Comparing the Export and Import Trade Patterns of the Chinese Low-technology Manufactures

Yu Hong[1], Shanshan Ren[1], Bonan Shao[1] and Xiaowei Mu[2, *]
[1] Jilin University of Finance and Economics, Changchun 130117, China
[2] College of Humanities & Sciences, Northeast Normal University, Changchun 130117, China
*Corresponding author

Abstract—This study analyzes the Chinese trade patterns in low-technology manufactures for the period of 1987-2017. We employ H-index, or the difference between net export capability and symmetric revealed comparative advantage, to assess the trade policies in exports and imports. The results reveal that China has comparative advantage in the exports, and has had comparative disadvantage in the imports before 2006. We document that China has attempted to protect its low- technology industries by both export facilitation and import restriction.

Keywords—China; low-technology manufacture; trade pattern; trade protection

I. INTRODUCTION

It is generally believed that China has a comparative advantage in labor-intensive, low- technology manufactured goods, which has been particularly evident since the 1980s. This is partly due to the relative abundance of labor factor endowments in China; the second reason is the institutional changes and market-oriented reforms that began in 1978 allowed a large number of rural labor forces that had been idle to flow, providing labor force for the development of the manufacturing industry; and the third reason is that the knowledge and skills of these labors are relatively low, so they mainly flow to the low-end manufacturing industry in the international division of labor system, it provides a basis for China to form a comparative advantage in labor-intensive and low-technology products[1]. The theory of free trade points out that if a country has a comparative advantage in a certain commodity, it should be more divide the production and export of the product, and import a product with a comparative disadvantage at the same time. By participating in international division of labor and international exchange, economic resources can be allocated in a wider scope, thus enabling each participant to benefit from international trade [2]. Proponents of protectionism, however, describe another story. Both early mercantilism and Keynesians pointed out that encouraging domestic exports or restricting imports and pursuing international trade surpluses can make the country richer or stronger by accumulating gold and silver or increasing aggregate demand, and the national income can be improved. The theory of strategic trade policy and the theory of dynamic comparative advantage emphasize that a country can support the industries that is of strategic importance but do not have comparative advantages currently to obtain comparative advantage by promoting exports or restricting imports.

A country may exhibit different combinations of free trade and protectionism because of different policy objectives in the trade in a specific product. According to free trade theory, if China has a comparative advantage in exports of low-tech manufactured goods, it should adopt a free trade policy that neither encourages exports nor restricts imports; rather, in the view of trade protectionism, if China has a comparative disadvantage in its imports, it should mainly adopt the trade policy of restricting imports to protect the relevant domestic industries. What is China's import and export policy on low-tech manufactured goods? Are import and export trade policies consistent? What has changed in recent years? Even does China really have a comparative advantage in exports and imports of low-tech manufactured goods? Those questions call for empirical analysis to answer.

II. METHODOLOGY

A. Trade Patterns for Exports

1) Revealed symmetric comparative advantage

Ballasa (1965) measures a country's comparative advantage in a given product export using the "indicative comparative advantage index" (revealed comparative advantage, RCA) [3]:

$$RCA_{ik} = (X_{ik} / X_i)/(X_{wk} / X_w) \tag{1}$$

where X means exports, X_{ik} represents the exports of product k by country i, X_{wk} represents the total exports of product k from all over the world, X_w represents total exports of all products. Clearly, if RCA_{ik} is higher than 1, it indicates that country i will produce or export more products than the world average, which also means that country i has lower relative cost or higher comparative advantage for product k.

RCA ranges from zero to infinite, but its average is uncertain. Its distribution is asymmetric. Dalum (1998) solves the above problem by using logtransformation of RCA [4]:

$$RSCA_{ik}^{X} = (RCA_{ik} - 1)/(RCA_{ik} + 1) \tag{2}$$

$RSCA_{ik}^{X}$ represents the "symmetrical comparative advantage index" of country i, The range of $RSCA_{ik}^{X}$ is [-1,

1] .If $RSCA_{ik}^{X} > 0$, there must be $RCA_{ik} > 1$, which means that country i has comparative advantage in the export of product k ;and when $RSCA_{ik}^{X} < 0$, there is $RCA_{ik} < 1$, which means that country i has comparative disadvantage in the export of product k. When $RSCA_{ik}^{X} = 0$, the export of product k of the country i has the same comparative advantage as other countries in the world, and the export of product k in this country has neither comparative advantage nor comparative disadvantage. Since one of the key points of this analysis is "showing comparative advantage in imports", appropriate variations for formulas (1) and (2) are needed:

$$RCA_{ik}^{M} = (M_{ik}/M_i)/(M_{wk}/M_w)$$

(3)

in which M represents the imports, while the subscript i, k and w denote country i and the world. Correspondingly. The "symmetrical comparative advantage index" of import is

$$RSCA_{ik}^{M} = -(RCA_{ik}^{M} - 1)/(RCA_{ik}^{M} + 1)$$

(4)

According to the comparative advantage theory, the more goods the country imports, the smaller, but not the bigger, the comparative advantage is under the same conditions. Therefore, a negative sign was added artificially to for consistency [5].

