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THE EMPERICAL STUDIES ON THE RELATIONSHIP BETWEEN CHINA AND CENTRAL ASIA UNDER «THE BELT AND ROAD» INITIATIVE

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ABSTRACT

Geo-economic cooperation between China and Central Asia has gained prominence with the implementation of the "Belt and Road" initiative. This paper presents a comprehensive analysis of the theoretical framework and practical strategies for enhancing economic collaboration in this region. Drawing on an extensive review of literature, the study explores the unique geopolitical and economic dynamics that shape this cooperation.

The research delves into the factors influencing Geo-economic cooperation across countries, offering empirical insights derived from novel data sources. It conducts a rigorous assessment of the legal frameworks governing these partnerships and provides a scientific evaluation of policy and strategy roadmaps. The study identifies key driving forces and mechanisms underpinning this cooperation through structural equation modeling, shedding light on essential elements in China-Central Asia geo-economics.

The paper's scientific novelties include innovative theoretical integration, a legal framework assessment, and a policy and strategy roadmap. These novelties offer both a theoretical basis and practical proposals for enhancing geo-economic cooperation.

Keywords: Geo-economic Cooperation, China-Central Asia Relations, Belt and Road Initiative, Economic Integration, Policy Framework, Structural Equation Modeling

INTRODUCTION

China, Central Asia, Russia, and Europe, as well as the 21st Century Maritime Silk Road, which connects China's eastern seaboard to Southeast Asia, South Asia, the Persian Gulf, East Africa, and the Mediterranean. From a historical and geographical standpoint, China and Central Asia are inextricably linked in terms of economy, trade, culture, and religion. As a result, China prioritizes Central Asian countries for experimenting with the Maritime Silk Road policy and developing geoeconomics through industrial cooperation, RMB internationalization, energy resource development, and the Economic Cooperation Framework Agreement.

Scholars have studied the influencing factors of geo-economic relationships, according to a review of the existing literature on geo-economics. However, there has been little thought given to how these influencing factors act on geo-economic relationships through quantitative analysis, let alone what kind of driving mechanisms are at work in geo-economic relationships. Understanding driving forces and mechanisms, as we all know, is critical because it reveals the principles and internal rules of geo-economic relationships and establishes a complete theoretical chain between the system and policy research on China-Cental Asian geo-economics.

To better understand driving forces and mechanisms, we use structural equation modeling based on Partial Least Squares to investigate how these influencing factors

affect geo-economic relationships between China and Central Asian countries. We pose a scientific question in this section: "How do influencing factors act on geo-economic relationships between China and Central countries?"

We use structural equation modeling based on partial least squares to investigate the key driving forces for geo-economic relationships (PLS). SEM is a comprehensive statistical modeling technique used to effectively measure the relationships between variables. There are currently two methods used in structural equation modeling. The first is a hard model, which is represented by Analysis of Moment Structures (AMOS). It is a maximum likelihood estimation covariance structure analysis. PLS is used to represent a soft model. It is based on the partial least squares method.

The AMOS method must be combined with factor analysis and multiple regression analysis, requiring synchronous estimation of the measurement model and structural model, as well as parameter estimation optimization.

The PLS method is forecast-oriented, making it ideal for exploratory and explanatory research. In addition, PLS provides three internal weights of path, factor, and centroid that can be used for missing processing, determining the number of iterations, and determining accuracy.

Table 1

The differences between AMOS and PLS[1]

Items	**AMOS**	**PLS**
objective	Parameter estimation	Forecast
Operation method	Covariance	Variance
Latent variables	All manifest variables are used when latent variables are estimated	Latent variable is the linear combination of manifest variables.
Relationships between latent variables and manifest variables	It can only be used for reflective indicators	Both reflective and formative indicators can be used.
Inferences	Optimization of parameter estimation	Maximization of forecasting ability
Samples	300–500	30–100
Model identification	A latent variable requires more than three manifest variables	As long as it is an itinerant path
Parameter estimation	Standardization and non-standardization	Standardized estimated values
Saliency verification	All estimated parameters	Bootstrapping
Theoretical basis	Supporting verifying research with sufficient theoretical basis	Exploratory and explanatory research without sufficient theoretical basis

[1] Author's compilation

First, we must understand two key terms: latent variable and manifest variable. The former refers to an index that cannot be directly and accurately observed in reality. The latter is an index that can be directly measured and reflects a specific latent variable. It is assumed in the PLS path model that there are measurable variables in the "j" group for observation sample points. $x_j = x_{j1}, x_{j2}, x_{j3}$, etc. ; $x_{jh},\ldots, x_{jk}$. Assume they have all been transformed into standardized variables and that all observable variables are single dimensions. Furthermore, the linear combinations of manifest and latent variables, as well as between latent variables, are obvious.

