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THE MODEL OF ECONOMIC COOPERATION SYSTEMS IN THE CONTEXT OF IMPLEMENTATION OF THE "ONE BELT ONE ROAD" INITIATIVE

Purpose. To develop recommendations on the effectiveness of economic cooperation between Ukraine and China in the context of the implementation of the One Belt One Road initiative (BRI), using the gravity model of trade to analyze the factors influencing such cooperation.

Methodology. Analysis of scientific literature and Internet sources – to determine the purpose and objectives of the research; formalization methods – to describe the characteristics, dynamics and states of the gravity model of trade; methods of the theory of the gravity model of trade – to analyze factors affecting bilateral trade and the construction of a model of economic cooperation between China and Ukraine.

Findings. A gravity model of trade between China and Ukraine was developed in the context of the implementation of the "One Belt One Road" initiative, which illustrates the influence on bilateral trade of such factors as the size of the economy, the level of demand, port infrastructure, the logistics efficiency index, participation in international organizations and bilateral mutual recognition agreements. It has been proven that the geographical distance and time of trade registration have a negative effect on the efficiency of bilateral trade. Institutional factors also play a key role in bilateral trade.

Originality. For the first time, the use of the gravity model of trade has been proposed to assess factors influencing bilateral economic cooperation between China and Ukraine, which contributes to the identification of key factors influencing such cooperation. It has been proven that the dynamics of bilateral trade relations are significantly influenced by the factor of institutional stability and infrastructure development.

Practical value. The proposed approach makes it possible to formulate proposals regarding the formation of economic policy aimed at strengthening trade cooperation along the BRI path. They include strengthening infrastructure construction, promoting multilateral cooperation, creating effective mechanisms for economic and trade cooperation, accelerating the development of the free trade area within the framework of the BRI, removing trade barriers, strengthening environmental trade management, and unlocking the trade potential of the BRI countries.

Keywords: *Belt and Road Initiative (BRI), economic and trade cooperation, model, influence factor, Ukrainian-Chinese relations*

Introduction. In 2013, Chinese President Xi Jinping proposed the significant initiatives of building the "Silk Road Economic Belt" and the "*21st* Century Maritime Silk Road" [1]. As of June 2023, China has signed over 200 cooperation documents for the joint construction of the BRI with 152 countries and 32 international organizations, resulting in more than 3,000 cooperative projects. There are significant differences among countries along the BRI in terms of politics, economics, infrastructure, tariffs, logistics conditions, and geographical distances, which invisibly increase the risks and challenges of bilateral trade [2]. It is of great research significance to analyze the key factors influencing trade between countries along the BRI and explore the trade potential of these countries for the stable development of the BRI [3].

Literature review. Research on the factors influencing trade country effects is abundant. Roberts (2010) found that the smaller the gap between the consumer demands and per capita income levels of two countries, the larger the bilateral trade volume [4]. Yang Yiting (2019) and Li Peng (2022) discovered that institutional factors have a significant positive impact on trade levels [5, 6]. Si Zengchuo, Zhou Kun, and Shao Jun (2019) argue that an increase in the bilateral economic aggregate, common language, and the signing of trade agreements all improve the trade environment and promote an increase in bilateral trade volume [7]. Wan Lunlai and Gao Xiang (2014) found that three distance factors – geographical distance, institutional distance, and cultural distance – all hinder trade development, with cultural distance having the most significant inhibitory effect [8]. Wang Tieshan, Jia Ying, and Xu Ling (2015) studied the facilitation of trade along the Silk Road Economic Belt and suggested strengthening overall planning, customs cooperation, and targeted area development to achieve complementary advantages and common development [9]. Liu Wei and Gao Zhigang (2018) believe that the level of logistics performance and the quality of communication infrastructure play a promoting role in the development of bilateral trade [10]. Regarding gravity models, Kong Qingfeng and Dong Hongwei (2015) used the gravity model approach to study the trade potential of "Belt and Road" countries, subsequently using the intermediary method to measure the improvement in trade facilitation's potential for the countries along the route [11]. Zhang Pengfei (2018) applied the gravity model to analyze the impact of the construction level of transportation infrastructure and communication infrastructure in countries along the "Belt and Road" on intra-regional trade volume [12]. Liu Hongkui's (2022) stochastic border gravity model collected separate import and export data to calculate the trade potential between China and countries along the "Belt and Road" [13].

