The Impact of Financial Crisis on Textile Trade Pattern between China and ASEAN

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Abstract:
China and ASEAN have been maintaining a relationship both cooperative and competitive in the textile trade. Due to its labor intensive feature and high dependence on foreign trade, the textile trade has received much attention after the 2008 financial crisis. The customs data (classified by the HS code) from year 2006-2009 is employed to research the impact of the crisis on the trade pattern of textile industry as a whole and each of the 4 subfields (raw materials, textiles, clothing and textile machinery). G-L index and the export-import unit value ratio are analyzed with Brown-Mood median test, and the results show that the China-ASEAN trade pattern has not changed fundamentally. However, the trade-pattern indicators of the textile industry and the subfields, except for the machinery subfield, have been experiencing some quantitative variation in the crisis.

Key Words: Inter-Industry Trade, Intra-Industry Trade, VIIT, HIIT

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1.   Introduction

In China, the biggest exporting country of textile products and clothing, textile industry is both labor Intensive and highly dependent on foreign trade. However, it is also one of the most competitive industries in China in terms of international trade. In recent years, the ASEAN (Association of South East Asian Nations) has become a cooperation partner of China as well as a competitor in the textile area. On the one hand, the textile industry in ASEAN has benefited from the low labor cost and tariff and has gained a larger-and-larger share in international market with its low price, thus posing much pressure on China's textiles. On the other hand, however, the development of ASEAN textile industry requires a great amount of raw materials, which cannot be satisfied by the local factories, giving China a big market for textile materials. On January 1st 2010, the China-ASEAN free trade area was established. The tariff of textiles in a majority of countries of ASEAN has declined, and this could be the start of a more prosperous two-way trade between the two economies, which will greatly relieve the heavy dependence of China on American and Europe market. Moreover, the China-ASEAN free trade area, following the Europe and North America free trade area, will become the third biggest one in the world and provide a new platform for the future in-depth cooperation and competition of China-ASEAN textile industries.

The financial crisis in 2008 has severely affected many countries and districts. As a labor- Intensive and foreign-trade- dependent industry, the damage suffered of textile industry goes without saying. However, will this impact change the trade pattern between China and ASEAN textile field? To seek the answer, we have divided the conventional textile industry into 3 subfields: raw materials, textiles and clothing. Besides, textile machinery is added into the research as the 4th subfield. The customs data (classified by the HS code) from year 2006-2009 is employed to analyze the impact of the crisis on the trade pattern of textile industry as a whole as well as each of the 4 subfields.

2.   Evaluation Indexes

The industry trade patterns analyzed in this article include basic trade patterns and specific intra-industry trade patterns. The former is about identifying whether the industry trade is mainly inter-industry or intra-industry pattern. The latter is used to further distinguish between the horizontal intra-industry trade (HIIT) and vertical intra-industry trade (VIIT). Moreover, the vertical intra-industry trade can be categorized into UP-VIIT and DN-VIIT. The concepts and measurement methods are discussed in details below.

2.1.   Basic Industry Trade Patterns and G–L Index

Industry trade patterns are basically divided into intra-industry-dominant trade and inter-industry-dominant trade. Intra-industry trade refers to the international trade within the industry, which means a country or region, in a period of time, exports and imports products of the same industrial sector at the same time. G-L index (Grubel–Lloyd index) is the most authoritative index used to identify the current international trade pattern and is also employed in this study. We furthermore classify intra-industry trade into Horizontal Intra-Industry Trade (HIIT) and Vertical Intra-Industry Trade (VIIT).

For a single product, G-L index measures the degree of importing and exporting similar products within the same industry between the trading partners, i.e. the degree of intra-industry trade. The formula is expressed as:

$$GLI_i = 1 - \frac{|X_i - M_i|}{X_i + M_i} \tag{1}$$

In the formula, X_i and M_i respectively represent the exports and imports of Product i. GLI_i represents the G-L index of Product i in a certain period. The principle of G-L index is to measure the overlapping part in the import and export of Product i. Larger overlapping part indicates the higher degree of intra-industry trade. The range of G-L index is [0, 1], in which 0 means complete inter-industry trade and 1 means complete intra-industry trade. A G-L index between 0 and 1 means the combination of two trade patterns.