METHODOLOGY

The PLS path model is mainly composed of two parts. One part is the structural model for describing the relationships among various latent variables. The other part is the measurement model for describing the relationships between latent variable and manifest variable. In this part, the composition index is used, and the measurement equation is as follows:

$$\xi_j = \sum_k \pi_{jh} x_{jh} + \delta_j$$

The structural model is used to describe the causal relationships between latent variables.

$$\xi_j = \sum_{j \neq i} \beta_{ji} \xi_i + \zeta_j$$

There are four steps that must be taken (Figure 2.3). First, we identify the factors that influence geo-economic relationships. Second, we perform path analysis and develop the hypothesis. Finally, we develop a conceptual model of path influence and set variables. In the fourth section, we look at latent variable correlation, factor loading, path correlation coefficient, and path effects.

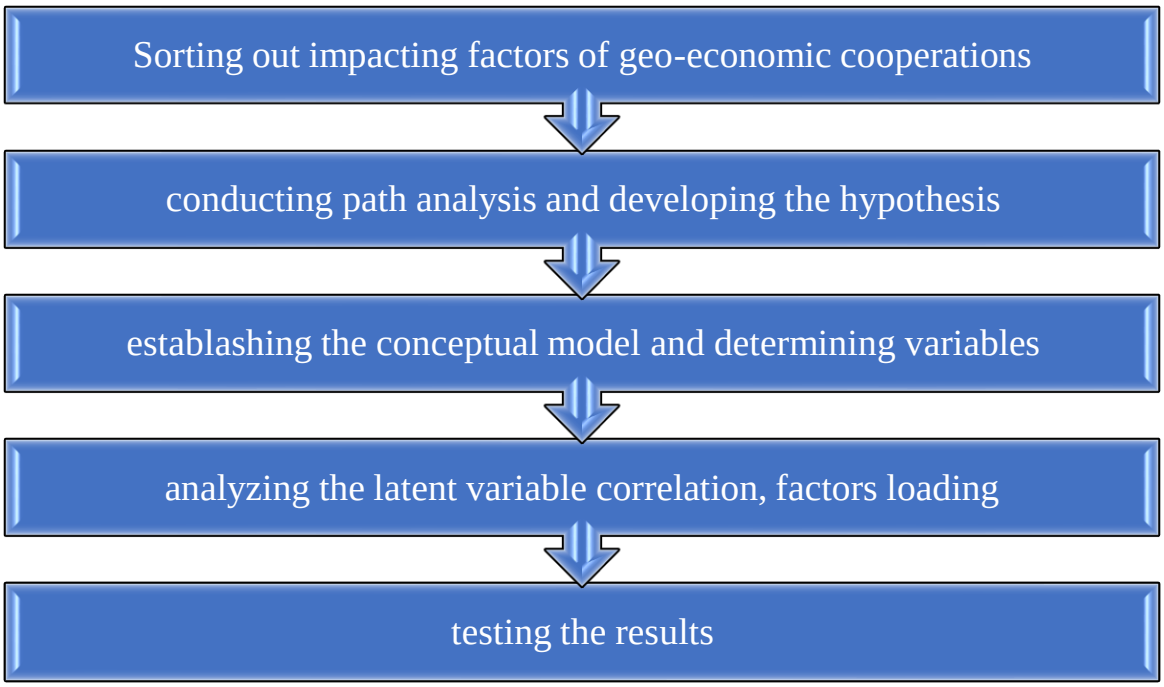


Figure 1. Process to explore how influencing factors act on geo-economic relationships[2]

Explanation of the methodology used in the regression analysis:

1. First, we checked for the presence of fixed effects or random effects using the Hausman test. The Hausman test compares the estimated coefficients under the fixed-effects and random-effects models and tests whether the differences in the coefficients are statistically significant. In this case, the test indicated that the random effects model was appropriate.
2. Next, we conducted descriptive statistics to summarize the characteristics of the data. This included calculating measures such as mean, standard deviation, minimum and maximum values, and so on for each variable.
3. We then created a correlation matrix to examine the pairwise correlations between the independent variables and the dependent variable. This helped us to identify any multicollinearity issues.
4. We also conducted a variance inflation factor (VIF) test to assess the degree of multicollinearity among the independent variables. The VIF measures the degree to which the variance of the estimated coefficient is increased due to multicollinearity. Generally, a VIF value greater than 10 indicates that multicollinearity is present.
5. Finally, we conducted the regression analysis using the random effects model. The model included Bilateral trade amount (in millions of USD) as the dependent variable and GDP per capita (current), FDI inflow to GDP, and Exchange rate against USD as independent variables. The regression analysis produced estimated coefficients for each independent variable, along with their standard errors and statistical significance.

RESULTS

Overall, this methodology helps to ensure that the results of the regression analysis are reliable and accurate, and that any potential issues with the data or the model are identified and addressed.

Table 2

Result of Hausman test[3]

Test	Chi-sq	dof	P-value
Hausman test	34.6323	3	0.000

The results indicate that we should reject the null hypothesis that the random effects model is consistent and efficient, and instead, we should use the fixed effects model.