Unsolved aspects of the problem. The above scholars have conducted extensive and in-depth research on the factors influencing trade. However, they mainly focus on individual aspects of import and export goods, and the exploration of influencing factors is not sufficiently thorough. Additionally, as more and more countries join the joint construction of the BRI, it is necessary to conduct research using a larger sample size.

The purpose of this paper is to provide theoretical support and reference for improving the quality and efficiency of bilateral trade and providing external driving force for domestic economic development.

Methods. It applies an expanded gravity model and selects typical countries along the BRI route to study the influencing factors of China's economic and trade cooperation with these countries. It also analyzes the important factors affecting trade between China and countries along the BRI, while estimating the bilateral trade potential.

Results. The study reveals that in recent years the trade potential of countries along the BRI has been gradually unleashed. China's trade with countries along the BRI is influenced by various factors. Some of them are positive, while some are negative.

From 2013 to 2022, the cumulative total of imports and exports between China and countries participating in the BRI reached $19.1 trillion. During this ten-year period, China's merchandise trade with these countries increased from $1.6 trillion in 2013 to nearly $2.9 trillion in 2022, with an average annual growth rate of 6.4 %. The proportion of this trade to China's total foreign trade value increased from 39.2 to 45.4 %. By 2022, China's investment stock in the BRI countries reached $309.9 billion, 2.7 times higher than in 2013 [14, 15] (Fig. 1).

Fig. 1 illustrates the fact that the scale of trade cooperation between China and countries participating in the BRI showed an overall upward trend from 2013 to 2022. The proportion of China's trade with these countries in relation to its total foreign trade has also continued to increase. This indicates that the BRI has provided a broader platform for participating countries to engage in foreign trade. The BRI has increased in trade volume among the participating countries and providing momentum for economic development.

Over the past decade, the BRI has achieved notable progress. Digital cooperation has enhanced connectivity and development, while green cooperation has advanced low-carbon initiatives with 43 countries joining the BRI Green Development International Alliance. Health cooperation has improved global health governance via traditional Chinese medicine, and innovation cooperation has forged agreements with over 80 countries and initiated partnerships such as China-ASEAN and China-South Asia. Financially, the Asian Infrastructure Investment Bank's membership has expanded to 106 countries, and cultural cooperation has enriched exchange channels, leading to advancements in education and tourism. The BRI has not only had a significant impact on trade cooperation among the countries along the routes but has also brought about many other impacts, with great potential for the future [16, 17]. The 2019 World Bank report on the BRI underscores its goal of enhancing regional cooperation and global connectivity. By investing in transportation infrastructure, the initiative significantly lowers trade costs, boosts cross-border trade and investment, and fosters economic growth regionally and globally. Thanks to the implementation of the "One Belt, One Road" initiative, the volume of trade between China and Ukraine is increasing every year. Fig. 2 presents the dynamics

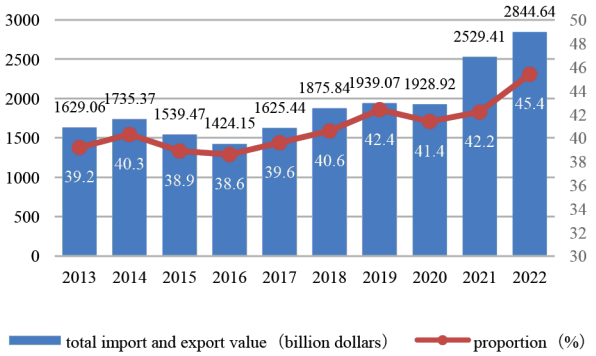

Fig. 1. 2013–2022 Total Import and Export Value between China and the BRI Countries and its Proportion to China's Total Foreign Trade Value

Fig. 2. Volumes of trade in goods between Ukraine and China during 2013–2023

of export and import deliveries between Ukraine and China for the period 2011–2022 [18].