We use weighted sum to explore the basic trade pattern of a class of products:

$$GLI = \sum W_i \times GLI_i \tag{2}$$

In the formula, $GLIi$ represents the G-L index of product i or Subfield i in a certain period. W_i represents the weight of Product i or Subfield i, that is $\frac{X_i + M_i}{X + M}$ X_i and M_i

respectively represents the exports and imports of Product *i* or Subfield *i*, while *X* and *M* denote the exports and imports of a class of products. The intra-industry trade is in the superior place when *GLI* is greater than 0.5, and vice versa.

a.   Horizontal Intra-Industry Trade and Vertical Intra-Industry Trade:

Intra-industry trade can be classified into Horizontal Intra-Industry Trade (HIIT) and Vertical Intra-Industry Trade (VIIT).The former category refers to the exchange of horizontally differentiated products which is the result of the horizontal division of labor within industry. Similarly, the latter refers to the exchange of vertically differentiated products resulting from the vertical division of labor within -industry. Differentiated products are produced by the same industry, similar but not identical, and cannot be completely replaced by each other. In general, the closer of the level of factor endowments, economic development, per capita income of two countries, the more likely that horizontal intra-industry trade comes into being. People distinguish products of similar qualities from products with great difference in the overlapping part of the international trade. The fundamental idea is that the difference between unit value of the same product in export and import can reflects the difference of product quality between two economies. The higher the unit value, the higher quality of the product, and vice versa.

By setting the degree of trade overlapping (λ), Greeaway et al. (1995) apply the unit value ratio of import and export to classify different types of intra-industry trade as below:

Horizontal Intra-Industry Trade (HIIT):

$$1 - \lambda \leq \frac{UV_P{}^X}{UV_p{}^M} \leq 1 + \lambda$$

(3)

Vertical Intra-Industry Trade (VIIT):

$$\frac{UV_P{}^X}{UV_p{}^M} \leq 1 - \lambda \quad \text{or} \quad \frac{UV_P{}^X}{UV_p{}^M} \geq 1 + \lambda$$

(4)

$UV_p{}^X$ is the unit value of Product P which is exported from a country. $UV_p{}^M$ is the unit value of Product P imported from that country. λ is usually set as between 0.15 and 0.25.

b.   UP-VIIT and DN-VIIT:

Following the work of Greenway and others, Celi (1999) made a further classification of Vertical Intra-Industry Trade: UP-VIIT(the quality or price of export product is greater than the import) and DN-VIIT(the quality or price of import product is greater than the export). As Table 1 shows, for the unit value ratio $\alpha = \frac{UV_P{}^X}{UV_p{}^M}$, $\alpha \geq 1 + \lambda$ implies that the country lies in the high-end of industry value chain and tends to produce relatively high-value products, indicating the up-vertical-intra-industry trade (UP-VIIT) pattern; $\alpha \leq 1 + \lambda$ tells the opposite, i.e. down-vertical-intra-industry trade (DN-VIIT).

Table 1: Measurement of Inter-Industry Trade Patterns

Measurement	Product Differentiation	Inter-Industry Trade Pattern
$1 - \lambda \leq \alpha \leq 1 + \lambda$	Horizontal Differences	HIIT
$\alpha \leq 1 - \lambda$	Vertical Differences	DN-VIIT
$\alpha \geq 1 + \lambda$	Vertical Differences	UP-VIIT

Source: **Authors**

c. Brow-Mood Test

Brow-Mood test (median test) is a non-parametric hypothesis test method which is based on the null hypothesis of no significant difference between the medians of two independent samples. The fundamental idea is: if two samples *X* and *Y* have the same median, then the median of sample *XY* which is the mixture of *X* and *Y* is equal to the median of *X* or *Y*. We refuse the null hypothesis when the test result is significant, which represents the distributions of the two samples are significantly different.

3. Empirical Results

3.1. Impact of financial crisis on the China-ASEAN textile trade pattern:

According to the basic trade pattern, the whole textile industry and the 4 subfields are categorized into intra-industry trade and inter-

industry trade. The index used to differentiate between the two types is G-L index: when the value of G-L is above 0.5, the industry or subfield is identified as intra-industry trade, and vice versa.

From 2006-2009, China has been enjoying trade surplus in the textile trade with ASEAN. In 2009, the surplus has reached 8.998 billion dollars. As is shown in Table 2, China's exports to ASEAN also exceeded its imports in all the 4 subfields.