2) Net export ratio: we use net export ratio

$$NX_{ik} = (X_{ik} - M_{ik})/(X_{ik} + M_{ik})$$

(5)

which reflects the relative position of imports and exports of products k in the trade of country i , used to reflect the net export capacity of country i. It is easy to see that the range of NX values is the same as that of $RSCA$ [-1, 1], and its average value is also 0. When $NX_{ik} > 0$, country i is in surplus position in product k trade, and when $NX_{ik} < 0$, country i is in deficit position in product k trade. More importantly, the same range and average value make it possible to analyze both RCA_{ik} and NX_{ik} .

3) Policy intervention index

A country should specialize in the production and export products with a comparative advantage, while according to free trade theory, the stronger a country's comparative advantage in a given product, the more it should export. Import less of a product [6]. In equilibrium, NX_{ik} is always consistent with $RSCA_{ik}$, $NX_{ik}-RSCA_{ik}=0$. Therefore:

$$NX_{ik} = RSCA_{ik}^{X} = RSCA_{ik}^{M}$$

(6)

is a necessary and sufficient condition for export and import to realize free trade. And the difference between NX_{ik} and $RSCA_{ik}$, which means:

$$h_{ik}^{X} = NX_{ik} - RSCA_{ik}^{X}$$

(7)

$$h_{ik}^{M} = NX_{ik} - RSCA_{ik}^{M}$$

(8)

are "trade pattern deviation" or "policy intervention" in export and import of product k of country i, respectively, reflects when the comparative advantage of country i in product k 'exports and imports is fixed, Its net export capacity is higher or lower than the actual situation of comparative advantage. When the trade model is balanced, there should be $h_{ik}.=0$.If $h_{ik} > 0$, the net export ratio is higher than that of imports, indicating that country i has adopted a trade policy of increasing the net export ratio of its products by restricting imports; If $h_{ik} < 0$, it means that the import trade policy adopted by country i is not only not restrictive, but also has the characteristic of encouraging imports[7][8].

4) Weighted average of policy intervention index

Since the Chinese low-technology manufactured goods in this study contain N kinds of specific product categories, it is necessary to obtain the trade policy intervention index for the whole product category by weighted average:

$$H_{ij} = \sum_{k=1}^{n}(\omega_{ik} \cdot h_{ik})$$

(9)

Where H_{ij} is the trade policy intervention index for category j products. And the weight of each commodity:

$$\omega_{ik} = (X_{ik} + M_{ik})/\sum_{i=1}^{n}(X_{ik} + M_{ik})$$

(10)

is the proportion of each specific product k in China's import and export of low-tech manufactured goods . The reason why we use the weight which is weighted by the total import and export trade value of low-technology manufactured goods rather than the total import value is that in the calculation of the h and H indexes, the NX part is inevitably involved in both export and import value. Accordingly, the process of weighted average of the NX index of the product j is the same as the formula (10), which is:

$$NX_{ij} = \sum_{k=1}^{n}(\omega_{ik} \cdot NX_{ik})$$

(11)

When we calculated the weighted average $RSCA$, the weight we used is the proportion of a specific product to the total export or import of a whole category of products:

$$RSCA_{ij}^{X} = \sum_{k=1}^{n}(\omega_{ik}^{X,RSCA} \cdot RSCA_{ik})$$

(12)

$$\omega_{ik}^{X,RSCA} = X_{ik} / \sum_{i=1}^{n} X_{ik} \qquad (13)$$

$$RSCA_{ij}^{M} = \sum_{k=1}^{n} (\omega_{ik}^{M,RSCA} \cdot RSCA_{ik}) \qquad (14)$$

$$\omega_{ik}^{M,RSCA} = M_{ik} / \sum_{i=1}^{n} M_{ik} \qquad (15)$$

Where $\omega_{ik}^{X,RSCA}$ and $\omega_{ik}^{M,RSCA}$ are separately represents the weight of weighting RSCA of export and import.

5) Data and classification

We employ the SITC Rev.2annual trade data from UN Comtrade Database for the period 1987-2017.

Lall (2000) classifies three digit classification products under SITC Rev.2 according to technical structure [11]. According to this method, 43 kinds of low-technology manufactured goods were identified in the import and export products of China which as the reporting country during 1987-2017.Table 1 shows the SITC Rev.2 codes for all 43 low-tech products involved in this research.

