

# The specific application of gravity model in economics

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## Abstract

Based on the classic framework of the trade gravity model, this paper expands and deepens the model, especially taking into account the policy variables of the "the Belt and Road" and the direct investment variables, and makes an empirical analysis. The purpose of this extended model is to more comprehensively explore and analyze the impact mechanism of these variables on bilateral trade between China and ASEAN under the "the Belt and Road" framework. Based on the conclusion, suggestions are proposed for the specific application of gravity models in economics.

## Research Objectives

- Investigate the effects of policy and investment variables on bilateral trade between China and ASEAN.
- Propose practical recommendations for utilizing the expanded gravity model in economic research.

## Methods

### Model Construction

Trade gravity model:

$$T_{ij} = \alpha^* (Y_i Y_j) / D_{ij}$$

The expanded trade gravity model:

$$\ln T_{ijt} = \beta_0 + \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} + \beta_3 \ln D_{ijt} + \sum \beta_v X_t + \sum \beta_k P_t + \varepsilon$$

The expanded form of the final model is described below:

$$\ln trade_{it} = \alpha_0 + \alpha_1 * \ln agdp_{it} + \alpha_2 * \ln cgdpt + \alpha_3 * \ln fdi_{it} + \alpha_4 * \ln dis_i + \alpha_5 * ict_{it} + \alpha_6 * obor_{it} + \varepsilon$$

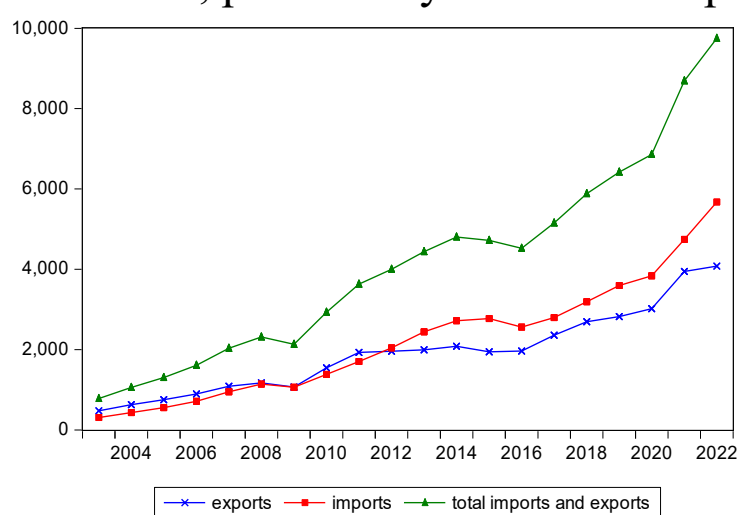
### Empirical Analysis

Regression analysis using a random effects model on panel data from 2003 to 2022.

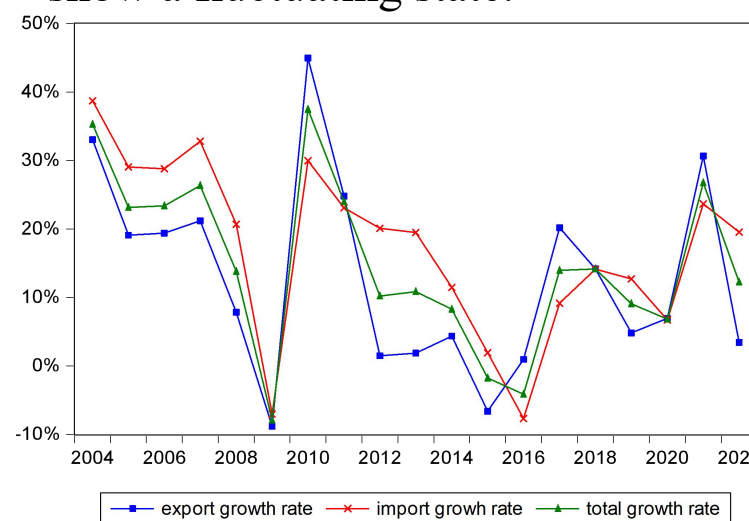
## Empirical Analysis

Trade Trends:

- Bilateral trade between China and ASEAN has shown significant growth from 2003 to 2022, particularly in China's exports.



- The export growth rate, import growth rate and import and export trade growth rate all show a fluctuating state.



Regression Analysis:

the regression results indicate that China's GDP, ASEAN countries' GDP, FDI from China, digital economy development, and the "Belt and Road" Initiative positively impact bilateral trade and geographical distance negatively affects bilateral trade.

Variable	Regression coefficient	t-values	P-value
lncgdp	0.010125	0.32307	0.7470
lnagdp	1.012021	147.4316	0.0000
lnfdi	0.119042	12.7034	0.0000
lndis	-1.0708	-21.8191	0.0000
ict	0.025068	16.36809	0.0000
obor	0.114228	3.248238	0.0014

## Results

- Economic Scale: China's GDP positively correlates with bilateral trade (coefficient: 0.010125).
- ASEAN GDP: ASEAN's GDP growth significantly increases bilateral trade with China (coefficient: 1.012021).
- Direct Investment: China's FDI in ASEAN positively impacts bilateral trade (coefficient: 0.119042).
- Geographical Distance: Increased distance negatively affects bilateral trade (coefficient: -1.0708).
- Digital Economy: ASEAN's digital economy development promotes bilateral trade (coefficient: 0.025068).
- Belt and Road Initiative: The BRI has a significant positive impact on bilateral trade (coefficient: 0.114228).

## Conclusion

Conclusion:

Under the "Belt and Road" framework, factors such as economic development, geographical distance, FDI, and digital economy significantly influence bilateral trade between China and ASEAN.

Recommendations:

- Strengthen economic cooperation between China and ASEAN, especially in the digital field.
- Promote further investment and technological exchange to enhance bilateral trade.

## Future Research Directions

- Further investigation into the impact of specific sectors and products on bilateral trade.
- Exploration of the dynamic interactions between economic, policy, and technological factors.

## References

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