Table 2: Net export for textile industry and 4 subfields from year 2006 to 2009
(Unit: dollar)

Year	Whole industry	Raw material	Textiles	Clothing	Machinery
2006	5931523410	-68743079	3297464255	2422688107	280114127
2007	9564517646	17221275	4280955533	4872763418	393577420
2008	9565616506	124182614	5310411213	3722602088	408420591
2009	8998494387	120948634	5315124147	3267020612	295400994

Source: **Authors**

As can be seen from Figure 1, there are some fluctuations in the G-L index of China-ASEAN trade in both the whole textile industry and the 4 subfields, but the overall trade pattern remains unchanged. The whole textile industry falls into the inter-industry trade category, and the main way of trading is China exporting to ASEAN. Three out of four subfields (textiles, clothing and machinery) share the same trade pattern with the whole industry, with only the raw material subfield is intra-industry trade from 2006 to 2009. None of the five (whole industry and 4 subfields) trade patterns moved from one category to another.
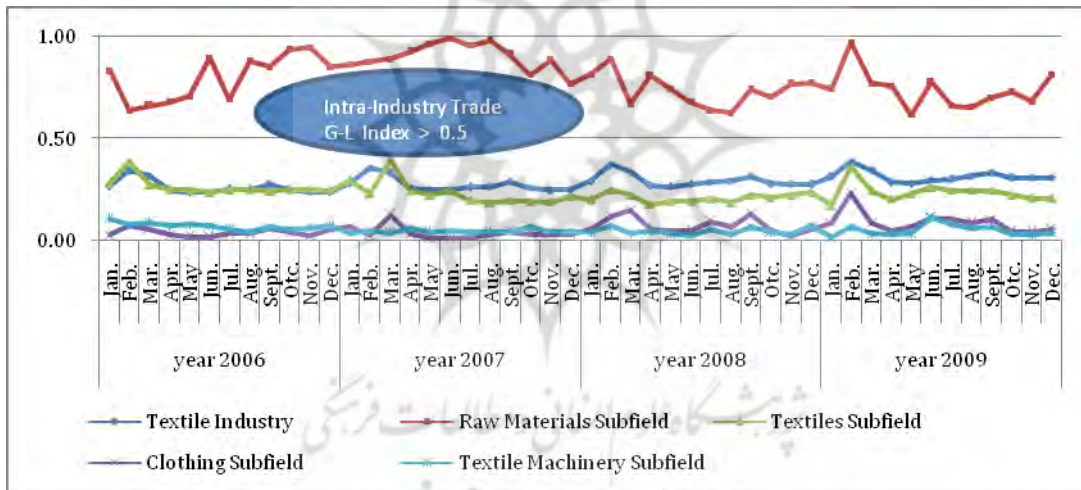

Figure 1: Monthly G-L index in textile industry and four subfields in year 2006-2009
Source: **Authors**

When comparing the G-L index before and after the crisis, we can see that the trade pattern remained unchanged for the whole textile industry as well as the 4 subfields. However, the value of the index, except for the textile machinery field, did show some statistically significant (P-value smaller than 0.01) variations according to the result of Brow-Mood median test, which is applied to the monthly G-L index of 2006-2007 vs. 2008-2009.

Table 1: Distribution of monthly G-L index (Year 2006-2007 vs. 2008-200), (P value)

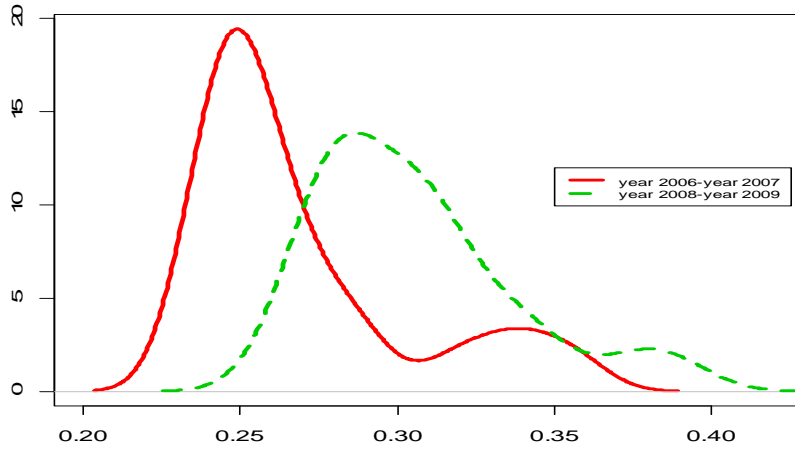|	Textile industry	Raw material	Textiles	Clothing	Machinery
P value of *BM* test	0.0012	0.0001	0.0087	0.0012	0.1482

