multicollinearity by establishing an auxiliary regression model between explanatory variables. Do the following in EVIEWS software:

Enter Ls lnX1 c lnX2 lnX3 lnX4

Ls lnX2 c lnX1 lnX3 lnX4

Ls lnX3 c lnX1 lnX2 lnX4

Ls lnX4 c lnX1 lnX2 lnX3

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -55.03133 | 13.89802 | -3.959653 | 0.0011 |
| LNX2 | 8.395599 | 1.197693 | 7.009812 | 0.0000 |
| LNX3 | 0.445005 | 0.140070 | 3.177019 | 0.0059 |
| LNX4 | 1.544750 | 0.792403 | 1.949448 | 0.0690 |

| | | | |
|---|---|---|---|
| R-squared | 0.986558 | Mean dependent var | 12.63153 |
| Adjusted R-squared | 0.984038 | S.D. dependent var | 0.768481 |
| S.E. of regression | 0.097090 | Akaike info criterion | -1.649497 |
| Sum squared resid | 0.150824 | Schwarz criterion | -1.450350 |
| Log likelihood | 20.49497 | Hannan-Quinn criter. | -1.610621 |
| F-statistic | 391.4451 | Durbin-Watson stat | 0.802559 |
| Prob(F-statistic) | 0.000000 | | |

Figure 8. Least squares estimation 1

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 7.776655 | 0.559599 | 13.89683 | 0.0000 |
| LNX1 | 0.089853 | 0.012818 | 7.009812 | 0.0000 |
| LNX3 | -0.067061 | 0.007833 | -8.561124 | 0.0000 |
| LNX4 | -0.289557 | 0.055461 | -5.220885 | 0.0001 |

| | | | |
|---|---|---|---|
| R-squared | 0.996147 | Mean dependent var | 6.254326 |
| Adjusted R-squared | 0.995425 | S.D. dependent var | 0.148498 |
| S.E. of regression | 0.010044 | Akaike info criterion | -6.186790 |
| Sum squared resid | 0.001614 | Schwarz criterion | -5.987644 |
| Log likelihood | 65.86790 | Hannan-Quinn criter. | -6.147915 |
| F-statistic | 1379.003 | Durbin-Watson stat | 1.175471 |
| Prob(F-statistic) | 0.000000 | | |

Figure 9. Least squares estimation 2

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 103.3694 | 8.899090 | 11.61573 | 0.0000 |
| LNX1 | 0.869246 | 0.273604 | 3.177019 | 0.0059 |
| LNX2 | -12.23973 | 1.429688 | -8.561124 | 0.0000 |
| LNX4 | -4.040221 | 0.705421 | -5.727391 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.972735 | Mean dependent var | 11.20670 |
| Adjusted R-squared | 0.967623 | S.D. dependent var | 0.754130 |
| S.E. of regression | 0.135695 | Akaike info criterion | -0.979957 |
| Sum squared resid | 0.294610 | Schwarz criterion | -0.780810 |
| Log likelihood | 13.79957 | Hannan-Quinn criter. | -0.941081 |
| F-statistic | 190.2792 | Durbin-Watson stat | 1.128902 |
| Prob(F-statistic) | 0.000000 | | |

Figure 10. Least squares estimation 3

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 20.48701 | 2.127882 | 9.627887 | 0.0000 |
| LNX1 | 0.124249 | 0.063735 | 1.949448 | 0.0690 |
| LNX2 | -2.176159 | 0.416818 | -5.220885 | 0.0001 |
| LNX3 | -0.166365 | 0.029047 | -5.727391 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.955104 | Mean dependent var | 6.581651 |
| Adjusted R-squared | 0.946687 | S.D. dependent var | 0.119254 |
| S.E. of regression | 0.027535 | Akaike info criterion | -4.169827 |
| Sum squared resid | 0.012131 | Schwarz criterion | -3.970681 |
| Log likelihood | 45.69827 | Hannan-Quinn criter. | -4.130952 |
| F-statistic | 113.4610 | Durbin-Watson stat | 1.142572 |
| Prob(F-statistic) | 0.000000 | | |

Figure 11. Least squares estimation 4

The F test value of each regression equation is very significant, and the T test value of regression coefficient shows that the T test values of lnX1 and lnX4 are small, and they may not be related or have a small degree of correlation.

