

# *Research on China-Central and Eastern Europe Countries Economic and Trade Cooperation*

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**Keywords:** BRI, China, CEE, Economic and Trade Cooperation

**Abstract:** With the proposal and continuous implementation of the Belt and Road Initiative (BRI), the economic and trade relations between China and Central and Eastern Europe countries (CEEC) are also constantly improving. Together with the “16+1” cooperation mechanism between China and CEEC, bilateral economic and trade cooperation has reached a new height. This paper uses the gravity model to study the factors affecting China's exports to CEEC, conduct empirical analysis and estimate export potential.

## 1. Introduction

CEEC include: Albania, Bosnia and Herzegovina, Croatia, Bulgaria, Czech Republic, Hungary, Estonia, Latvia, Macedonia, Lithuania, Montenegro, Romania, Poland, Serbia, Slovakia, Slovenia. CEEC are at the heart of the BRI and is an important link to the Asian and European markets. At present, cooperation between China and CEEC has entered a period of rapid development. Therefore, China's strengthening of economic and trade cooperation with CEEC will inevitably bring about an expansion of trade scale and investment scale between the two sides.

## 2. Theoretical background

investment and cooperation between the two countries. Cheng Xinhe and Yang Chengyu (2016) analyzed the industrial competitiveness of China and Serbia from the macro and micro levels. It is found that China's overall industrial competitive advantage is mainly reflected in labor-intensive industries and technology-intensive industries. Technology-intensive industries happen to be weak in Serbia's industrial competitiveness. Rudolf Fürst (2017) found that the two countries' investment in each other maintained a certain level by analyzing the bilateral investment relationship between China and the Czech Republic, but it was far below the Czech expectations.

### 3. Research on the potential of trade cooperation between China and CEEC

Based on the traditional gravity model, this chapter selectively selects relevant variables to extend the traditional gravity model, so as to empirically analyze the export of CEEC and estimate the export potential.

#### 3.1 Model Overview

This paper uses the trade gravity model to empirically analyze how relevant variables affect China's exports to CEEC. The basic forms of the model include: per capita GDP reflecting the economic scale of China and CEEC, the total population reflecting the market size of CEEC, the distance reflecting China's export costs, and whether the CEEC join the EU's dummy variables. Since China does not border the territories of CEEC and there is no overlap in culture, the political and theoretical levels of the two sides cannot be measured, so these factors are not considered.

Through the extension of the traditional trade gravity model, the trade gravity model of this paper is obtained:

$$\ln EX_{ijt} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln DIS_{ij} + \beta_4 \ln DG_{ijt} + \beta_5 \ln OPEN_{jt} + \beta_6 EU + u_{ij}$$

(i stands for China; j stands for CEE countries; t stands for year, t=1995, 1996, ..., 2015)

among them:

(1)  $EX_{ijt}$  is an explanatory variable that represents China's exports to CEEC during the t period.

(2)  $GDP_{it}$  represents China's gross domestic product, reflecting China's economic scale and supply capacity.

(3)  $GDP_{jt}$  represents the gross domestic product of CEEC, reflecting the economic scale and demand level of CEEC.

(4)  $DIS_{ij}$  represents the distance between China and the capitals of CEEC. The geographical distance reflects the cost of trade between the two sides. Generally speaking, the greater the geographical distance, the greater the export cost.

(5)  $DG_{ijt}$  represents the absolute value of the per capita GDP difference between China and CEEC. It is used to measure the gap between the two sides' economic development levels, that is, the difference in demand between the two sides. It is generally believed that the greater the similarity between the demand of the two sides, that is, the smaller the difference in demand, the closer the trade is. However, there is another saying that the greater the absolute difference in GDP per capita, the greater the difference in demand between the two sides. The more obvious the advantage, the greater the chance of trade.

(6)  $OPEN_{jt}$  represents the degree of trade openness of CEEC during the t period. This paper uses the ratio of import dependence, that is, the ratio of the total import value of a country to the GDP of the same period as an index to measure the dependence of a country's foreign trade. The greater the dependence on imports, the stronger the ability of imports to promote the economy, that is, the stronger the ability to promote import trade, the more favorable it is for import trade.