Source: **Authors**

Figure 2: Comparison of monthly G-L index distributions in textile industry before and after financial crisis
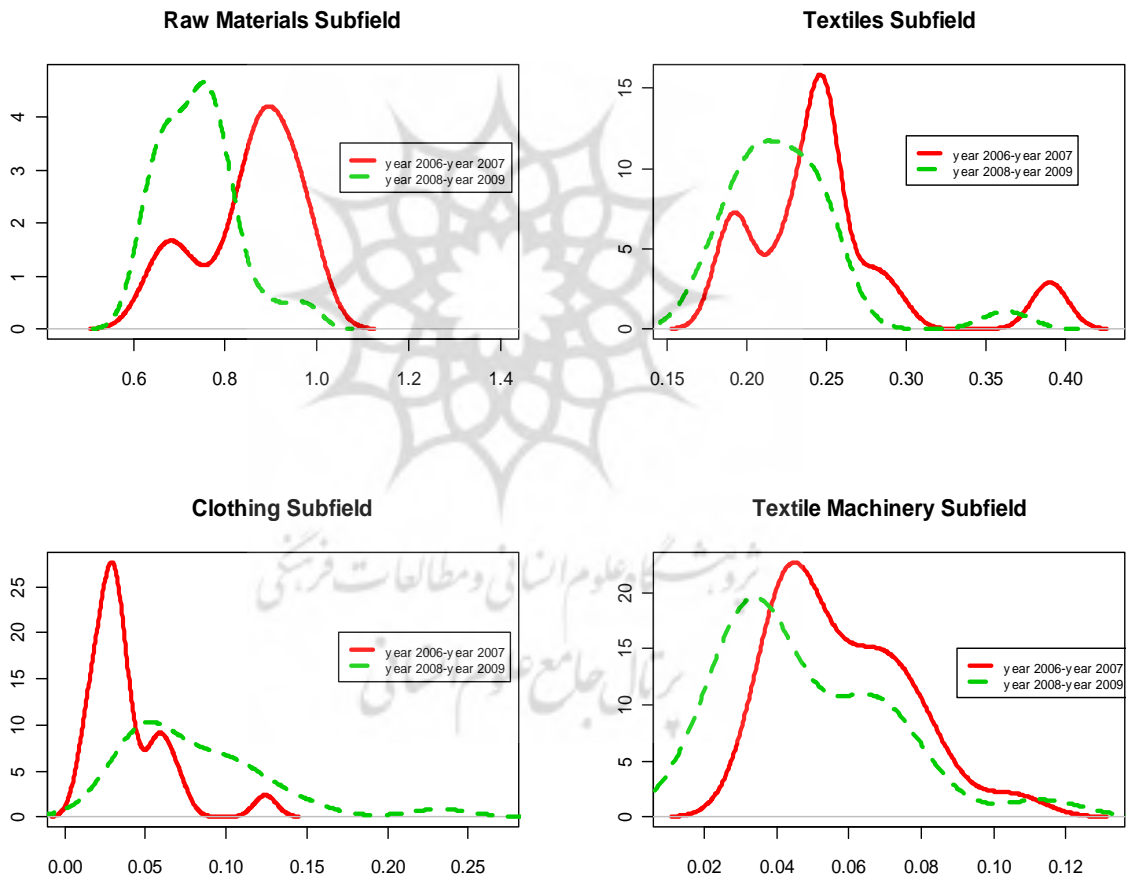
*Source***: Authors**

Figure 3: Comparison of monthly G-L index distributions in four subfields before and after financial crisis

*Source***: Authors**

For the textile industry and 3 subfields, of which the G-L index value changed significantly, the characteristics of the trend in trade pattern are summarized as follows:

(1) G-L index of the whole industry as well as the textiles subfield has risen significantly after the crisis, though still under 0.5, indicating inter-industry trade. A trend can be spotted in both of the two economies that the trade pattern is moving from inter-industry category to intra-industry category due to the financial crisis.

