Empirical analysis on intra-industry trade in textile between China and Vietnam

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Abstract. The total volume of import and export trades between China and Vietnam exceeded 723 billion yuan in 2018. A comprehensive analysis of the Sino-Vietnamese intra-industry trade in textile is presented. By calculating G-L index and Bruelhart index, this paper analyzed the current situation of intra-industry trade of textile between China and Vietnam. A regression econometric model was established to explore factors affecting the intra-industry trade of textile. The study shows that adjusting textile industry structure and optimizing trade environment between China and Vietnam, as well as strengthening trade liberalization, are of great significance for reference, and are beneficial to promoting coordinated and sustainable development of economic and trade between China and Vietnam.

1. Introduction
In recent years, trade cooperation between China and Vietnam has continued to deepen. As of 2018, China as Vietnam's largest trading partner has continued to make efforts to promote trade between the two countries for 14 consecutive years. According to the statistics of the Vietnam Textile Association, there are currently more than 4,000 textile enterprises in Vietnam, and the scale of the industry has expanded year by year. Therefore, textile trade plays a very important role in the economies of both China and Vietnam. At present, China's textile industry needs to seek new economic and trade growth points through transformation. During this critical period, China needs to strengthen cooperation with other countries to obtain more textile raw materials and products to meet what it needs. This paper believes that analyzing and studying the intra-industry trade in textile industry between China and Vietnam can not only promote the economic and trade development of the two countries, but also have certain reference significance for strengthening further cooperation between the two countries in other areas.

2. Analysis of the status quo of Sino-Vietnamese intra-industry trade in textile
China's overall import and export of textiles to Vietnam has shown a growing trend. During 2008-2017, the trade balance between the two countries has been positive, and the gap is getting bigger and bigger. It shows that China’s export trade to Vietnam is greater than that of China’s imports from Vietnam, that is trade is in an unbalanced state. Based on the product trade structure data, the
G-L index and Bruelhart index are used to analyze the current status of Sino-Vietnamese textile intra-industry trade.

2.1. Sino-Vietnamese main textile G-L index
According to the data obtained in the UNCOMTRADE statistical database, the G-L index calculation and analysis of different types of textile trade between China and Vietnam were carried out, and the following results were obtained (Table 1).

| category | 2007  | 2008  | 2009  | 2010  | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  | 2017  |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 651      | 0.427 | 0.832 | 0.748 | 0.878 | 0.918 | 0.900 | 0.885 | 0.797 | 0.643 | 0.576 | 0.562 |
| 652      | 0.012 | 0.020 | 0.007 | 0.004 | 0.004 | 0.005 | 0.004 | 0.004 | 0.010 | 0.008 | 0.042 |
| 653      | 0.072 | 0.070 | 0.064 | 0.065 | 0.054 | 0.040 | 0.029 | 0.017 | 0.012 | 0.012 | 0.018 |
| 654      | 0.053 | 0.042 | 0.015 | 0.008 | 0.003 | 0.004 | 0.003 | 0.002 | 0.004 | 0.011 | 0.006 |
| 655      | 0.022 | 0.016 | 0.016 | 0.037 | 0.051 | 0.039 | 0.033 | 0.032 | 0.065 | 0.106 | 0.130 |
| 656      | 0.103 | 0.044 | 0.050 | 0.032 | 0.033 | 0.046 | 0.043 | 0.034 | 0.033 | 0.028 | 0.021 |
| 657      | 0.054 | 0.064 | 0.074 | 0.054 | 0.070 | 0.072 | 0.070 | 0.080 | 0.057 | 0.074 | 0.077 |
| 658      | 0.307 | 0.245 | 0.091 | 0.059 | 0.070 | 0.066 | 0.080 | 0.073 | 0.092 | 0.124 | 0.148 |

According to the results, there are inter-industry and intra-industry trades in the Sino-Vietnamese textile industry, but most of the textiles are traded between China and Vietnam based on the inter-industry trade model. Only textile yarns such as 651 yarn, wool yarn, cotton yarn and hemp yarn are mainly based on intra-industry trade, showing a trend of polarization. In general, the difference in the level of intra-industry trade between yarn-based textiles and other types of textiles is still very high. The level of intra-trade trade in raw materials is maintained at a relatively high level while that in intermediate and finished textiles is low. This can explain to a certain extent that China's textiles mainly participate in the Sino-Vietnamese textile trade with the comparative advantage of lower labor costs. Although the import and export volume is large, the products are still mainly low-end.

