


# Dynamic Econometric Analysis of Supply Chain Relationship Between China and Five Continents Based on Time Series Regression Model

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## ABSTRACT

In response to the overall national security concept and the guiding ideology of and supply chain security proposed by President Xi, based on the authoritative data of the National Bureau of Statistics in the past 19 years from 2000 to 2018, the long-term dependence trend of the supply chain relationship between China and each continent is analyzed through the time series trend chart and time series regression model of China's trade relationship with the five continents. And the short-term abnormal phenomenon, and further explain the contribution value of the influencing variable factors between China and the supply chain relationship of the supply chain of various continents through the variance decomposition.

## KEYWORDS

Time Series Analysis, Supply Chain, Trade Relations

## RESEARCH BACKGROUND

The idea of supply chain security originated from the mercantilism of the 15<sup>th</sup> to 18<sup>th</sup> centuries in western countries. They believed that increasing agricultural production or exports was the only way to maintain a country's supply chain security. Adam Smith, a representative figure of classical economic theory in the late 18<sup>th</sup> century, proposed the theory of absolute advantage, which states that a country should only develop industries with absolute cost advantages; David Ricardo proposed the theory of relative advantage, which is based on the theory of absolute advantage and keeping one's own country's supply chain security.

Globally, there are still many unknown variables in post-pandemic global supply chains, especially among the China-United States supply chain. Certain events threaten the security of this supply chain, including increasing tariff barriers and trade restrictions imposed by the United States on Chinese entities. In order to navigate these issues, the evolving interdependence between the United States and China must be evaluated to identify adaptable strategies and policies that can foster supply chain

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security for all parties involved, including those entities outside of China and the United States. These policies must not only align with China’s national interests but also be conducive to global supply chain cooperation.

## LITERATURE REVIEW

### China’s Industrial Supply Chain Strategic Security Issues and Research on the Security of China’s Industrial Supply Chain

Since China’s entry into the World Trade Organization and participation in global industrial competition, under the conditions of an open economy, many scholars have conducted in-depth studies on the paradigm that poses questions, such as “What are the challenges facing China’s industrial security strategy?” and “What are the experiences of the United States, Japan, and South Korea?,” and ultimately want to know, “What should we do?” Researchers and authors like Chenhua (2012), Wen (2012), Baorui (2015), Su and Shuai (2020), Jin (2020), Iftekhar and Cui (2021), Xiang and Yu (2021), Lang and Fei (2021), Chuanjing (2021), Kaili (2021), and others approached these questions from different angles and found their own answers.

### Research on Security Influencing Factors and the Evaluation System of China’s Industrial Supply Chain

After joining the World Trade Organization, some scholars innovated or reset industrial safety evaluation indicators and their thresholds. Scholars of the China Economic and Security Forum reached a consensus that the primary task of maintaining China’s industrial safety is to build an industrial safety indicator system (Fujun, 2011). Many scholars, like Xiaolu et al. (2021) and Wang et al. (2021), have put forward their own indicator systems based on different industry standards. Some scholars use the analytic hierarchy process (AHP), the clustering method, or the principal component analysis method to measure and evaluate the safety of each industry. Table 1 shows Freeman’s centrality analysis.

Table 1. Freeman's centrality analysis

Analytical methods	Out-degree	In-degree	Standard out-degree	Standard in-degree
Analytic hierarchy process (AHP)	2.400	0.900	53.333	20.000
Entropy weight method	2.100	0.900	46.667	20.000
Clustering method	1.000	1.000	22.222	22.222
Principal components	0.200	2.100	4.444	46.667
Data envelopment analysis (DEA)	0.200	0.400	4.444	8.889
Grey correlation analysis	0.000	0.600	0.000	13.333

From the perspective of origin, the AHP has the highest centrality. From the perspective of entry point; data envelopment analysis (DEA) has the highest centrality. The AHP and the DEA are the two most common traditional methods for measuring and evaluating trade security in industrial and supply chains. Overall, domestic and foreign scholars, especially Chinese scholars, have conducted a large amount of effective research on the issue of trade security in China’s supply chain, producing rich research results that are worthy of admiration. On the basis of authoritative data from the National Bureau of Statistics in China, this article uses methods such as feature analysis, unit root

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