#### 3.2.3.3 Variance Expansion Factor Test

| Variable | Coefficient Variance | Uncentered VIF | Centered VIF |
|---|---|---|---|
| C | 543.4521 | 811399.4 | NA |
| LNX1 | 0.088815 | 21232.26 | 74.39595 |
| LNX2 | 8.298653 | 484925.0 | 259.5631 |
| LNX3 | 0.045468 | 8562.523 | 36.67736 |
| LNX4 | 1.104210 | 71438.17 | 22.27393 |

Figure 12. Variance expansion factor test

According to the above auxiliary regression model, VIF1=74.3960, VIF2=259.5631, VIF3=36.6774 and VIF4=22.2739 are all greater than 10, and there are serious multicollinearity among explanatory variables lnX1, lnX2, lnX3 and lnX4.

#### 3.2.3.4 Stepwise Regression Method

Irrelevant variables are eliminated by stepwise regression method. First, single explanatory variables are regressed separately, and the results are shown in the following table:

Table 2. Univariate regression results

| Explanatory variable | $\ln X1$ | $\ln X2$ | $\ln X3$ | $\ln X4$ |
|---|---|---|---|---|
| Parameter estimation | 0.8953 | 4.3928 | -0.7752 | -5.2526 |
| T statistic | 13.2461 | 8.9143 | -5.0506 | -7.3837 |
| $\bar{R}^2$ | 0.9070 | 0.8153 | 0.5842 | 0.7518 |

The adjusted $R^2$ of the equation with lnX1 is the largest. based on lnX1, other variables are added in sequence for stepwise regression, and the results are shown in the following table:

Table 3. Regression results of adding new variables 1

| variable | $\ln X1$ | $\ln X2$ | $\ln X3$ | $\ln X4$ | $R^2$ |
|---|---|---|---|---|---|
| $\ln X1$, $\ln X2$ | 2.4908 (10.019) | -8.3513 (-6.4914) | | | 0.9732 |
| lnX1, lnX3 | 1.3545 (12.4668) | | 0.5167 (4.6667) | | 0.9592 |
| lnX1, lnX4 | 0.9829 (5.3917) | | | 0.0697 (0.519) | 0.9084 |

By comparison, the adjusted $R^2$=0.9732 of the equation newly added with lnX2 is the largest, and the test of each parameter T (value in brackets) is significant, so lnX2 is reserved, and then other variables are added for stepwise regression. Then add other variables for stepwise regression, and the results are shown in the following table:

Table 4. Regression results of adding new variables 2

| variable | $\ln X1$ | $\ln X2$ | $\ln X3$ | $\ln X4$ | $R^2$ |
|---|---|---|---|---|---|
| $\ln X1$, $\ln X2$, lnX4 | 2.4740 (9.5789) | -8.4665 (-6.2732) | | -0.2698 (-0.4052) | 0.9735 |
| $\ln X1$, $\ln X2$, $\ln X3$ | 2.2726 (8.1690) | -6.3029 (-3.4643) | 0.1948 (1.5365) | | 0.9767 |

After adding lnX4 to lnX1 and lnX2, the adjusted $R^2$ has little change, but the T test of lnX4 parameters is not significant, and it is unreasonable that the parameters are negative. The equation after lnX3 is added, and lnX3 fails the t test, so it shows that lnX3 and lnX4 cause serious multicollinearity and should be eliminated. Finally, the regression results of correcting multicollinearity influence are shown in table:

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 31.81921 | 4.964115 | 6.409844 | 0.0000 |
| LNX1 | 2.490804 | 0.248601 | 10.01927 | 0.0000 |
| LNX2 | -8.351340 | 1.286522 | -6.491407 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.973254 | Mean dependent var | 11.04987 |
| Adjusted R-squared | 0.970107 | S.D. dependent var | 0.722441 |
| S.E. of regression | 0.124907 | Akaike info criterion | -1.185018 |
| Sum squared resid | 0.265229 | Schwarz criterion | -1.035658 |
| Log likelihood | 14.85018 | Hannan-Quinn criter. | -1.155862 |
| F-statistic | 309.3021 | Durbin-Watson stat | 1.628016 |
| Prob(F-statistic) | 0.000000 | | |

Figure 13. Least squares estimation

Determine the equation form as follows: $lnY = 31.8192 + 2.4908\, lnX_1 - 8.3513\, lnX_2$

### 3.2.4 Economic Significance Test

The symbols and sizes of LnX1 and lnX2 coefficients are in line with the actual situation and pass the economic significance test.