TABLE I. 3-DIGIT SITC REV.2 CLASSIFICATION OF LOW-TECHNOLOGY MANUFACTURED PRODUCTS (43 PRODUCTS)

611, 612, 613, 651, 652, 654, 655, 656, 657, 658, 659, 831, 842, 843, 844,845, 846, 847, 848, 851, 642, 665, 666, 673, 674, 676, 677, 679, 691, 692,693, 694, 695, 696, 697, 699, 821, 893, 894, 895, 897, 898, 899

III. EMPIRICAL RESULTS

A. Export Patterns

Figure 1 depicts the the weighted average NX_{ij}, $RSCA_{ij}$ and H_{ij} of China's exports of low-technology manufactured goods during the period 1987-2017.
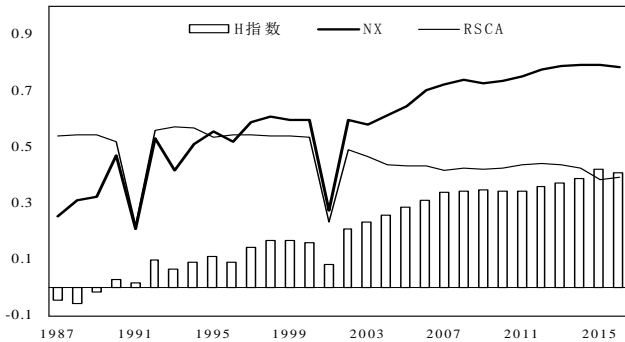

FIGURE I. THE CHINESE EXPORT PATTERNS OF LOW-TECHNOLOGY MANUFACTURES

First, both the weighted averages of NX_{ij} and $RSCA_{ij}$ are positive for the Chinese export of low-technology manufactures during the sample period, strongly implying that China has comparative advantages and trade surplus in this product category.

Secondly, the weighted average of export policy intervention index had been negative only for the period of 1987-1989, suggesting that China has adopted export facilitating policies since the 1990s, pushing the Chinese export capability above the comparative advantage in these products. The facilitation policies have kept strengthening.
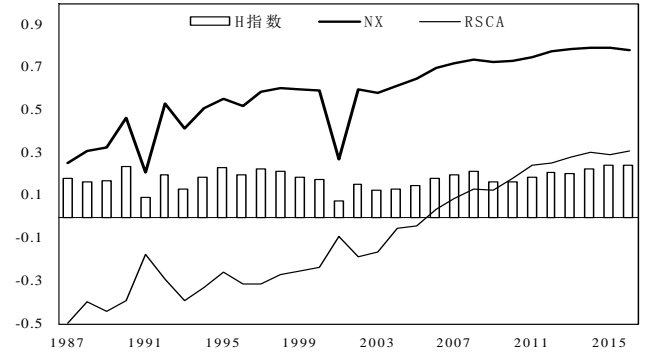
B. Import Patterns

FIGURE II. THE CHINESE IMPORT PATTERNS OF LOW-TECHNOLOGY MANUFACTURES

First, the *RSCAij* index of imports has gone through a process from negative to positive. China's imports of low-technology manufactured goods were generally at a comparative disadvantage before 2005 and had a comparative advantage since 2006. During the sample period, the comparative advantage showed a significant upward trend.

Secondly, China's *Hij* index on imports of low-technology manufactured goods has always been positive, indicating that China has implemented a protectionist policy of restricting imports of such products. Even after the comparative advantage of imports turned positive in 2006, the extent of policy intervention on trade restrictions was not reduced, but stabilized at a certain level. Comparing the *Hij* index of China's exports and imports of low- technology manufactured goods, it can be found that both of them are positive except for a few years, and the tendency of export and import trade policy is basically consistent that China has adopted the method of import restriction while promoting export, but the intensity of export promotion in the sample period, especially in recent years, is obviously greater than that of import restriction.

IV. CONCLUSION

This paper makes a comparative analysis of the net export ratio, symmetrical comparative advantage and "deviation of trade mode" or "policy intervention" index of China's export and import trade of low-technology manufactured goods from 1987 to 2017. The results as follows:

First, China has different degree of comparative advantage in the export of this kind of products and importers. The so-

called "comparative advantage in labor-intensive low-technology products" is inconsistent with the facts and is only suitable for export trade. In terms of import trade in low-tech manufactured goods, a comparative advantage emerged only after 2006. Before that, China actually has a long-term comparative disadvantage in low-tech manufactured imports.

Second, whether in export trade or import trade, China has an obvious characteristic of "the trade model is deviating from each other." The goal of policy intervention is to make China's net export capacity in such products higher than the level determined by its comparative advantage. Therefore, China has adopted a de facto protectionist policy in the trade of low-technology manufactured goods, but in export it is "export promotion" and in import "import restriction".

Third, the trade policy of "import restriction" seems to help enhancing the comparative advantage embodied in imports to a certain extent, but the pattern of export and import trade is not falling significantly after having a comparative advantage. On the contrary, the policy intervention of export has increased year by year. This means that China's protectionist policies may not simply be aimed at boosting the comparative advantage of exports or imports. One possible explanation for this quiz is that this kind of trade policy can help promote employment in China and relieve the pressure caused by releasing rural labor force. Whether this explanation or hypothesis is true or not is subject to further empirical research.

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