

A Study on the Trade Patterns among the World's Major Economies(2015-2017)

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Abstract: With the rapid development of the world economy, the international trade pattern has undergone tremendous changes. In the process of continuous evolution, the world trade pattern has gradually developed from the traditional single-polarization centered on the United States to multi-polarization. From the hegemony of the United States to the formation of the tripartite momentum of the United States, Japan and Europe, and to today's multipolar pattern of the United States, Asia and Europe. The rapid rise of developing countries is one of the important manifestations of the multipolar pattern. With the rapid expansion of WTO members during this period, the content of consultation is also changing with the change of world trade pattern. This paper uses the social network analysis method and UCINET 6.0 as the analysis tool to analyze the changes of the trade pattern of the world's major economies from 2015 to 2017, in order to have a profound understanding of the evolution and differentiation of the international trade pattern.

1. Introduction

In the wave of globalization, international trade has become the most prominent factor affecting the development of the world economy, leading to closer and closer links among the global economies. After China's accession to the WTO, China's import and export trade has been growing. Today, China is not only playing a more and more important role in unilateral trade and regional trade, but also in global trade. The pattern of world trade has changed from the traditional single-polarization centered on the United States to multi-polarization, which is inseparable from the rapid economic development of developing countries. Nowadays, the international trade pattern is no longer dominated by one party or three legs. Faced with the changing situation of diversification, we should fully study the process of the differentiation of the international trade pattern and the reasons for the change of the international trade order. Because if China wants to gain more benefits in international trade, it must do a good job of targeted research, in order to fully integrate into the current international trade order, and constantly adapt to the new international trade pattern.

2. Current Definition of Related Concepts and Data Description

2.1 Definition of Related Concepts

1) The Concept of Trade Patterns. The trade pattern represents the situation and development trend of trade exchanges. By analogy, the world trade pattern refers to the comparative relationship of trade advantages among the global economies. And according to the growth of knowledge, the transfer of science and technology centers, the change of international trade pattern will be accompanied by the rise and fall of cultural endowments of various countries and produce consistent changes. Once the transfer of science and technology centers is equivalent to the transfer of international trade centers, this is the definition of changes in international trade patterns.

2) Social Network Theory and Its Application in International Trade. As one of the earliest quantitative analysis methods applied in the field of sociology, social network analysis has been developed on the basis of mathematical and image analysis. Traditional econometrics focuses on the

analysis of various attribute data, but ignores the analysis of various relationships between subjects. Because econometrics usually assumes that some variables remain unchanged, and then deduces various variable models. However, the relationship is not dependent on a subject, and it must be at least two subjects in order to have a certain relationship, which is not the attribute of a subject. Relatively speaking, social network analysis is conducive to the in-depth study of the evolution of network structure through the study of the relationship between individuals, the combination of "macro" social system structure, and the use of some mathematical quantitative analysis methods.

2.2 Research Methods and Data Collection and Processing

1) Selection of Data Sources and Economics. This paper chooses import and export trade data of 30 major economies in the world from 2015 to 2017, and uses several social network analysis indicators to analyze the changing characteristics of the world trade network. However, because the United Nations report does not have import and export data of all countries and regions, the study of the World Trade Network in this paper only includes the countries and regions involved in the UNCOMTRADE database, but has little impact on the analysis of the international trade pattern and the study of the trade status of major economies. The main economies selected in this paper are: USA; China; Japan; Germany; UK; India; France; Brazil; Italy; Canada; Russia; South Korea; Australia; Spain; Indonesia; Mexico; Nigeria; Hong Kong; Philippines; Ireland; Qatar; Luxembourg; Macao; Singapore; Brunei; Kuwait; Norway; Arab Emirates; Swiss; Sweden.

2) Data Collection and Processing. Considering the convenience of statistical analysis, this paper standardizes the trade data collected from all economies. Data normalization is a special case of data standardization. This standardization method is to scale all data according to certain rules, and finally make all data fall into a specific small interval. In this paper, deviation standardization method is used, which is also called maximum-minimum standardization method. Generally speaking, it is a linear transformation of the original data to map the final data to the [0,1] interval. All the trade data collected in this paper are processed to form a matrix data, which can be regarded as a weighted network, and all the standardized data represent the weight. In addition to analyzing weighted networks, we also need to analyze unweighted networks. The usual way is to set all the data with standard values less than 0.01 to 0, and all the values with standard values greater than or equal to 0.01 to 1. The final result will constitute the weightless networks of trade between the world's major economies.

3. Descriptive Statistics of Trade Networks among the World's Major Economies

3.1 Sociogram Analysis

Sociogram were first used in sociometrics. It can be simply understood that the relationship between members of a group is expressed by a sketch of points and lines. For the unweighted network, the standard value of trade volume between the two countries is less than 0.01, and the value is 0, which means that the trade volume between the two countries is too small to be neglected. When the standard value of trade volume is greater than 0.01 and the value is 1, it shows that there is a strong connection between the two countries in international trade. According to the above content, using UCINET 6.0 software, we can produce the unauthorized network sociogram of international trade among the world's major economies in 2016. As shown below:

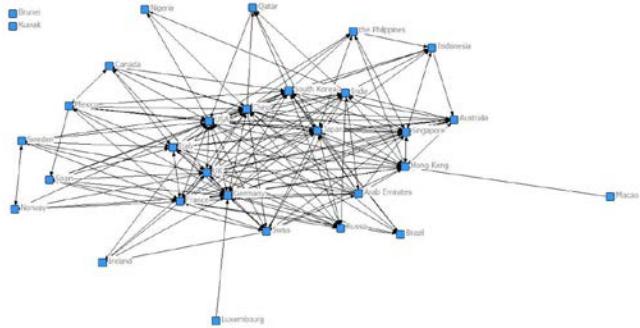


Fig. 1 Sociogram with Threshold of 0.01

Combining the sociogram of the international trade network in 2015 and 2017, we can see that there is no significant change in the sociogram from 2015 to 2017, indicating that the structure of the international trade network is relatively stable. The Ukrainian crisis, the Syrian war, the refugee crisis, and Britain's disengagement from Europe will affect the volume of trade among the world's major economies, but the overall trade network is showing a more stable pattern.