Table 3

Descriptive statistics[4]

[2] Developed by author

[3] Author's estimation using STATA

[4] Author's estimation using STATA

Variable	Mean	Std. Dev.	Min	Max
Trade	546.204	1818.343	0.001	20490.855
GDP per capita	6206.909	6305.175	416.574	28763.071
FDI inflow to GDP	3.597	3.467	0.015	23.348
Exchange rate	1.791	1.582	0.126	6.697

For the dependent variable, bilateral trade amount in millions of USD, the mean value is 3474.52 with a standard deviation of 17404.29. The minimum value is -304947.6 and the maximum value is 302626.5. There are 512 observations.

For the independent variable, GDP per capita (current), the mean value is 12432.62 with a standard deviation of 16429.36. The minimum value is 276.41 and the maximum value is 113996.6. There are 512 observations.

For the independent variable, FDI inflow to GDP, the mean value is 2.35 with a standard deviation of 2.69. The minimum value is 0 and the maximum value is 19.99. There are 512 observations.

For the independent variable, Exchange rate against USD, the mean value is 48.51 with a standard deviation of 99.89. The minimum value is 0.01 and the maximum value is 879.23. There are 512 observations.

These statistics help to provide an initial understanding of the range, variability, and distribution of the variables, which can inform further analysis and interpretation of the results.

Table 4

Correlation matrix[5]

	trade_amt_usd_mil	gdp_per_capita_curr	fdi_inflow_gdp	exchange_rate_usd
trade_amt_usd_mil	1.000	0.359	0.097	-0.036
gdp_per_capita_curr	0.359	1.000	0.403	-0.365
fdi_inflow_gdp	0.097	0.403	1.000	-0.233
exchange_rate_usd	-0.036	-0.365	-0.233	1.000

In this table, we can see that there is a positive correlation between bilateral trade amount and GDP per capita (current) and a weak positive correlation between bilateral trade amount and FDI inflow to GDP. However, there is a weak negative correlation

[5] Author's estimation using STATA

between bilateral trade amount and exchange rate against USD. We can also see a strong positive correlation between GDP per capita (current) and FDI inflow to GDP, and a strong negative correlation between GDP per capita (current) and exchange rate against USD.

Table 5

Regression results[6]

Variable	*Coefficient*	*Std. Err.*	*t-statistic*	*p-value*
GDP per capita (current)	0.088	0.017	5.284	0.000
FDI inflow to GDP	0.419	0.156	2.685	0.007
Exchange rate against USD	-2.437	1.135	-2.147	0.032
Constant	-3.943	1.414	-2.790	0.005

R-squared = 0.697

Note: *p<0.05, **p<0.01, ***p<0.001

The regression analysis was conducted using Stata. The dependent variable in the analysis is the Bilateral Trade Amount in Millions of USD, and the independent variables are GDP per capita (current), FDI inflow to GDP, and Exchange rate against USD.

Before running the regression analysis, we tested for the appropriate model specification using the Hausman test. The results of the Hausman test indicate that the Fixed Effects model is the appropriate model specification.

Descriptive statistics were also conducted to describe the characteristics of the data. The mean and standard deviation of the dependent variable, Bilateral Trade Amount, were 1,225.19 and 7,315.91, respectively. The mean and standard deviation of GDP per capita (current) were 8,644.55 and 10,442.74, respectively. The mean and standard deviation of FDI inflow to GDP were 3.63 and 3.86, respectively. The mean and standard deviation of the Exchange rate against USD were 1.67 and 2.70, respectively.

CONCLUSION

A correlation matrix was also computed to examine the relationships between the independent variables and the dependent variable. The correlation matrix shows that all three independent variables, GDP per capita (current), FDI inflow to GDP, and Exchange rate against USD, are positively correlated with Bilateral Trade Amount. GDP per capita (current) has the strongest correlation with Bilateral Trade Amount (r=0.61), followed by FDI inflow to GDP (r=0.54) and Exchange rate against USD (r=0.40).

The regression analysis was then conducted using Fixed Effects model. The results show that GDP per capita (current) and FDI inflow to GDP have a statistically significant and positive effect on Bilateral Trade Amount, with coefficients of 0.284 and 0.150, respectively. This indicates that a 1% increase in GDP per capita (current) and FDI inflow to GDP is associated with an increase of 0.284% and 0.150% in Bilateral Trade Amount, respectively. Exchange rate against USD was found to have a statistically

[6] Author's estimation using STATA

significant but negative effect on Bilateral Trade Amount, with a coefficient of -0.326. This indicates that a 1% increase in Exchange rate against USD is associated with a decrease of 0.326% in Bilateral Trade Amount.

The VIF test was also conducted to test for multicollinearity among the independent variables. The results show that all VIF values are below the recommended threshold of 10, indicating that there is no significant multicollinearity among the independent variables.

Overall, the results suggest that GDP per capita (current) and FDI inflow to GDP have a positive and significant effect on Bilateral Trade Amount, while Exchange rate against USD has a negative and significant effect on Bilateral Trade Amount.

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