### 3.2.5 Statistical Inference Test

#### 3.2.5.1 Goodness of Fit Test

$R^2$=0.9733, which is close to 1, indicating that the model has high goodness of fit.

#### 3.2.5.2 F Test

Take the significance level α =0.05, F=309.3021, which is greater than the critical value, and the P value of 0.0000 is also significantly less than the significant levelαIt shows that the explanatory variables as a whole have a significant influence on the import value of goods, and the model passes F test.

#### 3.2.5.3 T Test

Given the significance level α = 0.05,look up the t distribution table with degree of freedom (n-k-1) and get the critical value $t_{\alpha/2}$ (n-k-1)=2.1315. The absolute values of lnx1 and lnx2 T tests are all greater than 2.1315, and the corresponding P values are all 0.0000, which is less than the significant level α. It shows that the explanatory variables as a whole have a significant influence on the import value of goods, and the model passes the T test.

### 3.2.6 Heteroscedasticity Test

#### 3.2.6.1 Correlation Chart Analysis

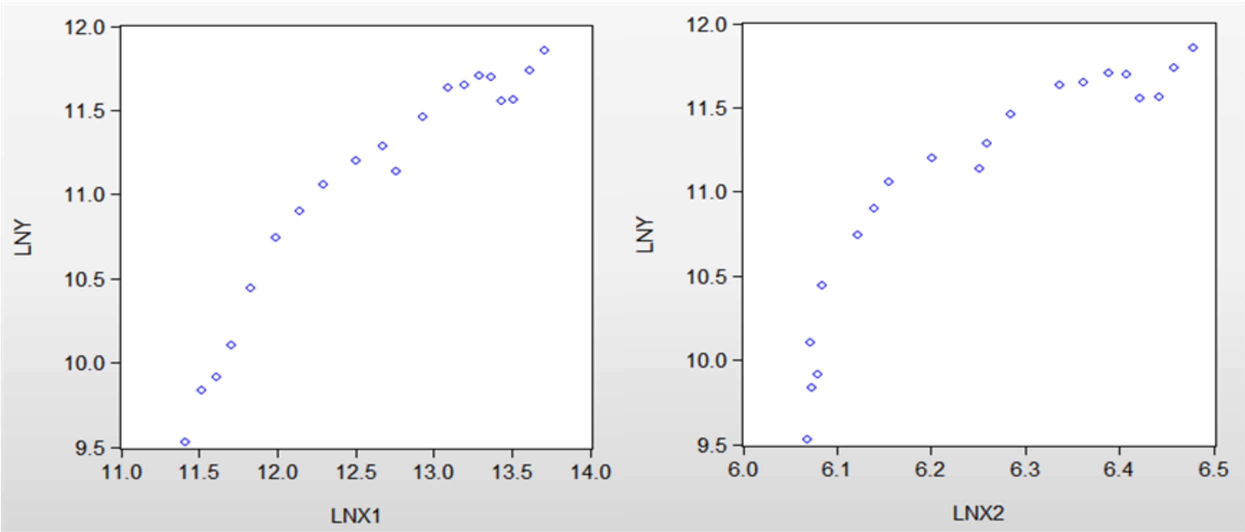



Figure 14. Correlation Chart

It can be seen from the figure that with the increase of lnX1 and lnX2, lnY is continuously improved, but the degree of dispersion is gradually expanded. This shows that there may be increasing heteroscedasticity among variables.

#### 3.2.6.2 White Test

| | | | |
|---|---|---|---|
| F-statistic | 0.776849 | Prob. F(4,15) | 0.5572 |
| Obs*R-squared | 3.432183 | Prob. Chi-Square(4) | 0.4883 |
| Scaled explained SS | 1.690806 | Prob. Chi-Square(4) | 0.7924 |

Figure 15. White Test

White test is used in EVIEWS to test whether the model has heteroscedasticity. Take the significant level $\alpha = 0.05$, due to $\chi^2_{0.05}(3) = 7.81 > nR^2 = 3.4322$, accept the original hypothesis, there is no heteroscedasticity in the model.

