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Comparison of Traditional and Value Added Method on China's Trade

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Abstract: Under the background of the division of global value chain, traditional trade statistics based on customs territory cannot answer the question of who is producing for whom, but also exaggerates the trade situation of China. So the paper estimates China's trade in the value-added method and traditional method and comparisons could be made with the results between two methods. We analysis through the whole trade to the world, sector trade to the world and bilateral trade between China and US to illustrate the difference and advantage of the value added method. It is found that the traditional customs statistical method not only overestimates the export scale of China, but also seriously distorts the export scale of various industries in China.

Key words: Value Added Trade · Input-Output Table · Global Value Chain

INTRODUCTION

Gross exports from China to the world was sharply increasing by more than 14 times C from US$148.8billion in 1995 to US$2281.9 billion in 2015, while the gross exports of US increased by nearly 1.6 times in the same period, the gross exports of UK also increased nearly one times and we also can know that the bilateral trade surplus between China and US was increasing these years and slightly increased between China and UK. So_C we will ask" Does China has become the largest trading country in the world? Does China has become the most powerful economy to determine the world's trade? " From the reality, the answer absolutely is no. but why the data results isdifferent from the reality? To answer these questions, we have to know the characteristics of global trade. With the continuous refinement of the international specialization, The production process of a product is often divided into several stages, which need to be completed in several countries (regions) for the lowest production cost and best sales. Second, there exists large numbers of elements of cross-border flows. In the global value chain, factors of production (capital, talent, technology, etc.) go into the host country through the international direct investment, which combine the local elements become the main source of production expansion and export growth of the host country.

In view of the global value chain background of traditional trade statistics system problems, many international organizations and institutions have proposed international trade statistics from the perspective of value added.

Literature Review: Increasingly refined production division of labor, increasing production processes and gradually elongated production chain makes the production of different parts of the production process in several countries, which forms global value chain Although the traditional system of international trade statistics has been amended and supplemented several times, it is still impossible to calculate the actual situation of the national intermediate trade and cannot answer the question "who produce for whom" [1], which reflects the importance of trade to economic growth and income is "What you see is not what you get" [2], so since 2010, more and more scholars began to research the revision of trade statistics methods and revaluation of trade volume based on the value-added analysis in the global value chain.

The vertical trade concept was proposed by [3] Cfollowed by [4] use vertical specialization (VS) to measure a country's direct or indirect value-added exports, which is referred to as the HIY method, but the HIY method requires the following two assumptions: First,

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it require all of intermediate inputs are 100% of foreign value-added, it do not consider re-import or third-party re-export; Second, It requires the equal degree of import inputs for the purpose of export and domestic final demand. Such a harsh condition is generally difficult to meet.

Subsequently, the World Input-Output Database (WIOD), a project of the European Commission's 7th Framework Program, developed theInternational Input-Output Table. The international input-output tables are based primarily on the domestic supply-use tables of countries ((National Supply and Use Table, NSUT) and the bilateral trade in goods and services, which clearly distinguishes between the use of intermediate goods and final products. Stehrer[5], based on the WIOD database, calculates the value-added trade of countries around the world based on Johnson and Noguera[6] calculations. This method can avoid the shortcomings of the above methods and better solve the problem of added value trade statistics in international trade.

In this article, the details of the export value-added approach will have a deeper level of discussion. Based on the international input-output table of WIOD database and the methods of Johnson and Noguera[6]_AStehrer[5], we firstly compares the import and export value of China's from 1995 to 2011 with traditional and value added methods and then analyze the value-added export characteristics of each industry and then take Japan and Korea as the comparison, Third, we take the bilateral trade between China and the United States as an example to further analyze the manufacturing industry differences, so as to get to know the value-added accounting method which is different from the traditional method of customs clearance.

MATERIALS AND METHODS

According to input-output analysis, a country's total output can be divided into domestic and foreign final consumption goods and intermediate inputs, the formula can be expressed as (To simplify, we assume there are 3 countries in the world):

$$X_S = A_{SS} + X_S + Y_{SS} + A_{SR} X_S + Y_{SR} \text{ S, R = 1, 2, 3}$$

where, X_S is the country S's total output; A_{SS} is national input-output coefficient matrix of country S; $_{ASR}$ is intermediate input-output coefficient matrix of exporting to the country R from the country S 's production; Y_{SS} is the final consumption by the country S; $Y_{SR}$is the final consumption by country S which is imported from country S; The production and trade situation in the three countries can be represented by the following:

$$\begin{pmatrix} X_1 \\ X_2 \\ X_3 \end{pmatrix} = \begin{pmatrix} A_{11} & A_{12} & A_{13} \\ A_{21} & A_{22} & A_{23} \\ A_{31} & A_{32} & A_{33} \end{pmatrix} \begin{pmatrix} X_1 \\ X_2 \\ X_3 \end{pmatrix} + \begin{pmatrix} Y_{11} & Y_{12} & Y_{13} \\ Y_{21} & Y_{22} & Y_{13} \\ Y_{31} & Y_{32} & Y_{33} \end{pmatrix}$$

