Study on the Economic Development of China's Manufacturing Industry under the Influence of International Trade

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Abstract: Under the background of international trade division, it is a difficult problem for China to improve the status of manufacturing industry. This paper analyzes the status of China's manufacturing industry in the context of international trade, and finds that the scale of China's manufacturing industry is expanding and the growth rate is declining; the industrial structure is optimized, and the technology intensive industry becomes the leading industry. At the same time, it is found that the degree of specialization of Chinese manufacturing industry in international trade is deepened, and its position in Global trade is improved. Next, it discusses the factors that influence the international status of China's manufacturing industry under the international trade. Finally, the paper makes an empirical analysis of the factors that influence the status of China's manufacturing industry in the context of international trade. Through the establishment of individual effect model and regression analysis, the Hausman test results are completed. The results show that the government creates a loose market environment, provides favorable industrial and financial policies, and promotes the export trade of China's manufacturing industry. At the same time, we also find that physical capital has a significant positive impact on the global international trade status index.

1. Research background

China has carried out the policy of reform and opening up for more than 40 years. In the process of economic globalization, China's economy has achieved rapid growth for decades in succession by undertaking the industrial transfer of developed countries, using the superior "demographic dividend" and huge market [1]. Especially after China's official accession to the World Trade Organization (WTO) in 2002, China's economy has maintained two consecutive years in 2003-2007 The increase in the number of digits has achieved an unprecedented "economic miracle" in human history. After the outbreak of the financial crisis, the international and domestic situation has changed dramatically. Internationally, the political situation in the world is particularly turbulent, the global economy is getting cold, and foreign demand is sluggish [2], and the elimination of backward production capacity and the transformation of economic growth mode have become the main keynote of China's economic policies in recent years [3].

As a new type of international division of labor, the global division of international trade has changed the international production system and mode, and brought great development opportunities and unprecedented challenges to developing countries. On the one hand, developing countries have achieved rapid economic development by participating in the division of labor in global international trade. On the other hand, the developed countries, by virtue of their own technology and brand advantages, play a leading role in international trade and restrain the developing countries in the low-end of international trade. China has abundant labor and resources. The research on the status upgrading of China's manufacturing industry in the context of international trade enriches the theory of division of labor and industrial upgrading, and provides an important reference for the status upgrading of manufacturing industry in the international trade division.

2. Characteristics of manufacturing industry under international trade

(1) Scale expansion and growth decline

After the reform and opening up, China made use of the comparative advantage of labor force, embedded in the global international trade production, and the scale of manufacturing industry continued to expand. The added value of China's manufacturing industry exports to the world in 2000-2014 is shown in the figure. It can be concluded from the figure that the export of China's manufacturing industry scale keeps growing internationally. In 2000, the added value of China's manufacturing industry export international was 394.088 billion US dollars, and in 2014, the added value was 3129.377 billion US dollars. The scale of manufacturing industry has grown significantly [4]. From 2000 to 2014, the growth trend of the added value of China's manufacturing export international has changed a lot. As shown in the figure, the growth of the added value of China's manufacturing export international has obviously experienced growth - decline - growth - decline - growth - decline. The reason for the rapid growth of the added value of China's manufacturing export international is that China's accession to the World Trade Organization and expansion of market access. In 2009, the negative impact of the financial crisis was highlighted, and the growth rate of China's manufacturing exports in the world was only 8.21%. Since 2012, the growth rate of China's manufacturing export value-added has declined significantly. In 2014, the growth rate of China's manufacturing export value-added was only 5.99%, becoming the lowest growth rate in 15 years. It can be seen that the growth rate of China's manufacturing industry has declined while the scale of international added value of China's manufacturing industry has expanded.

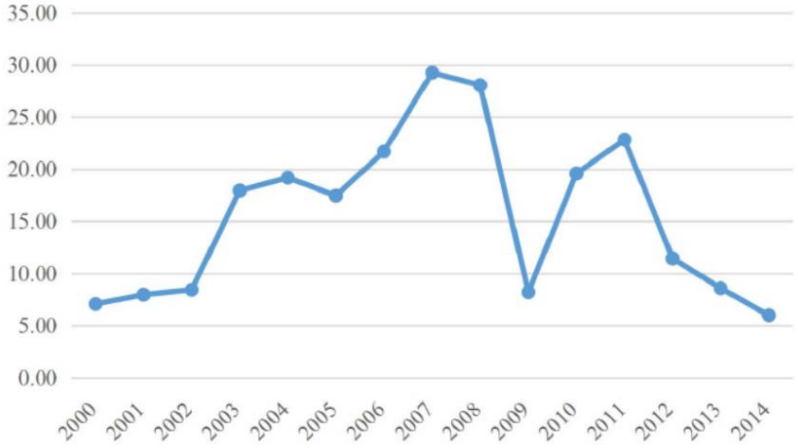

Figure 1. Growth trend of added value in international trade of manufacturing industry