As shown in Fig. 2, the general trend of growth of bilateral trade relations between Ukraine and China is maintained under conditions of stable socio-economic development. The above diagram illustrates the decline in bilateral trade and economic relations in 2014–2015, which coincided with the stage of change of power in Ukraine, after which there is a significant increase in the indicator until 2021. Another decrease in the volume of trade and economic cooperation is observed in 2022, which is associated with the beginning of military aggression. Actually, political stability is one of the most effective factors of influence, which will be reflected in the choice of parameters and the construction of a model.

Variable selection and model construction. The development of foreign trade is the result of the combined influence of various factors, which can be roughly divided into two dimensions: increasing trade volume and improving trade efficiency [19]. At the level of institutional development, a sound institutional system, political stability, and strong government management capabilities are conducive to creating a favorable trade environment [20]. The Global Governance Index can be used as an indicator to measure the level of institutional development in the sample countries along the route. At the level of agreement framework, joining the same economic and trade organization and signing mutual recognition agreements can reduce bilateral trade barriers and increase trade vitality. Dummy variables can be set to measure whether mutual recognition agreements have been signed and whether the countries have joined the same cooperative organization. At the level of economic size, the larger the economy, the larger the output scale for international trade between the two countries, showing a positive correlation. The gross domestic product (GDP) can be used as corresponding indicators to measure the economic size of the two countries. At the level of demand, according to the theory of overlapping demands, the closer the economic development level and hierarchical needs of the two countries, the higher the possibility of bilateral trade. Dummy variables can be set to measure whether the per capita income level of the countries along the route is in the same group as China, in order to measure the bilateral demand level.

From the perspective of improving trade efficiency, three important influencing factors include geographical distance, port infrastructure level, and customs clearance efficiency. In terms of geographical distance, the farther the geographical distance, the higher the trade transportation costs, resulting in lower motivation for bilateral trade [21]. The geographical distance between the two capitals can be selected as an evaluation indicator in this paper. At the level of port infrastructure, the higher the quality of port infrastructure, the higher the efficiency of cargo handling and unloading, which plays a positive

role in improving bilateral trade efficiency [22]. The quality of port facilities can be chosen as an indicator. In terms of customs clearance efficiency, the shorter the clearance time, the higher the logistics efficiency, providing better conditions for facilitating bilateral trade. Trade clearance time and logistics performance index can be selected as factor indicators to measure the customs clearance efficiency. By enhancing these factors, trade efficiency can be effectively improved, promoting the development of bilateral trade.

The respective meanings of the variables set in this paper and their data sources are shown in Table 1. This paper sets 10 variables corresponding to the levels of institutional development, economic size, geographical distance, demand level, port infrastructure level, and customs clearance efficiency, and uses China's bilateral trade volume with sample countries along the route as the dependent variable to conduct multidimensional empirical analysis.

The Trade Gravity Model, originating from Newton's law of universal gravitation, states that the force of interaction between two objects is directly proportional to their masses and inversely proportional to the distance between them. Tinbergen (1962) and Poyhonen (1963) were the first to apply this gravity model to the study of international trade. The economic size of the exporting country reflects its potential supply capacity, while the economic size of the importing country reflects its potential demand capacity. The distance between the two countries serves as a measure of transportation costs and trade barriers [23]. The traditional form of the gravity model, used to study the factors influencing international trade, represents the trade volume between two countries as follows

$$\ln Trade_{ij} = \alpha_0 + \alpha_1 \ln GDP_i + \alpha_2 \ln GDP_j + \alpha_3 \ln GDP_{ij} + \varepsilon_{ij}.$$