#### 3.2.6.3 Park Test

It can be seen from figure 16 that the value of F statistics generated by Park test is small, and the corresponding P value is 0.9435>0.05, indicating that it failed the F test; The T statistics generated by Park test are all small, and their corresponding P values are all greater than 0.05, which indicates that they have failed the T test, so the original hypothesis is accepted, and there is no strong correlation between the variance of random error terms and explanatory variables, that is, the model does not have heteroscedasticity.

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -16.90425 | 81.74168 | -0.206801 | 0.8386 |
| LNX1 | -0.254388 | 4.093598 | -0.062143 | 0.9512 |
| LNX2 | 2.369386 | 21.18454 | 0.111845 | 0.9123 |

| | | | |
|---|---|---|---|
| R-squared | 0.006823 | Mean dependent var | -5.298642 |
| Adjusted R-squared | -0.110021 | S.D. dependent var | 1.952189 |
| S.E. of regression | 2.056778 | Akaike info criterion | 4.417640 |
| Sum squared resid | 71.91572 | Schwarz criterion | 4.567000 |
| Log likelihood | -41.17640 | Hannan-Quinn criter. | 4.446796 |
| F-statistic | 0.058396 | Durbin-Watson stat | 1.537105 |
| Prob(F-statistic) | 0.943465 | | |

Figure 16. Park Test

### 3.2.6.4 Gleiser Test

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 2.404735 | 2.613462 | 0.920134 | 0.3704 |
| LNX1 | 0.124356 | 0.130881 | 0.950146 | 0.3554 |
| LNX2 | -0.620158 | 0.677317 | -0.915610 | 0.3727 |

| | | | |
|---|---|---|---|
| R-squared | 0.051759 | Mean dependent var | 0.096877 |
| Adjusted R-squared | -0.059799 | S.D. dependent var | 0.063878 |
| S.E. of regression | 0.065760 | Akaike info criterion | -2.468137 |
| Sum squared resid | 0.073514 | Schwarz criterion | -2.318777 |
| Log likelihood | 27.68137 | Hannan-Quinn criter. | -2.438980 |
| F-statistic | 0.463963 | Durbin-Watson stat | 1.929483 |
| Prob(F-statistic) | 0.636518 | | |

Figure 17. Gleiser test

It can be seen from the figure that the value of F statistics generated by Gleiser test is small, and the corresponding P value is 0.6365>0.05, indicating that it failed the F test; The T statistics generated by Gleiser test are all small, and their corresponding P values are all greater than 0.05, indicating that they have failed the T test, so the original hypothesis is accepted, and the model has no heteroscedasticity.

### 3.2.6.5 ARCH Test

Figure 18 shows the results when the lag period is 8, in which the (n-p)$R^2$ of lag phase 8 is the largest, (n-p)$R^2$ =6.4738< $\chi_{\alpha}^2(p) = \chi_{0.05}^2(8) = 15.5073$, the results show that there is no heteroscedasticity in the model.

| | | | |
|---|---|---|---|
| F-statistic | 0.439309 | Prob. F(8,3) | 0.8433 |
| Obs*R-squared | 6.473844 | Prob. Chi-Square(8) | 0.5943 |

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.031058 | 0.034896 | 0.890033 | 0.4390 |
| RESID^2(-1) | 0.388668 | 0.487251 | 0.797674 | 0.4834 |
| RESID^2(-2) | -0.402344 | 0.473522 | -0.849682 | 0.4579 |
| RESID^2(-3) | -0.293270 | 0.476167 | -0.615898 | 0.5815 |
| RESID^2(-4) | 0.153414 | 0.469970 | 0.326433 | 0.7655 |
| RESID^2(-5) | -0.238157 | 0.507213 | -0.469541 | 0.6707 |
| RESID^2(-6) | -0.342063 | 0.442609 | -0.772835 | 0.4959 |
| RESID^2(-7) | 0.292175 | 0.413576 | 0.706460 | 0.5308 |
| RESID^2(-8) | -0.496358 | 0.438451 | -1.132072 | 0.3399 |

| | | | |
|---|---|---|---|
| R-squared | 0.539487 | Mean dependent var | 0.014967 |
| Adjusted R-squared | -0.688548 | S.D. dependent var | 0.017799 |
| S.E. of regression | 0.023129 | Akaike info criterion | -4.581723 |
| Sum squared resid | 0.001605 | Schwarz criterion | -4.218043 |
| Log likelihood | 36.49034 | Hannan-Quinn criter. | -4.716371 |
| F-statistic | 0.439309 | Durbin-Watson stat | 2.490203 |
| Prob(F-statistic) | 0.843279 | | |

