Analysis of the Import and Export Trade of Chinese Herbal Medicine in China

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ABSTRACT

This paper analyzes the import and export data of Chinese herbal medicine from 1994 to 2018, analyzes the current situation of Chinese herbal medicine international trade, analyzes its international competitiveness by using the trade competition index, and uses the multi-linear regression model to analyze the data gradually. This paper explores the factors affecting the international competitiveness of Chinese herbal medicine. The research shows that the main factors affecting the international trade of Chinese herbal medicine are the sowing area of herbs and the World commodity price index, which is not Gross domestic product (Percent change, market exchange rates).

Keywords: *Chinese herbal medicine, trade competitiveness index, international competitiveness, empirical analysis*

1. INTRODUCTION

In 1994-2018, in the import and export trade of Chinese medicine resources, although the import volume and trading partners are on the rise, but China has been playing the role of a major resource exporter. The proportion of exports to total imports and exports has been maintained between 75% to 90%, and the import and export gap is expanding trend [1]. In the international pharmaceutical market, natural medicines have exceeded 30% of the market share, annual sales of nearly 50 billion U.S. dollars, global sales growth rate of 10% per year. China's natural medicine only accounts for 3% - 5% of the world natural medicine market, exports less than 10% of the international Chinese medicine market, the international trade in Chinese herbal medicine is facing great challenges [2].

2. THE COMPETITIVENESS OF CHINESE HERBAL MEDICINE IN INTERNATIONAL TRADE

According to united Nations data, China's total imports and exports of Chinese medicine resources reached an all-time high of $2,217 million in 2014, while the difference between imports and exports reached $1,707 million, the highest in history; Since 2014, the import and export volume of Chinese herbal medicines has occasionally declined, showing a state of erratic fluctuations; In 2018, the total import and export volume of Chinese herbal medicines in my country was 1.762 billion U.S. dollars, of which imports were 195 million U.S. dollars, a year-on-year increase of 3.97%, and the import volume hit a new high in the past three years. The export value is 1.567 billion dollars.
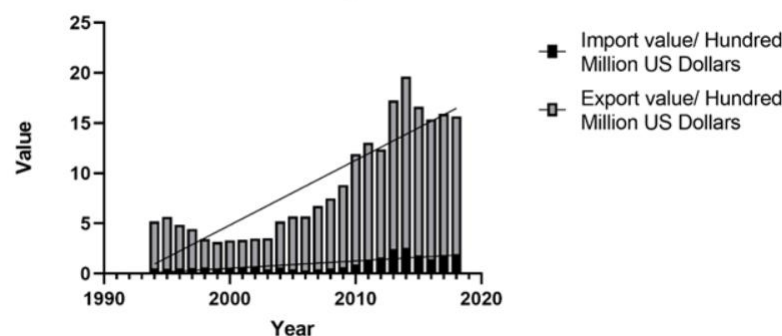

Figure 1 1994-2018 Chinese herbal medicine import and export data

Due to the particularity of Chinese herbal medicine, the General Administration of Customs of China has not classified it separately. The scholar has counted the HS code of the classification of Chinese medicine products, and clearly mentioned the HS code of Chinese herbal medicine and the import and export products of drinking tablets [3]. The statistical scope of Chinese herbal medicine in this paper is as follows:

Table 1 Statistical range of Chinese herbal medicine

Type	HS	Products
	0906	Cinnamon and cinnamon-tree flowers
	0907	Cloves
	0908	Nutmeg, mace and cardamoms
	0909	Seeds of anise, badian, fennel, coriander, cumin, caraway or juniper
	0910	Ginger, saffron, turmeric(curcuma), thyme, bay leaves, bay leaves, curry and other spices
Chinese herbal medicine	0506	Bones and horn-cores, unworked, defatted, simply prepared(but not cut to shape), treated with acid or degelatinised; powder and waste of these products
	0507	Ivory, tortoise-shell, whalebone and whalebone hair, horns, antlers, hooves, nails, claws and beaks unworked or simply prepared, not cut to shape; waste and powder of these products
	0510	Ambergris, castoreum, civet and musk; cantharides; bile, dried or not glands, other animal products used in preparation of pharmaceutical products, fresh chilled, frozen or otherwise provisionally preserved
	1211	Plants (including seeds and fruits), used primarily in perfumery, pharmacy; for insecticidal, fungicidal or similar purposes, fresh or dried, whether or not crushed or powdered