Here α represents the variable coefficients, $\ln Trade_{ij}$ represents the bilateral trade volume, $\ln GDP_i$ and $\ln GDP_j$ represent the gross domestic product (GDP) of countries *i* and *j* respectively, $\ln GDP_{ij}$ represents the geographical distance between the two countries, and ε_{ij} is the random error term. Building upon the traditional theoretical framework and existing research, this study extends the gravity model by incorporating new factors that influence bilateral trade levels such as logistics performance, trade clearance time, port infrastructure level, and agreement frameworks. The extended trade gravity model takes the following form

$$\ln Trade_{ij} = \beta_0 + \beta_1 \ln GDP_i + \beta_2 \ln GDP_j + \beta_3 \ln DIS_{ij} +$$
$$+ \beta_4 \ln LPI_j + \beta_5 GOV_j + \beta_6 \ln INFR_j + \beta_7 \ln TFA_{ij} +$$
$$+ \beta_8 INCOME_{ij} + \beta_9 MUAR_{ij} + \beta_{10} EOR_{ij} + \varepsilon_{ij}.$$

Here β represents the variable coefficients that measure the impact of the factors on bilateral trade. $\ln Trade_{ij}$ represents the bilateral trade volume, $\ln GDP_i$ and $\ln GDP_j$ represent the gross domestic product of China and the sample countries along the route respectively, $\ln DIS_{ij}$ represents the geographical distance between the two countries, $\ln LPI_j$ represents the logistics performance index, GOV_j represents the level of institutional development, $\ln INFRj$ represents the port infrastructure level, TFA_{ij} represents the trade clearance time, $INCOME_{ij}$ is a dummy variable representing the difference in per capita income between China and the sample countries, $MUAR_{ij}$ is a dummy variable indicating whether China and the sample countries have signed bilateral mutual recognition agreements, EOR_{ij} represents whether China and the sample countries have joined the same economic and trade cooperation organizations, and ε_{ij} represents the random error term.

The sample period is set from 2013 to 2022. Considering the representative nature of the regions along the BRI, this study includes 32 sample countries, including 8 ASEAN countries: Laos, Sri Lanka, Singapore, Thailand, Indonesia, Vietnam, Cambodia, Malaysia; 7 West Asian countries: the United Arab Emirates, Kuwait, Lebanon, Turkey, Qatar, Iran, Saudi Arabia; 4 South Asian countries: Nepal, Bangladesh, India, Pakistan; 5 Central Asian countries: Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan, Turkmenistan; 8 Eastern Eu-

Table 1

Variable Explanations and Data Sources

Variable Explanations	Variables	Variable Definitions	Expected Impact	Data Sources
Bilateral Trade Volume	$Trade_{ij}$	Bilateral Trade Volume	–	International Monetary Fund (IMF) Database
Economic Size	GDP_i GDP_j	China's Gross Domestic Product (GDP)	+ +	World Bank World Development Indicators (WDI) Database
Geographical Distance	DIS_{ij}	Gross Domestic Product (GDP) of countries along the BRI routes	–	CEPII or Calculated based on Google Maps
Development Level	GOV_j	Distance between the capitals of the two countries	+	World Bank Global Governance Index
Demand Level	$INCOME_{ij}$	Level of institutional development	+	World Economic Forum's Global Competitiveness Report
Port Infrastructure Level	$INFR_j$	Per capita income level of countries along the routes:1 if in the same group as China, 0 otherwise	+	World Economic Forum's Global Competitiveness Report, World Bank WDI Database
Customs Clearance Efficiency (time)	TFA_{ij}	The time taken for customs clearance processes in countries along the BRI route	+	World Economic Forum's Global Competitiveness Report, World Bank WDI Database
Customs Clearance Efficiency (logistics index)	LPI_j	A measure indicating the efficiency and effectiveness of logistics operations in countries along the BRI route	+	World Economic Forum's Global Competitiveness Report, World Bank WDI Database
Joining International Organizations	EOR_{ij}	Membership in economic organizations such as APEC, SCO, and WTO: 1 represents membership, 0 represents non-membership	+	Compiled based on official materials from APEC, SCO, WTO, and other organization websites
Signing Bilateral Agreements	$MUAR_{ij}$	Bilateral mutual recognition agreements: 1 indicates bilateral agreements sign, indicates no agreements signed	+	Official website of China's Belt and Road Initiative