(2) Industry structure optimization, technology intensive industry becomes the leading industry

After the reform and opening up, China has made use of abundant labor force to undertake the production, processing and assembly links transferred from developed countries, and to produce a large number of labor-intensive products for export. China's labor-intensive industries have developed rapidly. However, from the trade practice of developed countries, only mastering the core technology can be in the leading position in the global division of international trade. In order to improve its position in the international division of labor and change its subordinate position in the international trade, China has improved its understanding of technology, created a good external environment for research and development, and enterprises have carried out technological innovation.

3. Factors influencing the international status of China's manufacturing industry under international trade

In practice, the international trade status index is usually used to measure the status of a country's industry in global international trade. Therefore, this paper takes the above factors as explanatory variables and the global trade status index of China's manufacturing industry as explanatory

variables.

(1) Gvcps is the global international trade position index. The larger the index value is, the higher the manufacturing position is. Technological innovation and technological progress are considered to be the result of *Rrd* investment. Therefore, this paper uses *Rrd* investment intensity to express *Rrd* progress and innovation. *Rrd* investment intensity is the ratio of *Rrd* expenditure to GDP. Since it takes time from scientific research input to patent output and then to patent to play its role, this paper also controls the lag of *Rrd* investment intensity.

(2) Capital, including material capital and senior human capital. The stock of material capital generally uses the perpetual inventory method. In this paper, the material capital (*C*) is expressed as the proportion of the net value of fixed assets in the GDP by referring to the perpetual inventory method. Human capital (*Rhr*) refers to the method of years of education, and expresses human capital as the proportion of the number of scientific and technological personnel in the number of manufacturing industry employees.

(3) Scale compensation. In order to realize the increasing returns to scale, change the constant returns to scale and the decreasing returns to scale, we need technological progress and technological innovation. Therefore, to study the impact of returns to scale on the upgrading of China's manufacturing status is to study the impact of technological innovation and technological progress on the upgrading of China's manufacturing status. So we can use the *Rrd* investment intensity to express the empirical results.

(4) Law, finance, currency, international trade. It is measured by the economic freedom index (*EFWI*). At present, there are two main institutions to measure economic freedom: the American Heritage Foundation and the Fraser Institute of Canada. Since the American Heritage Foundation has changed its evaluation methods and contents since 2007, in order to maintain the consistency of data, the economic freedom index of this paper adopts the data published by Fraser Institute. A research institute measures economic freedom, government revenue and expenditure, legal structure and property rights protection, monetary policy, trade freedom, credit, labor and business system. The index value is [0, 10]. The larger the index value is, the looser the system of a country, the lower the transaction cost of enterprises, and the better the status of manufacturing industry. In the empirical analysis, the growth rate of manufacturing added value caused by the index of international trade and economic freedom of government policy indicates that the index value is large, which means that due to the loose external environment, the contribution rate of government policy to manufacturing added value is high. Vefwi is used in the empirical analysis.

(5) Infrastructure, including transportation and communication facilities. Communication facilities also include the construction of mobile cellular wireless communication system telephone and network. In the analysis of the impact of transportation facilities on the improvement of China's manufacturing status, the railway length per 100 square kilometers is used as the transportation index (*Tran*). In the world bank's development indicators, the mobile cellular wireless communication system telephone rental (per hundred people) and secure Internet server (per million people) are used to calculate the mobile cellular wireless communication system telephone manufacturing industry penetration rate (*M*) and manufacturing branch Internet server penetration rate (*In*).

4. An empirical analysis of the influencing factors of status promotion in international trade

4.1 Data sources

This paper calculates the global international trade status index through the University of Foreign Trade and economic cooperation's global international trade database. The original data comes from the 2016 wiots table published by the EU wiod database, which provides the relevant data of 56 departments of 43 economies in 2000-2014. Therefore, the global trade status index in this paper is the panel data of 19 manufacturing sectors in China from 2000 to 2014. The index of economic freedom and the added value are respectively from the data published by Fraser Institute and the international trade database of the University of International Business and economics. The current liabilities of the Department's debt ratio come from China Industrial Statistics Yearbook. In the

proportion of industrial scientific research employment and industrial employment, the number of industrial scientific research employment and industrial employment comes from China's statistical yearbook of science and technology and China's industrial statistical yearbook. The Internet server penetration rate and mobile cellular wireless communication system telephone penetration rate of transportation and manufacturing employees are calculated by the world bank development index total railway kilometers, safe Internet servers (per million people) and mobile cellular wireless communication system telephone rental (per hundred people), respectively. The data are from the World Bank statistics.