2.2. Analysis of Sino-Vietnamese Textile Bruelhart Index
The difference between the Bruelhart index and the G-L index is that the Bruelhart index measures the dynamics of intra-industry trade based on trade flows, which makes up for the defects of the G-L index [1]. According to the marginal intra-industry trade index formula, the marginal intra-industry trade index of China and Vietnam textiles from 2007 to 2017 is calculated. From a dynamic perspective, it reflects the extent of the changes in the intra-industry trade of textiles at different times. The results calculated from the previous data are shown in Figure 1.

As shown in the chart, from a dynamic perspective, the trend of intra-industry trade in China and Vietnam has increased and decreased, and the fluctuations are more intense. The years of China-Vietnam textiles' overall marginal intra-industry trade index greater than 0.5 are 2008-2009, 2011-2012, 2015-2016, 2016-2017, indicating that in these time spans, the increase in Sino-Vietnamese textile trade is mainly caused by intra-industry trade. The marginal intra-industry trade index for the remaining six time periods is less than 0.5, indicating that the increase in Sino-Vietnamese textile trade is mainly caused by inter-industry trade. As can be seen from the figure, since 2013, the Sino-Vietnamese textile marginal intra-industry trade index has generally grown steadily.
3. Empirical Analysis on Influencing Factors of Sino-Vietnamese Textile Industry Trade

3.1. Theoretical assumptions and variable selection
There are many factors affecting intra-industry trade. According to whether the various factors are quantifiable and whether sufficient sample size can be obtained, this paper finally selects and quantifies five influencing factors to measure the intra-textile trade between China and Vietnam.

1) Differences in per capita income: The higher the per capita income level, the more obvious consumers feel about the differentiation of textiles, which will make the division of labor more refined.

2) Trade imbalance: Therefore, this paper believes that the trade imbalance is negatively related to the level of Sino-Vietnamese intra-industry trade in textiles. This article uses China’s Vietnam import and export textile trade balance (China's textile trade volume to Vietnam - China's textile trade volume from Vietnam) to reflect the textile trade balance between the two countries [2].

3) China's direct investment in Vietnam: This paper assumes that China's FDI to Vietnam is positively related to the level of intra-industry trade in textiles. This article uses China's FDI data for Vietnam to reflect China's investment in the Vietnamese textile industry.

4) Market size: This paper assumes that the scale of marketization is positively related to the level of intra-industry trade in textiles of the two countries. This paper uses the average market size (average of China and Vietnam's GDP) to reflect market size.

5) Official launch of the China-ASEAN Free Trade Area: The China-ASEAN Free Trade Area was officially completed on January 1, 2010. Therefore, it is assumed that the official launch of the China-ASEAN Free Trade Area is positively related to the level of Sino-Vietnamese intra-industry trade in textiles. This article sets this variable as a dummy variable [3].

3.2. Model construction and the results

3.2.1 Model setting
Based on the data of 18 years from 2000 to 2017, the G-L index of textiles in the two countries is taken as the explained variable. Creating a double logarithmic model with the following model [4]:

\[
\ln y = C + \beta_1 \ln x_1 + \beta_2 \ln x_2 + \beta_3 \ln x_3 + \beta_4 \ln x_4 + \beta_5 D_5 + \mu
\]  

(1)

* is the index of Sino-Vietnamese intra-industry trade in textiles, \( x_1 \) is the absolute value of the Per capita GNI difference between China and Vietnam, \( x_2 \) is the absolute value of the textile trade balance, \( x_3 \) represents China's stock of direct investment in Vietnam, \( x_4 \) represents the average GDP of China and Vietnam, and \( D_5 \) indicates whether the China-ASEAN Free Trade Area has been launched (dummy variable).
3.2.2 The results of models

Finally, a regression result with good fitting in all aspects is obtained, as shown in table 2.