Table 2

Unit Root Test Results

Variables	LLC	IPS	ADF	PP	Conclusion
ln $Trade_{ij}$	6.432 (0.9972)	1.601 (0.1165)	15.113 (0.0058)	8.003 (0.2090)	Unstable
Δln $Trade_{ij}$	1.667 (0.0000)	–4.897 (0.0000)	211.715 (0.0000)	–5.762 (0.0000)	Stable
ln GDP_i	6.932 (1.0000)	2.866 (0.0863)	10.285 (0.0581)	3.936 (0.0951)	Unstable
Δln GDP_j	1.568 (0.0000)	–0.385 (0.0000)	37.295 (0.0000)	112.163 (0.0000)	Stable
ln GDP_j	2.893 (0.1008)	8.241 (0.2307)	7.387 (1.0000)	23.403 (0.0929)	Unstable
Δln GDP_j	–2.673 (0.0000)	2.885 (0.0000)	112.863 (0.0000)	293.382 (0.0000)	Stable
ln DIS_{ij}	1.045 (0.3806)	9.337 (0.0555)	10.213 (0.2034)	37.180 (0.0988)	Unstable
Δln DIS_{ij}	–0.902 (0.0000)	1.109 (0.0000)	75.432 (0.0000)	299.002 (0.0000)	Stable
ln LPI_j	18.388 (1.0000)	6.108 (1.0000)	50.632 (0.871)	17.345 (0.0430)	Unstable
Δln LPI_j	4.761 (0.0000)	–6.521 (0.0000)	153.784 (0.0000)	188.802 (0.0000)	Stable
GOV_j	5.3019 (0.0881)	1.1830 (0.0617)	22.6730 (0.2981)	4.7351 (0.2781)	Unstable
ΔGOY_j	–7.013 (0.0000)	–0.401 (0.0000)	148.622 (0.0000)	82.492 (0.0000)	Stable
ln $INFR_j$	9.003 (1.0000)	19.320 (0.451)	5.117 (0.5928)	72.119 (0.6032)	Unstable
Δln $INFR_j$	–3.108 (0.0000)	–6.981 (0.0000)	201.603 (0.0000)	156.710 (0.0000)	Stable
ln TFA_{ij}	8.293 (0.4619)	4.012 (0.7342)	71.930 (0.0891)	69.831 (0.0521)	Unstable
Δln TFA_{ij}	–1.003 (0.0000)	–5.931 (0.0000)	299.682 (0.0000)	281.105 (0.0000)	Stable

Note: Δ represents the first-order differenced series, and the values within parentheses indicate the P-values

ropean countries: Hungary, Serbia, Slovakia, Ukraine, Poland, Belarus, Russia, the Czech Republic.

Empirical analysis. Before conducting the gravity model analysis, this study performed stationarity tests on all variable data. In line with the conventional practices in testing variable stationarity based on existing research, in order to ensure the validity and authenticity of the stationarity test results, this study employed the PP-Fisher test, ADF-Fisher test, LLC test, and IPS test to conduct unit root tests on the panel data variable sequences in the gravity model. The results are presented in Table 2.

Based on the unit root test results in Table 2, the P-values of the original series of model variables are mostly greater than 0.05. According to the criterion for unit root test results, these variables are non-stationary, suggesting the presence of heteroscedasticity in the original data. If model testing is conducted without addressing this issue, it may lead to inaccurate empirical analysis results, biased estimations, and spurious regressions. To address this concern, this study applied first-order differencing to the variable data and conducted unit root tests. The test results show that the P-values of the first-order differenced variables are less than 0.05. Based on the unit root tests mentioned above, the first-order differenced variable sequences are stationary, indicating that the variables are integrated of order one.

To mitigate the impact of multicollinearity, this study conducted a multicollinearity VIF (Variance Inflation Factor) test on the model variable sequences, and the results are presented in Table 3. It can be observed that all VIF values of the variables in the gravity model are less than 5. According to the criterion for assessing multicollinearity, there is no presence of multicollinearity among the variables.