4.2 Individual effect model

Based on the above data, an individual effect model is constructed as follows:

$$GVCPs_{it} = \beta x_{it} + \delta z_i + \mu_i + \varepsilon_{it} \tag{1}$$

Among them, *GVCPs* is the explained variable, which is the global international trade status index of China's manufacturing industry. Xit is the explanatory variable, including *Rrd, Vefwi*, *Debt, Tran, Rrh, C, In, M, Zi* is the individual characteristic of each department that does not change with time.

If μ_i is related to an explanatory variable, the fixed utility model (FE) is used to get the consistent estimator after elimination. If μ_i is not related to (x_{it}, z_i), the random utility model is used.

For the fixed effect model, given *i*, formula (1) two sides take the average time and then make the difference, after eliminating the individual fixed effect, we can get the constant estimate of *ols*. For the random effect model, the covariance of the same individual disturbance term is:

$$\sum = \begin{pmatrix} \sigma_\mu^2 + \sigma_g^2 & \sigma_\mu^2 & \cdots & \sigma_\mu^2 \\ \sigma_\mu^2 & \sigma_\mu^2 + \sigma_g^2 & \cdots & \sigma_\mu^2 \\ \sigma_\mu^2 & \vdots & \ddots & \vdots \\ \sigma_\mu^2 & \sigma_\mu^2 & \cdots & \sigma_\mu^2 + \sigma_g^2 \end{pmatrix}_{T \times T} \tag{2}$$

In this paper, Hausman test will be used to determine whether to choose random effect model or fixed effect model. We set H0, the original hypothesis of Hausman test, to use the random effect model, i.e. μ_i is not related to (x_{it}, z_i). Whether or not the original hypothesis holds, we find that Fe is consistent all the time. However, when the original hypothesis holds, RE is more effective than Fe.

	(1)	(2)	(3)
In		0.00171	0.000291
		(1.30)	(0.67)
Rhr		0.0856	0.0997
		(0.64)	(0.74)
C		0.0678	0.0579
		(0.59)	(0.92)
Rrd _1			0.0330**
			(5.93)
Rrd _2			0.00278*
			(1.89)
Rrd _3			0.0236
			(1.50)
_Cons	0.910***	1.483***	1.115***
	(27.18)	(7.70)	(8.79)
N	243	199	159
Panel B: Hausman检验			
chi2(4) =10.76 Prob>chi2 =0.1494			

t statistics in parentheses

**p < 0.1, **p < 0.05, ***p < 0.01*

Figure 2. Hausman test results

4.3 Hausman test results

The original hypothesis is that H0: μ_i is not related to (x_{it}, z_i). Alternative hypothesis H1: using the fixed effect model Hausman test results are shown in the figure 2.

Due to $\Pr ob > chi2 = 0.1494$, so there is no reason to reject the original hypothesis and use the random effect model.

5. Conclusion

Lagged in the first phase of international trade R & D investment intensity, lagged in the second phase of international trade R & D investment intensity, growth of added value caused by international trade and economic freedom index, debt ratio and transportation facilities have significant positive impact on the global international trade status index. Mobile cellular wireless communication system in manufacturing industry has telephone penetration rate, and Internet server for manufacturing employees has the rate of employment, the number of researchers in the industry and the material capital have no significant impact on the position of global international trade.

Vefwi The coefficient is significantly positive, indicating that the growth rate of added value caused by the index of economic freedom of international trade is positively correlated with the index of global international trade status of manufacturing industry, which means that the higher the economic freedom of Chinese government is, the higher the service level of the government to manufacturing industry is. The Rrd_1 coefficient is significantly positive, indicating that the investment of scientific research funds has a lag effect on the global international trade status index, that is, the investment of scientific research funds one year ago has a significant positive impact on the current global international trade status index. The Rrd_2 coefficient is significantly positive, which indicates that the investment of scientific research funds has a two-stage lag effect on the global international trade status index, that is, the investment of scientific research funds two years ago has a significant positive impact on the current global international trade status index. Because the R & D process is usually time-consuming, it takes a long time from the investment of scientific research funds to the production of new technology to the application of technology in production and put on the market. Therefore, the lag effect of scientific research output needs to be considered when analyzing the influencing factors of the promotion of China's manufacturing industry status. In addition, the position of China's manufacturing industry in international trade is positively related to

technology, that is, more R & D investment, China's manufacturing industry has a high position in international trade.

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