3.2 Centralization Analysis

According to the trade data of 2016, using UCINET 6.0 as an analysis tool, we can see that the network centralization in 2016 is 13.96%, because it is more than 10%, we can see that the network tends to the center degree is stronger. The homogeneity index is 8.4%, which indicates that the core countries are more interconnected. The mean sample size was 0.962. The standard error is 1.063 and the coefficient of variation is 1.130. All the above data show that descriptive statistics have high reliability. Combining the data of 2014 and 2017, we can see that the network centralization is 13.91% in 2014 and 13.98% in 2016. The trend of network centralization is further strengthened, and the trend of the periphery of the center is more obvious.

4. Analysis of the Pattern of Trade Network

4.1 Centrality Analysis

The centrality of a point refers to the number of other points directly connected to that point, because the network in this paper is directed network, whether it is an unauthorized network or an authorized network. Therefore, the degree centrality of a certain point can be obtained by adding the point-in degree and the point-out degree, where the point-out degree indicates the number of countries that the country exports to, and the point-in degree indicates the number of countries that the country imports to. If a point is directly connected with many points, we can directly draw a conclusion this point is at the center of the network and has great power in the network.

Using UCINET 6.0 as a measurement tool, we collect relevant data from UNcomtrade, and obtain the degree of centrality of the trade network of the world's major economies in 2016. It can be seen that China and the United States are far ahead of each other in centrality, reaching over 4.0, followed by Germany, reaching 2.056, ranking in the top 10 countries, with centrality exceeding 1.0. Eight of the top 20 countries are members of the European Union, showing the three fulcrums of world economic and trade, namely China, the United States and the European Union. Considering the trade pattern of the world's major economies since the financial crisis in 2009, we can see that besides the fluctuation of the EU's overall centrality in 2011 and 2012, the centrality of China, the United States and the EU has been relatively stable, which also shows that the EU's trade influence has stabilized after the debt crisis in 2011.

Combined with the data from 2015 to 2017, it can be seen that the trade centrality of China, the United States and the European Union has been further strengthened, while the centrality of Britain and Hong Kong has shown smaller fluctuations.

4.2 Impact Index Analysis

This paper uses two indices to measure influence: one is Row Su and the other is Col Su. The Row Su index represents the country's global influence; the Col Su index represents the global influence on the country as a whole.

It can be seen that: (1) From ROW Su data, we can see that the countries with the world influence index exceeding 1 are the United States, China, Japan, Germany, Britain, South Korea and Singapore. (2) From COL Su's data, we can see that the countries and regions whose world economic influence index exceeds 1 are the United States, China, Japan, Germany, Britain, South Korea, France and Hong Kong. (3) From the comparison of ROW Su and COL Su data, the ROW Su data of the United States, Germany, Japan, Korea and Singapore are larger than COL Su data, indicating that these countries have more impact on the world economy than the world economy has on their own.

Combined with the data from 2015 to 2017, the Katz influence index is relatively stable for the United States, China, Germany, Japan, South Korea and so on, but it fluctuates greatly for countries with smaller Katz influence index. As the Katz influence index of some countries is 0, in order to further analyze, the Katz influence index of these countries is listed separately to re-analyze the Katz influence index. It can be seen that the influence of these countries in the period of 2014-2017 has fluctuated considerably, and the impact of these countries on the world economy is generally smaller than that of the world economy on these countries.

4.3 Cohesive Subgroup Analysis

This paper uses UCINET 6.0 to measure the agglomeration of 30 major economies in the world in 2016. It can be seen that the agglomeration of the world economy in 2016 shows a centralized trend, and the trend of the center and the periphery is more obvious. Combining with the previous analysis, we can confirm that there is a clear pattern of the center and periphery in the world trade in 2016. Combined with the data from 2015 to 2017, we can see that from 2015 to 2017, the trend of the periphery of the world's major economies is more obvious, the trade pattern is more stable, but the characteristics of the periphery of the center show a growing trend.

5. Conclusion

From the analysis of this paper, we can see that China and the United States are far ahead in centrality, followed by Germany. Eight of the top countries belong to EU member states, and their centrality has been relatively stable, indicating that their trade influence tends to be stable. Combined with the data from 2015 to 2017, we can see that the trend of the periphery of the center of the world economic system has been strengthened. The steady increase in the degree of trade centers of China, the United States and the European Union shows that as the three pillars of the world economic system, the role of the mainstay is more reflected. Combined with the data from 2015 to 2017, the Katz index is relatively stable for the United States, China, Germany, Japan, Korea and so on. But for countries with smaller Katz index, the fluctuation is greater. The influence of countries with a Katz index of 0 has fluctuated considerably between 2015 and 2017, and the impact of these countries on the world economy is generally smaller than that of the world economy on these countries. On the whole, the agglomeration of the world economy shows a trend of concentration, the trade pattern is relatively stable, and the trend of the periphery of the world's major economies is strengthened.

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