The international trade competitiveness index of Chinese herbal medicines is shown in Table2. From 1994 to 2018, the overall competitiveness of Chinese herbal medicines trade showed a fluctuating trend, and individual Chinese herbal medicines had strong competitiveness. The export markets with a higher share include "cinnamon and cinnamon-tree flowers ", " Seeds of anise, badian, fennel, coriander, cumin, caraway or juniper ", "Ginger, saffron, turmeric(curcuma), thyme, bay leaves, bay leaves, curry and other spices", " Plants and parts of plants (including seeds and fruits), used primarily in perfumery, pharmacy; for insecticidal, fungicidal or similar purposes, fresh or dried, whether or not crushed or powdered " (HS: 0906, 0909, 0910, 1211), the trade competitiveness index value is relatively stable, and the international competitiveness is strong; The international competitiveness of "cloves", " Nutmeg, mace and cardamoms " (HS: 0907, 0908) has increased in recent years and is expected to become export products with strong competitive advantages; "Bones and horn-cores, unworked, defatted, simply prepared(but not cut to shape), treated with acid or degelatinised; powder and waste of these products ", "Ivory, tortoise-shell, whalebone and whalebone hair, horns, antlers, hooves, nails, claws and beaks unworked or simply prepared, not cut to shape; waste and powder of these products", "Ambergris, castoreum, civet and musk; cantharides; bile, dried or not glands, other animal products used in preparation of pharmaceutical products, fresh chilled, frozen or otherwise provisionally preserved" (HS: 0506, 0507, 0510)'s international competitiveness is extremely

weak, and there has been a tendency to withdraw from the   international arena in recent years.

Table 2 1992-2018 Chinese herbal medicine trade competitiveness index in China

				The HS of Chinese herbal medicine					
Year	0506	0507	0510	0906	0907	0908	0909	0910	1211
1992	0.871	-0.232	0.633	0.999	-0.999	-0.885	0.989	0.846	0.692
1993	0.947	0.190	0.527	0.995	-0.968	-0.966	0.917	0.746	0.672
1994	0.934	0.609	0.521	0.999	-1.000	-0.930	0.988	0.806	0.807
1995	0.944	0.275	0.721	0.999	-0.965	-0.805	0.988	0.888	0.827
1996	0.973	-0.185	0.479	0.995	-0.996	-0.967	0.962	0.914	0.772
1997	0.946	0.233	0.434	0.999	-0.996	-0.999	0.849	0.933	0.726
1998	0.942	0.104	0.026	0.995	-0.972	-0.964	0.930	0.905	0.655
1999	0.843	0.217	0.373	0.994	0.106	-0.993	0.906	0.899	0.669
2000	0.693	-0.039	0.243	0.986	-0.986	-0.994	0.946	0.917	0.689
2001	0.036	-0.017	0.426	0.992	-0.993	-0.997	0.961	0.925	0.639
2002	0.390	0.129	-0.409	0.995	-0.979	-0.999	0.988	0.923	0.632
2003	-0.390	-0.585	0.340	0.998	-0.921	-0.996	0.973	0.912	0.750
2004	0.068	0.149	0.110	0.996	-0.468	-0.992	0.924	0.941	0.705
2005	-0.574	0.287	0.215	0.989	-0.473	-1.000	0.971	0.956	0.796
2006	-0.282	0.158	-0.012	0.992	0.221	-1.000	0.952	0.958	0.879
2007	-0.621	0.125	0.342	0.980	0.587	-0.974	0.991	0.964	0.847
2008	-0.923	0.157	-0.050	0.972	0.380	-0.336	0.980	0.970	0.835
2009	-0.895	-0.286	0.071	0.987	0.606	0.139	0.987	0.971	0.845
2010	-0.821	-0.056	0.302	0.994	0.349	0.033	0.992	0.974	0.796
2011	-0.683	-0.047	-0.277	0.984	-0.245	-	0.986	0.971	0.726
2012	-0.749	-0.068	-0.096	0.976	-0.063	-0.319	0.963	0.942	0.720
2013	-0.991	-0.195	-0.227	0.986	-0.704	-0.019	0.935	0.968	0.699
2014	-0.997	-0.068	0.028	0.977	-0.135	-0.019	0.946	0.979	0.709
2015	-1.000	-0.226	-0.273	0.967	-0.596	0.554	0.960	0.980	0.763
2016	-1.000	-0.183	-0.265	0.967	1.000	0.618	0.947	0.961	0.812
2017	-1.000	-0.483	-0.332	0.975	0.892	0.579	0.950	0.920	0.807
2018	-1.000	-0.144	0.044	0.976	0.841	0.328	0.979	0.964	0.735

Data source: calculated based on data from UN Comtrade Database

3. DATA SOURCES AND RESEARCH METHODS

3.1. Research Methods

This paper intends to collect data on the import and export of Chinese herbal medicine from 1994 to 2018, to descriptively analyze the current situation of Chinese herbal medicine international trade, and to establish a multilinear regression model through E-views8.0 regression quantitative analysis, and to explore the factors affecting the international trade in Chinese herbal medicine. Common indicators used for international competitiveness analysis using import and export data are the Shown Comparative Advantage Index (RCA) and the Trade Competitiveness Index (TC). Although RCA excludes the impact of macroeconomic aggregate fluctuations, it does not consider the impact of changes in the international trade environment on imports and exports when measuring products, and only uses export data to compare the advantages of measurement, the results are more controversial than TC, so this paper chooses TC to measure the international competitiveness of Chinese herbal medicine [4-5].