Figure 18. ARCH test

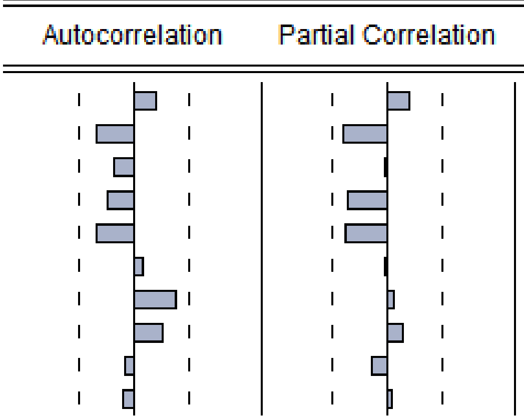
### 3.2.7 Autocorrelation Test

#### 3.2.7.1 DW Test

Because n=20, k=1, when the significance level $\alpha$ =0.05, according to the table $d_L$=1.10, $d_U$=1.54 and DW=1.6280 >$d_U$, so there is no first-order autocorrelation in the model.

#### 3.2.7.2 Partial Correlation Coefficient Test

In EVIEWS software, the autocorrelation coefficient and partial correlation coefficient of each period are as follows:




| | AC | PAC | Q-Stat | Prob |
|---|---|---|---|---|
| 1 | 0.183 | 0.183 | 0.7764 | 0.378 |
| 2 | -0.315 | -0.361 | 3.2043 | 0.201 |
| 3 | -0.165 | -0.024 | 3.9081 | 0.272 |
| 4 | -0.208 | -0.328 | 5.1003 | 0.277 |
| 5 | -0.305 | -0.343 | 7.8333 | 0.166 |
| 6 | 0.076 | -0.022 | 8.0160 | 0.237 |
| 7 | 0.344 | 0.041 | 12.030 | 0.100 |
| 8 | 0.239 | 0.125 | 14.130 | 0.078 |
| 9 | -0.066 | -0.119 | 14.303 | 0.112 |
| 10 | -0.091 | 0.036 | 14.671 | 0.145 |

Figure 19. Correlation coefficient

It can be seen from the above figure that the straight squares of partial correlation coefficient does not exceed the dotted line, indicating that there is no first-order and high-order autocorrelation in China's commodity import model.

#### 3.2.7.3 BG Test

In EVIEWS software, the results of lag period 1 and lag period 2 are as follows:

| | | | |
|---|---|---|---|
| F-statistic | 1.478616 | Prob. F(2,15) | 0.2594 |
| Obs*R-squared | 3.293639 | Prob. Chi-Square(2) | 0.1927 |

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 06/11/20 Time: 22:54
Sample: 2000 2019
Included observations: 20
Presample missing value lagged residuals set to zero.

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 1.006543 | 4.909374 | 0.205025 | 0.8403 |
| LNX1 | 0.054524 | 0.246281 | 0.221389 | 0.8278 |
| LNX2 | -0.270815 | 1.273441 | -0.212664 | 0.8345 |
| RESID(-1) | 0.247962 | 0.240205 | 1.032290 | 0.3183 |
| RESID(-2) | -0.378478 | 0.246775 | -1.533700 | 0.1459 |

| | | | |
|---|---|---|---|
| R-squared | 0.164682 | Mean dependent var | -3.20E-15 |
| Adjusted R-squared | -0.058069 | S.D. dependent var | 0.118150 |
| S.E. of regression | 0.121532 | Akaike info criterion | -1.164961 |
| Sum squared resid | 0.221550 | Schwarz criterion | -0.916028 |
| Log likelihood | 16.64961 | Hannan-Quinn criter. | -1.116366 |
| F-statistic | 0.739308 | Durbin-Watson stat | 2.059681 |
| Prob(F-statistic) | 0.579681 | | |

Figure 20. BG test

As can be seen from the above figure, $nR^2$=3.2936, critical probability P=0.1927>0.05, so there is no autocorrelation in the auxiliary regression model.

### 3.3 The Results of the Model

The estimated results of the final model in this paper are as follows: $lnY = 31.8192 + 2.4908\, lnX_1 - 8.3513\, lnX_2$

The model shows that with other variables unchanged, for every 1% increase in GDP, China's commodity imports will increase by 2.4908% on average; for every 1% decrease in CPI, China's commodity imports will decrease by 8.3513% on average.