The total output and the end use of the three countries are decomposed according to the different destination countries:

$$\begin{pmatrix} X_{11} & X_{12} & X_{13} \\ X_{21} & X_{22} & X_{23} \\ X_{31} & X_{32} & X_{33} \end{pmatrix} = \begin{pmatrix} B_{11} & B_{12} & B_{13} \\ B_{21} & B_{22} & B_{23} \\ B_{31} & B_{32} & B_{33} \end{pmatrix} \begin{pmatrix} Y_1 \\ Y_2 \\ Y_3 \end{pmatrix}$$

The matrix B is completely consumption matrix,

were $B = (I - A)^{-1}$ Assuming V_s is a diagonal matrix of direct value added coefficient vector, the value-added production matrix of the three countries can be expressed as:

$$VX = \begin{pmatrix} V_1 & 0 & 0 \\ 0 & V_2 & 0 \\ 0 & 0 & V_3 \end{pmatrix} \begin{pmatrix} X_{11} & X_{12} & X_{13} \\ X_{21} & X_{22} & X_{23} \\ X_{31} & X_{32} & X_{33} \end{pmatrix}$$

$$= \begin{pmatrix} V_1 & 0 & 0 \\ 0 & V_2 & 0 \\ 0 & 0 & V_3 \end{pmatrix} \begin{pmatrix} B_{11} & B_{12} & B_{13} \\ B_{21} & B_{22} & B_{23} \\ B_{31} & B_{32} & B_{33} \end{pmatrix} \begin{pmatrix} Y_{11} & Y_{12} & Y_{13} \\ Y_{21} & Y_{22} & Y_{13} \\ Y_{31} & Y_{32} & Y_{33} \end{pmatrix}$$

The elements on the diagonal of the matrix represent the value added absorbed by each country itself and the non-diagonal elements represent the value added absorbed by other countries. Thus, the sum of the lateral diagonal elements represents a country's export value added.

$$VAX_S = \sum_{R \neq S}^{G} V_S X_{SR} = V_S \sum_{R \neq S}^{G} \sum_{R=1}^{G} B_{SG} Y_{GR}$$

The sum of the vertical diagonal elements represents the value added of a country's imports (the foreign value added of domestic final consumption)

$$VAI_S = \sum_{R \neq S}^{G} V_G X_{RS} = V_G \sum_{R \neq S}^{G} \sum_{R=1}^{G} B_{SG} Y_{RS}$$

We use data coming from the World Input-Output Database (WIOD), which contains 41 countries from 1995 to 2011.The GDP of them accounts for more than 85% of global GDP share, so it can better reflect the global economic and trade activities. The intermediate input output table is the large matrix of 1435 * 1435 dimensions. The table is divided into 35 sectors[1]by the first edition of the European Economic Activities Classification Standard (NACE1), thus ensures the consistency of statistical caliber.

Therefore, the use of international input and output table can be more scientifically calculated in the increasingly deepening of the global division of labor today. In this paper, we use the proportion of each variable, which can eliminate the influence of the fluctuation of trade volume and reflect the trade trend and structural characteristics of an industry.

RESULTS AND DISCUSSION

In this part, China's import and export value of goods and services in 1995, 2000, 2005, 2009 and 2011 are calculated respectively in the two accounting methods and then the ratio of imports and exports in various industries in 2011 are calculated and compare with the value of Japan and South Korea in the same period, In the end, we take the Sino-US bilateral trade in manufacturing as an example to further compare the bilateral import and export of manufacturing industry to further experience differences and advantages of value added statistical methods.