China's international trade in Chinese herbal medicine is in an awkward situation, it is difficult to enter foreign markets by way of medicine [6]. Most scholars study the basis of the factors affecting the international competitiveness of the pharmaceutical industry, and use qualitative analysis methods, only a few empirical studies use regression analysis to quantify factor data. For example, by analyzing the import and export data of Chinese medicine from 2001 to 2008, Hao Gang found that the output of medicinal herbs, Gross domestic product (Percent change, market exchange rates), the world commodity price index and so on are important trade factors. By analyzing the export structure of Chinese medicine and the proportion of the world, Wei Jinman pointed out that the international competitiveness of Chinese medicine industry is greatly influenced by the scale of Chinese medicine industry, labor force, domestic and foreign market demand and supporting industry, and the empirical analysis finds that the international trade of Chinese medicine industry is greatly influenced by domestic and foreign market demand, labor force, etc., rather than the cultivation area of medicinal herbs[7]. Combined with the characteristics of Chinese herbal medicine consumption which are easily affected by their own output and the world economic situation, this paper speculates that the international trade of Chinese herbal medicine may be affected by Gross domestic product (Percent change, market exchange rates), the World commodity price index, the sowing area of herbs, etc.

Table 3 Classification of china's herbal medicine competitiveness indicators

Descriptive index	Trade competitiveness index
Influencing factor index	Commodity Non-Fuel In Price index includes Food and Beverages and Industrial Inputs Price Indices (Index, 2016=100)
	Gross domestic product (Percent change, market exchange rates)
	The sowing area of herbs（100,000 hectares）

3.2. Data Selection

Chinese herbal medicine is not classified separately by the General Administration of Customs of China, and the data are not perfect, while the United Nations database provides a full range of Chinese herbal medicine trade data for HS classification of trade products, and commodity trade is divided into three sectors: Chinese mainland (China), Hong Kong SAR (China), Macao SAR (China). The Chinese mainland data can be traced back to 1992, but the data of Hong Kong (China), and Macao (China) are missing more. In order to ensure the consistency and comparability of the data, the import and export data of Chinese herbal medicine selected in this paper are collected from the United Nations trade database. Data on the production and planting area of Chinese herbal medicines are from the National Bureau of Statistics statistical system. Gross domestic product (Percent change, market exchange rates) and commodity price index are from the International

Monetary Fund's World Economic Outlook Database, October 2019. The sowing area of medicinal herbs comes from the Chinese National Bureau of Statistics, and due to the lack of data for 1993 and 2019, it is proposed to study the data for 1994-2018.

4. RESEARCH DATA ANALYSIS

Table 4 shows the data we analyzed. Use the multiple linear regression method to establish the prediction model, construct the initial model, as in (1):

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + U_t \qquad (1)$$

Y_t is the total export of Chinese medicinal materials and decoction pieces in year t; X_{1t} represents Gross domestic product (Percent change, market exchange rates) in year t, and X_{2t} represents the World commodity price index in year t; X_{3t} represents the sown area of medicinal materials in year t, and Ut is the random error term.

Table 4 Summary of analysis data of Chinese medicinal materials export measurement model

Year	Export value	Gross Domestic Product	World commodity price index（2016=100）	The sowing area of herbs
1994	5.185	3.199	59.709	3.121
1995	5.661	2.928	63.826	2.787
1996	4.863	3.299	64.128	2.548
1997	4.455	3.497	60.721	3.079
1998	3.430	2.359	55.432	3.720
1999	3.129	3.181	50.543	4.825
2000	3.316	4.219	52.241	6.756
2001	3.345	1.701	50.124	8.273
2002	3.486	1.979	51.407	9.639
2003	3.526	2.891	57.582	12.482
2004	5.203	4.036	65.937	12.847
2005	5.693	3.591	71.193	12.133
2006	5.682	3.98	86.728	8.312
2007	6.734	3.832	101.541	11.587
2008	7.479	1.523	113.924	12.350
2009	8.821	-1.991	98.136	12.101
2010	11.904	4.124	123.101	12.623
2011	13.050	3.075	147.693	13.825
2012	12.367	2.472	136.225	15.190
2013	17.260	2.608	128.826	16.484
2014	19.624	2.846	121.831	17.589
2015	16.616	2.824	101.059	18.610
2016	15.388	2.57	100	19.324
2017	15.921	3.227	106.416	21.611
2018	15.675	3.077	108.171	23.924