This study conducted cointegration tests on individual variables and the overall series, and the results are presented in Table 4. Both the overall series and individual variables have corresponding P-values less than 0.05. Following the criterion for hypothesis testing, the null hypothesis is rejected, indicating the presence of cointegration among the variables in the gravity model. Consequently, regression analysis can be performed on the model equation.

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Panel data models can be classified into three forms: mixed effects models, random effects models, and fixed effects models. Conducting a specification test on the overall model can determine the form of the panel data model. In this study, the Hausman test is employed to determine the appropriate form of the gravity panel model, and the results are presented in Table 5.

In the Hausman test, if the corresponding P-value is less than 0.05, the null hypothesis is rejected, and the fixed effects

Table 3

Results of Multicollinearity Test

Variables	R^2	*VIF*	Variables	R^2	*VIF*
ln $Trade_{ij}$	0.7861	3.9021	ln *GDPi*	0.9351	3.9812
ln DIS_{ij}	0.8391	3.8791	ln LPI_i	0.9001	3.9519
GOV_j	0.9001	4.2016	ln $INFR_{ij}$	0.8971	3.8971
ln TFA_{ij}	0.9128	3.9201	$INCOME_{ij}$	0.8871	3.9910
EOR_{ij}	0.9081	4.0611	$MUAR_{ij}$	0.9021	3.7981

Table 4

ADF Cointegration Test Results

Alternative hypothesis	Test results	
Common AR coefficient	t-statistic P-value	–4.5882 0.0000
Individual AR coefficients	t-statistic P-value	–5.4129 0.0000

Table 5

Hausman Test for Model Specification

	X2 test statistic	X2 statistic degrees of freedom	Probability P-value
Hausman test	21.3120	5	0.0031

model is chosen. If the P-value is greater than 0.05, the null hypothesis is accepted, and the random effects model is chosen. Based on the test results, the P-value of the Hausman test is 0.0031, which is less than the significance level of 5 %. Following the criterion for hypothesis test, the null hypothesis is rejected, and the fixed effects model is established.

Regression results analysis. Based on the above testing process, the constructed gravity model for trade in this study is reasonable and scientific in terms of variable selection and model specification, reflecting various dimensions of factors that influence trade between China and countries along the BRI. Furthermore, using Stata software, this study conducts empirical analysis on the panel data gravity model to explore the factors influencing the trade levels, identify the effects of different factors on bilateral trade, and the regression results of the gravity model are presented in Table 6.