(7) EU is a dummy variable, indicating whether CEEC are members of EU, and the members of EU take 1; otherwise, they take 0. It is expected that the entry of CEEC countries into EU will hinder China's exports to CEEC.

(8)  $u_{ij}$  represents a random error term.

This paper selects panel data of China's exports to 16 countries in CEEC from 1995 to 2015. A total of 336 samples were analyzed using STATA12.0. The explanations and data sources of the relevant analytical variables are shown in Table 1.

Table 1 Explanations of the variables in the model

variable	meaning	Expected symbol	theoretical analysis	Data Sources
$EX_{ijt}$	China exports to 16 CEE countries (million USD)			World Bank website
$GDP_{it}$	China's Gross Domestic Product (USD)	+	Reflecting China's supply capacity, the higher China's GDP shows that the higher the level of China's economic development, the stronger its export capacity and the greater its export volume	World Bank website
$GDP_{jt}$	CEEC Gross Domestic Product (USD)	+	Reflecting the ability of domestic demand in CEEC, the higher the GDP, the higher the level of economic development in CEE, the strong domestic demand and the stronger import capacity	World Bank website
$DIS_{ij}$	Distance between China and CEEC (km)	-	The greater the distance, the higher the cost of transportation, and inversely proportional to the amount of exports	French International Prediction Research Center (CEPII)
$DG_{ijt}$	Absolute value of per capita GDP difference between China and CEEC	+ (-)	Reflecting the similarity of demand and comparative advantage between the two sides	World Bank website

OPEN <sub>jt</sub>	CEE trade openness	+	Reflecting the degree of dependence on foreign trade in CEEC and a positive relationship with China's exports	UN Comrade
EU	Dummy variables, CEEC are EU members	-	When CEEC belong to the EU, their imports into China will fall	EU official website

### 3.2 Analysis of empirical results

(1) First, we use the mixed-effects model to estimate, The second column of Table 2 shows the estimation result of the mixed effect: the  $R^2$  of the model is 0.8177, that is, the overall goodness of the model is better. All the variables used in the model can explain China's exports to 16 countries in CEEC by 81.77%. At the same time, it can be seen from the last column of Table 1 that the P value is 0.0000, the model is very significant.

(2) Next, we perform fixed-effect regression on the model, and the regression results are shown in the third column of Table 2. In the case of fixed-effect regression, the output contains an F-test whose original assumption is that the intercept terms are the same for different cross-section models (establishing a hybrid estimation model). The P value of the F test in the regression results is 0.0000, strongly rejecting the null hypothesis, and it is considered that the fixed effect model is better than the mixed effect model. The fixed effect results show that the  $R^2$  of the model is 0.8589, that is, the overall goodness of fit of the model is better. All the variables used in the model can explain the export of 16 countries in CEEC to the extent of 85.89%. At the same time, the model is also very significant.

(3) Finally, in order to judge whether to use a fixed effect model or a random effects model, the Hausman test is usually used. The original hypothesis is to support the random effect model. After inputting the test command, the test result shows that the P value is 0.3887 (greater than 0.1), that is, accepting the null hypothesis. The random effects model was selected for regression analysis, and the random effect regression results are shown in the fourth column of Table 2. The results show that the  $R^2$  of the model is 0.8583, which indicates that the model has good goodness of fit. All the variables used in the model can explain the export of 16 countries in CEEC to the extent of 85.83%. At the same time, the model is very significant. From the regression results of each variable, the sign of each explanatory variable is in line with expectations, but the explanatory variable  $\ln DIS_{ij}$  fails to pass the significance test.

Table 2 Regression results of export gravity model of China to CEEC

explanatory variable	mixed effect model	fixed effect model	random effect model
constant term	12.00715 (1.39)	-1.72079** (-2.42)	6.969249 (0.22)

lnGDP <sub>it</sub>	0.9247747*** (11.75)	0.6639352*** (5.93)	0.7771892*** (8.85)
lnGDP <sub>jt</sub>	1.011202*** (15.53)	1.506374*** (7.17)	1.272635*** (8.51)
lnDIS <sub>ij</sub>	-1.66927* (-1.71)	--	-1.026834 (-0.29)
lnDG <sub>ijt</sub>	0.2715401*** (4.59)	0.2803167*** (3.90)	0.3131998*** (4.74)
lnOPEN <sub>jt</sub>	0.1119539 (0.54)	1.027719*** (4.89)	0.9497037*** (4.60)
EU	0.0927529 (0.49)	-0.2937015** (-2.05)	-0.2458262* (-1.75)
R <sup>2</sup>	0.8177	0.8589	0.8583
F value / (P value)	234.03 (0.0000)	364.08 (0.0000)	1846.10 (0.0000)