From the regression results of the equation, α=0.05, tα/2(23)=2.07, X1t cannot pass the t test, and the X3t initial model works best. Choose X3t as the initial model, and perform the Frisch stepwise regression method to discuss the analysis results. As shown in Table 5, the best fitting equation is:

$$\hat{Y}=-3.705 + 0.434X_{3t} + 0.086X_{2t}$$

$$(-2.451) \quad (3.844) \quad (3.811)$$

$$R^2=0.808, DW=0.437, F=46.300$$

Table 5 Stepwise regression table

	c	X_{1t}	X_{2t}	X_{3t}	R^2
Y=f(X1t)	9.409	-0.245			0.003
t	3.336	-0.268			
Y=f(X2t)	-3.882		0.145		0.679
t	-2.031		6.976		
Y=f(X3t)	0.385			0.729	0.681
t	0.287			7.012	
Y=f(X3t, X2t)	-3.706		0.086	0.434	0.808
t	-2.451		3.811	3.844	
Y=f(X3t, X2t, X1t)	-4.100	0.125	0.086	0.435	0.809
t	-2.013	0.297	3.742	3.770	

When other factors remain unchanged, for every 1 unit increase in the world commodity price index, the export of Chinese herbal medicines will increase by 0.086 units, and the export of Chinese herbal medicines will increase by 0.434 units for every 1 unit increase in the sown area of medicinal materials. From a long-term perspective, the world economic growth variables have little effect on people's demand for Chinese medicine. This may be because the export of Chinese medicine is more susceptible to changes in the trading environment, export standards, and planting environment. The trend of the World commodity price index is the epitome of the macroeconomic trend, showing a positive correlation with my country's Chinese herbal medicine export trade, and it is impossible to artificially interfere with the global economic trend. The planting area of Chinese medicinal materials reflects the level of raw material resources and has a great impact on international competitiveness. It can be seen that the innate advantages of resources can bring advantages to my country's Chinese herbal medicine trade. In the future, while improving the utilization of natural resources, the sown area of medicinal materials can be appropriately increased.

5. CONCLUSION

The export volume of Chinese herbal medicines is positively correlated with the world commodity price index, and the trend of the world commodity price index is a microcosm of the macroeconomic trend. The world commodity price index is estimated to continue to increase in 2020-2024, which will seriously affect the future international economic situation. Coupled with the impact of the new crown epidemic, in 2020, the global economic growth is expected to be -4.9%, which will continue to expose economic and medical problems [8]. In the future, we will attach importance to the time series data of the import and export trade of Chinese medicine products, carry out dynamic analysis, and pay attention to the summary of the rules, which will help future generations to study and benefit the overall improvement of the country's Chinese medicine trade situation.

When selecting indicators, the article should have added all the main factors affecting the international competitiveness of Chinese herbal medicines. However, due to the data availability and accuracy of certain indicators, some indicators have to be abandoned. Moreover, some indicators are difficult to quantify, so the regression analysis is only to verify the existing available indicators, and the regression analysis method is relatively simple.

The research data spans a long time, the customs codes of Chinese medicinal materials and decoction pieces are messy, and still use the previous calculation range in 2011, and due to the availability of data, the data uses HS classification and mainland China's import and export trade data., Did not consider possible updates in the future.

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REFERENCES

[1] Wang Nuo, Ma Shuai, Yang Guang. My country's traditional Chinese medicine resources import and export trade and its potential analysis [J]. International Trade, 2017(05): 20-25+30. (In Chinese)

[2] Zheng Lijun. Research on the Problems and Strategies of the Internationalization of Traditional Chinese Medicine [D]. Shandong: Shandong University of Traditional Chinese Medicine, 2018. (In Chinese)

[3] Hao Gang. Research on my country's Traditional Chinese Medicine Industry Development Strategy [D]. Huazhong University of Science and Technology, 2011. (In Chinese)

[4] Kang Chengwen. Review of the Research on Revealed Comparative Advantage Index [J]. Business Research, 2014(05): 32-39. (In Chinese)

[5] Zhang Jinchang. Research on the Method of Evaluating International Competitiveness with Export Data [J]. Economic Management, 2001(20): 17-25. (In Chinese)

[6] Zhang Zhongpeng, Wang Jianfen. Status Quo and Thinking of my country's Traditional Chinese Medicine Trade [J]. China Modern Chinese Medicine, 2017, (02): 278-282. (In Chinese)

[7] Wei Jinman. Analysis of the International Competitiveness of Traditional Chinese Medicine Industry and Its Influencing Factors [D]. Ningbo University, 2015. (In Chinese)

[8] International Monetary Fund. World Economic Outlook [EB/OL]. (2020-06-24).

[9] https://www.imf.org/en/Publications/WEO /Issues/2020/006/24/WEOUpdateJune2020. (In Chinese)