Based on the empirical analysis results shown in Table 6, it can be observed that the impact coefficients of the economic size variables ln GDP_i and In GDP_j on the bilateral trade scale variable ln $Trade_{ij}$ are mostly significantly positive. This indicates the fact that countries along the BRI are mainly developing countries, with continuous growth potential and steady increase in economic volume, which drives the expansion of trade variety and industry distribution, providing strong support for expanding the bilateral trade scale. The impact coefficient of the geographical distance variable ln DIS_{ij} is consistently significant negative, indicating that the greater geographical distance between the two countries increases trade transportation costs and risks, and there are significant regional differences in customs, cultural traditions, and other factors, making it difficult for traded products to gain consumer acceptance in the host country's market, thereby increasing the difficulty of bilateral trade. The impact coefficient of the institutional development level variable GOV_j alternates between positive and negative at least at the 10 % level. For example, in this model, the coefficient is –0.2073, but in other models, it is 0.2882. This indicates that the role of institutional factors in influencing trade between China and countries along the BRI is not stable in terms of direction, but the impact is significant. Countries along the BRI have significant differences in political systems and regional political conditions are generally stable, but some countries face political risks such as regional conflicts, armed coups, and economic sanctions, and it is difficult to provide a stable political environment for continuous bilateral trade activities. At the same time, the demand level variable $INCOME_{ij}$ has at least a stable positive effect on the trade scale between China and countries along the BRI at the 10 % level, indicating that countries along the BRI have relatively similar per capita income levels, consistent consumer purchasing power and demand, and a relatively solid demand foundation for bilateral trade, which generates a positive driving force for trade scale growth, which is in line with Lind's theory of overlapping demand trade. The coefficient values of the port infrastructure level ln $INFR_{ij}$ and logistics performance index (LPI_j) are relatively large, indicating that port infrastructure and logistics performance have a significant positive impact on trade between countries along the BRI. The efficiency of port loading and unloading and trade product logistics transportation is generally high, which enhances bilateral trade efficiency to a certain extent, providing good prerequisites and solid guarantees for expanding trade between China and countries along the BRI and promoting continuous growth in bilateral trade volume. The coefficient of trade clearance time (ln TFA_{ij}) is significantly negative at the 1 % level. The shorter the customs clearance time in countries along the BRI, the lower the trade time cost and the higher the level of trade facilitation. Under the BRI, countries along the route are continuously strengthening customs cooperation, further simplifying clearance procedures, reducing clearance costs for trade enterprises, promoting efficient bilateral trade activities. The coefficients of the variables EOR_{ij} and $MUAR_{ij}$ are significantly positive at the 1 % level, indicating that signing bilateral recognition agreements and jointly joining the same economic and trade organizations effectively avoid trade barriers and reduce the difficulty of entering overseas markets. Currently, China has signed multiple mutual recognition

Table 6

Regression Results of the Gravity Model

	ln $Trade_{ij}$				
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
ln GDP_i	0.0298 (0.1788)	0.0300* (0.1001)	0.0321** (0.1380)	0.0355 (0.1801)	0.0325** (0.1987)
ln GDP_j	0.0568 (0.0412)	0.0401* (0.0153)	0.0403* (0.0314)	0.0411*** (0.0298)	0.0269*** (0.0201)
ln DIS_{ij}	–0.6812* (–1.124)	–0.4985** (–1.010)	–0.5810** (–1.873)	–0.4910*** (–1.695)	–0.6821*** (–1.118)
GOV_j	0.1715* (0.0832)	–0.2221* (–0.0481)	0.18932** (0.0398)	–0.3192** (–0.0482)	0.3012*** (0.02991)
$ICOME_{ij}$	0.0903* (0.7621)	0.0806** (0.8081)	0.0881*** (0.592)	0.0471*** (0.5913)	0.0801*** (0.6123)
ln $INFR_j$	0.1401 (0.0389)	0.1091** (0.0442)	0.18791** (0.0498)	0.1807*** (0.0399)	0.1591*** (0.0478)
ln TFA_{ij}	–	–0.0387*** (–0.0201)	–0.0521*** (–0.0212)	–0.0671*** (–0.0230)	–0.0412*** (–0.0075)
EOR_{ij}	–	–	2.0312*** (1.3210)	1.9721*** (1.2108)	1.8947*** (1.1581)
$MUAR_{ij}$	–	–	–	1.1109*** (0.2211)	1.0743*** (0.2108)
ln LPI_j	–	–	–		1.7421*** (1.1023)
Constant term	–6.2881*** (–0.1214)	–6.1172*** (–0.2891)	–5.5214*** (–0.1808)	–5.9125*** (–0.1812)	–4.3412*** (–0.1124)
R^2	0.9401	0.9821	0.9036	0.9013	0.9111
Adjusted R^2	0.9991	0.9871	0.8992	0.81397	0.8871
S.E	0.7169	0.6810	0.7210	0.9341	0.4981
Log likehood	350.081	351.134	331.381	339.231	323.619
F-statistic	90.130	69.781	89.112	71.269	68.719
Prob(F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000

Note: The values in parentheses represent the t-statistic, *, ** and *** indicate significance at the 1, 5 and 10 % levels respectively

agreements with countries along the BRI, and jointly joined various international and regional trade cooperation organizations.