Note: 1. The brackets are t and z statistics; 2. \*\*\* means  $p < 1\%$ , \*\* means  $p < 5\%$ , \* means  $p < 10\%$ , 1%, 5%, 10% Under the conditions of significance level.

According to the regression results and the regression equation, it can be seen that:

First, the regression coefficient of lnGDP<sub>it</sub> is 0.7771892, which is significant at the 1% level. This means that China's GDP has a positive effect on China's exports to CEEC. After controlling for other variables, if China's GDP increased by 1%, China's exports to CEEC increased by 0.78%.

Second, the regression coefficient of lnGDP<sub>jt</sub> is 1.272635, which is significant at the 1% level. This indicates that the GDP of CEEC has a positive effect on China's exports to CEEC. After controlling for other variables, if the GDP of CEEC increases by 1%, China's exports to CEEC will increase by 1.27%.

Third, the regression coefficient of lnDG<sub>ijt</sub> is 0.3131998, which is significant at the level of 1%. This means that the greater the absolute difference in GDP per capita between CEEC, the more obvious the promotion of China's exports to CEEC. After controlling for other variables, if the absolute value of GDP per capita in China and CEEC increases by 1%, China's exports to CEEC will increase by 0.31%.

Fourth, the regression coefficient of lnOPEN<sub>jt</sub> is 0.9497037, which is significant at the level of 1%. This shows that the higher the openness of foreign trade in CEEC, the more obvious the promotion of China's exports to CEEC. After controlling for other variables, if CEEC's openness increased by 1%, China's exports to CEEC increased by 0.95%.

Fifth, the EU's regression coefficient is -0.2458262, which is significant at the 10% level. The entry of CEEC into EU will have a trade transfer effect. Therefore, the entry of CEEC into EU will change the original trade relationship with China. This relationship may be replaced by trade relations within EU, resulting in a decline in China's export trade to CEEC.

Sixth, the regression coefficient of lnDIS<sub>ij</sub> is -1.026834, indicating that the farther China is from the CEEC, the more obvious the inhibition of China's exports to CEEC. However, the coefficient did not pass the significance test, indicating that the distance

factor is small in terms of affecting exports.

#### 4. Research conclusions:

The purpose of this paper is to explore the economic and trade cooperation between China and CEEC, and to explore the influencing factors affecting China-CEEC economic and trade cooperation from the perspective of import and export. Based on the traditional gravity model, this paper selectively selects relevant variables to extend the traditional gravity model, so as to empirically analyze the export of CEEC and estimate the export potential. The empirical results show that the economic aggregates of China -CEEC are positively correlated with exports. The higher the economic level, the higher the domestic supply and demand capacity will be. This is well understood. The difference in economic aggregates between the two sides is positively related to exports. This can be explained by the greater the difference in demand between China and CEEC, the more obvious the comparative advantage between the two sides and the greater the chance of trade. Another hypothesis we expect: the more similar the demand, the easier it is to generate trade, that is, the theory of demand similarity, which obviously does not apply to trade between China and CEEC. There is no doubt that the degree of openness of foreign trade is positively related to exports. As the cooperation between China and CEEC to deepen, the degree of openness between the two sides will continue to expand, and the exchanges between trade will certainly become closer and closer. Regarding the dummy variables in the model, the entry of CEEC into EU will have a trade transfer effect. As a result, China's export to CEEC has decreased. Regarding the distance factor, the variable is not significant in the model. This may be because with the advancement of new modes of transport and technology coupled with economic globalization, the cost of entry for exporters has decreased, so the impact of distance on exports has become smaller and smaller. From the above conclusions, we can see that with the continuous implementation of the BRI, China and CEEC's economy continues to develop, and China's cooperation with CEEC will inevitably lead to an expansion of trade and investment. In the end, both sides can achieve mutual benefit and win-win results.

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