(2) A statistically significant decline took place in the G-L index of the raw material subfield. Though not serious enough to change the intra-industry trade pattern, the decline may be an indication of moving to the inter-industry category.

(3) Compared with the pre-crisis period (2006-2007), G-L index of clothing subfield dropped after the crisis (2008-2009), implying that the degree of inter-industry trade is made higher (See Table 4).

Table 4: Impact of financial crisis on the trade pattern of textile industry and subfields

Field	Trade pattern	Impact of crisis on the pattern
Whole industry	Inter-industry trade (mainly China exporting to ASEAN)	Weakened
Raw material	Intra-industry trade	Weakened
Textiles	Inter-industry trade (mainly China exporting to ASEAN)	Reinforced
Clothing	Inter-industry trade (mainly China exporting to ASEAN)	Weakened
Machinery	Inter-industry trade (mainly China exporting to ASEAN)	No sig. impact

Source: **Authors**

3.2. Impact of financial crisis on the China-ASEAN raw material intra-industry trade pattern

Comparing the unit value of exports and imports, we can classify intra-industry trade into horizontal type (HIIT) and the vertical type (VIIT), with HIIT showing no significant difference in the two unit values and HIIT indicating a gap between the two. Within VIIT, UP-VIIT refers that the unit value of exports is significantly higher than the imports, and DN-VIIT means the opposite. In our research, method proposed by Celi (1999), which is already discussed specifically in part 2, is employed to further identify the type of trade pattern in raw material subfield. According the previous studies, λ is arbitrarily set as 0.25. So the threshold values in Table 1: are $0.75(1-\lambda)$ and $1.25(1+\lambda)$.

Table 2: Summarization of China-ASEAN trade in 2006 and 2009

Results		Year 2006		Year 2009	
		Export unit value	Import unit value	Export unit value	Import unit value
Unit(dollar/KG)		5.13	1.81	4.26	2.10
Distribution test of export and import unit value	P value	0.0000		0.0132	
	Conclusion	Sig. difference		Sig. difference (α=0.05)	
Unit value ratio α		2.84		2.03	
Type of IIT		UP-VIIT		UP-VIIT	

Source: **Authors**

Table 5 displays the summarization of the raw material trade between China and ASEAN before and after the crisis (2006 vs. 2009). The export-import unit value ratios in 2006 and 2009 are 2.84 and 2.03 respectively, indicating that the trade pattern remained UP-VIIT for China. Besides, the results of Brown-Mood median test show again that there is significant difference between the unit value of exports and imports in both of the years, which have reinforced the conclusion that the raw material subfield of China textile industry is a UP-VIIT pattern in the trade with ASEAN.

What has been brought to China and ASEAN by the crisis is also different. Before the crisis, the export unit value of China to ASEAN is 5.13 dollar per kilogram and the import unit value is 1.81. The two values have changed to 4.26 and 2.10 respectively after the crisis, with import unit value rising by 16% and export unit value declining 17%. Export-import unit value ratio dropped from 2.84 to 2.03, indicating that China remained in the high-end of the textile industry value chain in the trade with ASEAN, while the advantage is becoming narrower due to the impact of financial crisis. And this may probably make the trade pattern of raw material subfield change from UP-VIIT to HIIT.

4.   Conclusion

From the research and analysis above, conclusions for each specific field and the industry as a whole can be summarized as below:

(1) The whole textile industry in the China-ASEAN trade has been an inter-industry pattern (mainly China exporting to ASEAN). After the crisis, however, though not changed yet, the trade pattern is showing a trend of moving to intra-industry trade.

(2) In the raw material subfield, the intra-industry trade pattern also remained unchanged, but is moving in a direction to inter-industry trade (mainly China exporting to ASEAN). From the perspective of China, the more specific trade pattern is still UP-VIIT, however showing the trend of moving to VIIT.

(3) In the textiles subfield, the inter-industry trade pattern (mainly China exporting to ASEAN), though not changed, is likely to change into the intra-industry trade pattern.

(4) In the clothing subfield, the inter-industry trade pattern (mainly China exporting to ASEAN) is more than unchanged, actually even more consolidated.

(5) In the machinery subfield, the inter-industry trade pattern is somewhat stable before and after the crisis.

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