Conclusions. The above research indicates that economic size has a positive impact on the trade scale between China and countries along the BRI, and the effect is significant. Additionally, the bilateral trade scale between China and countries along the BRI is positively influenced by factors such as the level of demand, port infrastructure, logistics performance index, the signing of bilateral recognition agreements, and membership in international economic and trade organizations. Geographical distance and trade clearance time have a negative impact on the trade scale between China and countries along the BRI. The greater the geographical distance and the longer the trade clearance time, the higher the trade costs for enterprises, which hinders the growth of bilateral trade scale and is unfavorable for trade development between China and countries along the BRI. The impact of the level of institutional development on the trade scale between China and countries along the BRI is uncertain, with alternating positive and negative effects, but the impact is significant. This is closely related to the significant differences in institutional systems, government social governance capabilities, and economic and trade policies.

Efficiency levels in economic and trade cooperation along the BRI vary due to diverse factors. China's economic ties with India and South Korea demonstrate relatively high efficiency, while cooperation with nations like South Korea, Singapore, and Malaysia benefits from advanced logistics infrastructure and proximity. Overall, China's collaboration with Southeast Asian nations like South Korea, Singapore, and Malaysia appears particularly efficient, owing to their large economies, robust port facilities, favorable logistics, proximity, and supportive national institutions, market conditions, and international agreements.

Ukraine is of significant interest to China within the framework of the BRI in terms of bilateral trade and economic cooperation due to a number of influential factors, however, the political stability factor has a significant impact on relations between the countries.

The analysis of bilateral trade potential results also shows that the trade potential value between China and the regions along the BRI has been decreasing year by year, transitioning from trade potential reformation to potential of immense scale, continuously expanding the space for bilateral economic and trade cooperation, and gradually unleashing trade potential.

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Модель економічної співпраці в контексті реалізації ініціативи «Один пояс один шлях»

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Мета. Розробити рекомендації щодо ефективності економічного співробітництва між Україною та Китаєм у контексті реалізації ініціативи «Один пояс, один шлях» (BRI), використовуючи гравітаційну модель торгівлі для аналізу факторів, що впливають на таке співробітництво.

Методика. Аналіз наукової літератури та інтернет-джерел – для визначення мети й завдань дослідження; методи формалізації – для опису характеристики, динаміки та станів гравітаційної моделі торгівлі; методи теорії гравітаційної моделі торгівлі – для аналізу факторів впливу на двосторонню торгівлю й побудови моделі економічної співпраці Китаю та України.

Результати. Розроблена гравітаційна модель торгівлі між Китаєм і Україною в контексті реалізації ініціативи «Один пояс один шлях», що ілюструє вплив на двосторонню торгівлю таких факторів, як розмір економіки, рівень попиту, портова інфраструктура, індекс ефективності логістики, участь у міжнародних організаціях і двосторонні угоди про взаємне визнання. Доведено, що географічна відстань і час оформлення торгівлі негативно впливають на ефективність двосторонньої торгівлі. Інституційні фактори також відіграють ключову роль у двосторонній торгівлі

Наукова новизна. Уперше запропоноване використання гравітаційної моделі торгівлі для оцінювання факторів впливу на двосторонню економічну співпрацю між Китаєм і Україною, що сприяє визначенню ключових факторів впливу на таку співпрацю. Доведено, що на динаміку двосторонніх торгових відносин суттєво впливає фактор інституційної стабільності та розвиток інфраструктури.

Практична значимість. Запропонований підхід дозволяє сформулювати пропозиції стосовно формування економічної політики, що спрямовані на посилення торговельної співпраці вздовж шляху BRI. Вони включають зміцнення будівництва інфраструктури, сприяння багатосторонньому співробітництву, створення ефективних механізмів економічного й торговельного співробітництва, прискорення розвитку зони вільної торгівлі в рамках BRI, усунення торговельних бар'єрів, посилення екологічного управління торгівлею та розкриття торгового потенціалу країн BRI.

Ключові слова: *ініціатива «Один пояс, один шлях»* (*BRI*), *економічне й торговельне співробітництво, модель, фактор впливу, українсько-китайські відносини*

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