The Scale of China 's Import and Export of Goods and Services: Comparison of Two Methods: Table 1 lists the results of China's import and export scale to the world in the five years measured by the two methods. In terms of traditional trade statistics, China's exports increased from $ 167.9 billion in 1995 to $ 2, 086.2 billion in 2011, with an increase of 11.4 times and the average annual increase of 17.1%; China's imports increased from $ 142.1 billion in 1995 to $ 1, 915.1 billion in 2011 with an increase of 11.6 times and the average annual increase of 16.3%. In accordance with the value-added trade accounting method, China's exports increased from $ 138.7 billion in 1995 to $ 1, 547.4 billion in 2011, with an increase of 10.2 times and the average annual growth of 17.2%; China's imports increased from $ 110.5 billion to $1.2305 billion, with an increase of 10.1 times and the average annual growth of 16.3%. It can be seen that the import and export scale of China's import and export under the value-added accounting method is much lower than that of the traditional trade statistics, indicating that the traditional trade statistics method overestimates the actual import and export scale of a country. Between 1995 and 2005, the ratio of value-added exports to customs exports declined from 0.80 in 1995 to 0.71 in 2005, indicating that with the deepening of China's participation in international division of labor, the traditional statistical methods and value-added accounting Method of increasing the difference. However, the slight recovery in 2009 and 2011 may be related to the Chinese government's efforts to promote industrial upgrading and enhance China's global value chain status over the years, indicating an increase in value-added capacity in China.

Comparison of Exports and Value Added of Various Industries: Taking into account the results of the total blurred the value added of the export, the industry cannot learn the characteristics of the export structure and industry characteristics, so we measure the added value of exports in various industries to examine China's real exports and compare with that of Japan and Korean in same year, so that the differences between the two measurement can be more clearly understood. The discrepancy in the export volume, which is obscured by the aggregate size, can not only be demonstrated, but also contribute to a better understanding of the connotation of value added exports.

In 2011, the five sectors with the largest share of value-added exports in China were S14 (Electrical and Optical Equipment, 12.10%), S12 (Basic Metals and Fabricated Metal, 7. 63%), S20 (Wholesale Trade and Commission Trade, Except of Motor Vehicles and Motorcycles, 7. 62%), S1 (Agriculture, Hunting, Forestry and Fishing, 7. 42%), S4 (Textiles and Textile Products, 6. 73%) while in the traditional method way, the most powerful sectors were S14 (Electrical and Optical Equipment, 34. 58%), S4 (Textiles and Textile Products, 11. 59%), S13 (Machinery, Nec, 6. 88%), S12 (Basic Metals And Fabricated Metal, 6.18%) and S9 (Chemicals and Chemical Products, 5. 61%). Therefore, there are much different export structure in two different methods. In traditional method, S14 (Electrical and Optical Equipment) exports accounted for 34.58% of China's exports, but the value added of exports accounted for only 12%, which indicates S14 belongs to the processing trade with a large

Table 1: Comparison of China 's Import and Export Scale to the World (10 billion)

Method	Category	1995	2000	2005	2009	2011
Value Added Method	Export	138.7	225.2	591.3	1397.2	1547.4
	Import	110.5	176.4	420.8	869.9	1230.5
	Total import and export	249.2	401.6	1012.1	2267.1	2777.9
Traditional Method	Export	167.9	279.5	836.7	1951.5	2086.2
	Import	142.1	234.7	670.1	1427.5	1791.5
	Total import and export	310	514.2	1506.8	3379	3877.7
Export	Valueadded Gross ex	0.83	0.81	0.71	0.72	0.74
Import	Valueadded Gross im	0.78	0.75	0.63	0.61	0.69
Trade Volume	Valueadded Gross tr	0.8	0.78	0.67	0.67	0.72

Table :Percentage of Each Sector. Exporting in Total Exporting of China, Japan, and South Korea in two Methods (2011) unit:%

	CHN		JPN		KOR	
Sector	DVA	GROSS	DVA	DVA	GROSS	DVA
1	7.42(4)	0.85	0.49	0.09	1.16	0.12
2	5.46	0.50	0.33	0.36	0.17	0.00
3	2.62	2.42	0.79	0.46	0.69	1.06
4	6.73(5)	11.59(2)	0.68%(2)	0.74	1.68	1.92
5	1.27	2.47	0.03	0.03	0.14	0.17
6	0.93	0.52	0.23	0.13	0.12	0.01
7	1.44	0.44	1.60	0.41	1.23	0.51
8	1.25	0.67	2.25	2.14	1.54	9.14 (4)
9	5.49	5.61(5)	4.81	6.98	5.70	9.19(3)
10	2.66	3.42	2.59	3.55	2.77	1.84
11	1.34	1.28	1.07	1.24	1.08	0.27
12	7.63(2)	6.18(4)	10.5(3)	12.84(3)	10.51(3)	8.80(5)
13	4.16	6.88(3)	5.55	10.48(4)	5.21	6.85
14	12.10(1)	34.58(1)	10.87	18.64(2)	19.16(1)	25.98 (1)
15	2.52	4.65	10.14(4)	19.92(1)	11.96(2)	19.78(2)
16	2.02	3.50	0.34	0.92	0.50	0.42
17	3.19	0.09	2.31	0.08	1.87	0.06
18	0.21	0.43	0.78	0.00	0.17	0.04