## 4. Conclusions and Suggestions

### 4.1 Conclusion

#### 4.1.1 The Degree of National Economic Development Affects the Purchasing Power of Foreign Commodities

The GDP calculated by expenditure method is composed of four parts. Consumption, investment, government purchase, import and export together have an impact on the domestic economic development level, while a country's economic development level affects the purchasing power of foreign goods. A country's high level of economic development shows that people's living standards are constantly improving and their purchasing power for commodities is increasing. At the same time, the degree of import and export trade also affects China's economic development, consumption, investment, import and export Troika go hand in hand.

#### 4.1.2 The Domestic Price Level Has An Impact on Import and Export Trade

The price level determines the purchasing power of a country's people. The higher the price, the lower the purchasing power of money. When the price level is too high, even if people hold a large amount of money in their hands, they will not generate a large amount of effective demand for commodities, so they will also reduce the demand for imported commodities, thus reducing the growth rate of commodity imports.

### 4.2 Suggestions

#### 4.2.1 Promote High-quality Economic Development

From the conclusion, it can be seen that the level of domestic economic development has a certain influence on the amount of commodity imports. Therefore, it is necessary to promote the stable and high-quality development of the domestic economy. At present, China's economy is in the transition stage, and there are two main lines in China's current economic transition, one is from old kinetic energy to new kinetic energy, and the other is from high-speed growth to high-quality development. In the stage of high-quality development, we are not simply pursuing the high speed of economic development, but pursuing higher efficiency, more effective supply, higher-end structure, greener, sustainable and more harmonious growth, and even partially giving up the pursuit of economic growth speed to achieve higher-quality development, thus fundamentally improving China's economic development level. Actively implement the supply-side structural reform policy, implement the concept of high-quality development, solve the current major contradictions, and improve the purchasing power of the people, thereby increasing the national demand for imported goods.

#### 4.2.2 Relying on the "The Belt and Road Initiative" Policy, Strengthen Domestic Competitiveness

The implementation of "The Belt and Road Initiative" policy makes China's trading partners diversified, the trade structure perfect, and the total trade volume constantly increasing. Under the background of The Belt and Road Initiative policy implementation, China is the initiator and guide of The Belt and Road Initiative, and actively plays the role of The Belt and Road Initiative policy. As a fast-developing country, China must accumulate sufficient funds, train high-quality talents, and upgrade its technological advancement in order to seek further improvement of its national strength. In recent years, "The Belt and Road Initiative" has built a bridge for China to spread and absorb foreign cultures. We should integrate and utilize its diffusion effect to improve China's industrial structure, speed up the adjustment of industrial structure, and increase the proportion of the tertiary industry in the total industry.

#### 4.2.3 Stabilize Import Promotion Policies and Expand Domestic Demand to Drive Imports

Expand domestic demand and increase imports. At present, the degree of globalization of the world economy is deepening, the risks in the international market are intensifying, and it is more difficult to export foreign trade. China has a vast territory, unbalanced economic development, and people's life is transition from subsistence to well-off. Both market capacity and future development have great potential, and industrialization, urbanization and modernization are accelerating, economic structure is adjusted and upgraded, and domestic market demand is further expanded. Expanding domestic demand and appropriately expanding imports can not only strengthen the balance of international accounts, but also speed up the overall domestic development and promote the development of international trade.

#### 4.2.4 Stabilize the Domestic Price Level

It can be seen from the conclusion that the consumer price index has a great influence on China's commodity imports, and the consumer price level of a country's residents is affected by prices, so it is necessary to stabilize the domestic price level as much as possible. By reducing the money supply, increasing the reserve ratio, developing social production and increasing the total social supply, the consumer price index is reduced, thus increasing the national demand for imported goods.

#### 4.2.5 Further Optimize the Industrial Structure

Further optimize the industrial structure and give full play to the role of imports. Take the initiative to use strategic imports and domestic industrial transfer, and implement the principles of openness and sharing. Through the transfer of industries in various regions in China, we will strengthen economic cooperation within regions and promote regional trade and capital flow. By optimizing the industrial structure, we can adjust the income gap between regions and individuals, so as to promote the economic growth of the whole country and achieve common prosperity.

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