Dependent Variable: LNY
Sample: 2000 2017
Included observations: 18

Table 2. Model regression results

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|-------|
| C        | -26.12974   | 3.873203   | -6.746286   | 0.0000 |
| LNX1     | 2.380001    | 0.602858   | 3.947863    | 0.0017 |
| LNX2     | -1.204772   | 0.174087   | -6.920533   | 0.0000 |
| LNX4     | 0.864724    | 0.474261   | 1.823308    | 0.0913 |
| D1       | 0.516973    | 0.215358   | 2.400526    | 0.0321 |

R-squared 0.912299 Mean dependent var -1.698138
Adjusted R-squared 0.885314 S.D. dependent var 0.514196
S.E. of regression 0.174134 Akaike info criterion -0.427851
Sum squared resid 0.394194 Schwarz criterion -0.180526
Log likelihood 8.850663 Hannan-Quinn criter. -0.393749
F-statistic 33.80781 Durbin-Watson stat 1.369907
Prob(F-statistic) 0.000001

The regression results of the model show that the remaining four variables have passed the economic meaning test. The regression estimation results show that the R value of the model is 0.912299, the P value is 0.000001, and the P values of the four variables are all less than 0.1, so the model has been tested and the fitting effect of the equation is better. It shows that the difference of per capita income between China and Vietnam, trade balance, market size and the official launch of China-ASEAN free trade area have a significant impact on the index of Sino-Vietnamese intra-industry trade in textiles.

3.3. Model Analysis

(1) The difference of variable per capita income (X1) is positively correlated with the index of Sino-Vietnamese intra-industry trade in textiles, which is in line with theoretical assumptions that the degree of trade balance is negatively correlated with the index of Sino-Vietnamese intra-industry trade in textiles. According to the results of the regression model analysis, the index of Sino-Vietnamese intra-industry trade in textiles will increase by 2.38 percentage points for every 1 percentage point increase in per capita income under the same other conditions. Therefore, increasing the difference in per capita income between China and Vietnam will promote the development of intra-industry trade between the two countries[5].

(2) The trade balance (X2) is negatively correlated with the index of Sino-Vietnamese intra-industry trade in textiles, which accords with the theoretical assumption. According to the results of the regression model analysis, the index of Sino-Vietnamese intra-industry trade in textiles will fall by 1.20 percentage points for every 1% increase in the textile import and export balance between China and Vietnam. Therefore, in order to improve the level of textile trade development between China and Vietnam, it is necessary to reduce the trade balance between the two countries[6].

(3) The market size (X4) is positively correlated with the index of Sino-Vietnamese intra-industry trade in textiles, which is in line with theoretical assumptions. According to the results of the
regression model analysis, the index of Sino-Vietnamese intra-industry trade in textiles will increase by 0.86 percentage points for every 1% increase in the average GDP of China and Vietnam. With the expansion of market scale, people have higher requirements for textiles, so as to promote the differential production of textiles and improve the level of domestic trade development in the textile industry between China and Vietnam[7].

(4) The official launch of the China-ASEAN Free Trade Area (D1) is positively related to the index of Sino-Vietnamese intra-industry trade in textiles, that is to say, the comprehensive completion of the China-ASEAN Free Trade Area is conducive to the improvement of the internal trade level of the textile industry in China and Vietnam.

4. Conclusion
China should implement a product differentiation strategy to optimize the product structure of trade textiles between the two countries. China's textile industry is in a very critical stage of transformation and development. It is undergoing an industrial structure upgrade. China has gradually lost its competitive edge in terms of price [8]. In order to improve the economic benefits brought by China's textile industry, China needs to accelerate the adjustment and upgrading of the industrial structure of the textile industry. According to the principle of comparative interests, both China and Vietnam can make reasonable investments, especially pay attention to intra-industry investment, and gradually form a reasonable division of labor in textile production and export, which can stimulate the healthy and sustainable development of intra-industry trade between China and Vietnam.

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