number of foreign intermediate inputs and less domestic value added value; It is similar situation in case S4, China exports a large number of textiles, but trademarks and other high-value-added brands belonged to foreign countries, China just can get less value added though the textile exports. In contrast to S1 (Agriculture, Hunting, Forestry and Fishing) and S2 (Mining and Quarrying), the value added export share is 7.42% and 5.46% respectively, which are far higher than the proportion of exports, indicating that most value-added of these sectors' exporting coming from the domestic, because the characteristics of these two industries determine its exports include less foreign value added.

Next, we compare the differences between Japan and South Korea over the same period for each sector.

In 2011, there are also large different export structure in Japan's export. The largest five sectors invalue added method were: S20 (Wholesale Trade and Commission Trade, Except of Motor Vehicles and Motorcycles, 12.75%), S14 (Electrical and Optical Equipment, 10.87%), S12 (Basic Metals and Fabricated Metal, 10.58%), S15 (Transport Equipment, 10.14%), S30 (Renting of M & Eq and Other Business Activities 8.32%); while in traditional method, the top five exporting sectorswere S15 (Transport Equipment, 19.92%), S14 (Electrical and Optical Equipment, 18.64%), S12 (Basic Metals and Fabricated Metal, 12.84%), S13 (Machinery, Nec, 10.48%), S20 (Wholesale Trade and Commission Trade, Except of Motor Vehicles and Motorcycles, 8.28%). The value added export of S15 (Transport Equipment) and S14 (Electrical and Optical Equipment) were smaller than that of the customs export, because these two industries are vertical specialized division of labor, many production raw materials, spare parts need to be imported and the value

added export of S30 (Renting of M & Eq and Other Business Activities) and S20 (Wholesale Trade and Commission Trade, Except of Motor Vehicles and Motorcycles) were much larger than customs exports, indicating that the industry's exports mainly from Japan domestic value added.

The same situation is for KOR. S14 (Electrical and Optical Equipment 19.16%), S15 (Transport Equipment, 11.96%), S12 (Basic Metals and Fabricated Metal 10.51%), S30 (Renting of M &Eq and Other Business Activities, 8.29%), S20 (Wholesale Trade and Commission Trade, Except of Motor Vehicles and Motorcycles, 5.74%) were top five exporting sectors in value added method; while in traditional way, S14 (Electrical and Optical Equipment 25.98%), S15 (Transport Equipment, 19.78%), S9 (Chemicals and Chemical Products, 9.19%); S8 (Coke, Refined Petroleum and Nuclear Fuel 9.14%) , S12 (Basic Metals and Fabricated Metal 8, 80%) were top five exporting sectors; The value added exporting of S15 (Transport Equipment) and S8 (Coke, Refined Petroleum and Nuclear Fuel) were much smaller than that of customs exports, mainly due to the use of more imported parts or machinery and equipment, the exporting production included a large number of foreign value added , however, the value added exporting of S30 (Renting of M&Eq and Other Business Activities) and S28 (Financial Intermediation) were much larger than that of customs exports, indicating that the exports of these two services have created more added value for Korea.

From the analysis of the industries in three countries, we can see that the traditional accounting methods cannot really reveal a country's real trade structure and the source of profits, which would lead the deviation of national policy-making, the results of political measures would lose their impact. So, the following is an further analysis of the differences between the bilateral trade in the two trade accounts.

CONCLUSION

From the above analysis, the traditional methods of trade statistics caused overestimated to the level of China's export manufacturing sectors and that distorted the true level of the export sector status quo.

The establishment of value-added trade statistics system can better describe the reality of international trade. Under the system of global value chain division, the diversification of trade subject and the decentralization of trade position make the source and distribution of trade interests increasingly complicated. Added value of trade as a statistical approach, excluding the foreign value added in one country's exports, can truly measure the domestic value added in one country's exports and reflect the status of one country in GVC. The accounting of value added trade provides a new perspective for the division of international trade, investment and industry under the background of globalization, more fully and accurately reflects the real situation of the countries participating in international division of labor and international trade and helps to reflect the internationalization more objectively. The international trade flow in the production background, the real benefits of the two sides of trade and trade imbalance and so on. Policy makers can make a more reasonable judgments according to value added trade accounting system.

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