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An Evaluation for Comparative Advantage in the Steel Industry

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Abstract

Purpose - Current society is competitive society. Rules of the game is applied to every kind of aspects not only business but also academic matters. This research is to analyze competitiveness between China and USA by use of trade related data together with revealed comparative advantage index(RCA) including trade specialization index(TSI).

Research design, data, methodology - Per economic phase, both China-USA have mutually complementary character. That's why it is significant to analyze this 2 country's important industry. From our economic viewpoint, Both 2 economic powers should cooperate to achieve partnership in the steel business industry under the severe business competition.

Results – This paper will provide which country is more comparatively advantage in case international business is held. Especially, steel industry is in a sense technology related business. Therefore, tied-up up-to-date advanced know-how and technology should be developed to be a leader for one of major industries in the world market.

Conclusion – Among those various phenomena, this paper categorizes international business and research boundary is international trade contract. It is available to find out how to cooperate securing permanent and reliable business provider and supplier is essential and eminent for the successful accomplishment in the world steel market.

Keywords: nternational trade business, revealed comparative advantage, trade specialization index

1. Introduction

World steel trade volume records 460 million ton which is diminished by 10.4 million ton though Chinese export volume is diminished by 33.3 million ton in 2017. Chinese export diminishing volume trade off by India and Iran including Canada, Brazil and Turkey which eventually, made global trade volume with a small degree shrinking. Again, World trade volume turn into diminishing point due to shrinking of Chinese trade volume in 2017 that is for the first time in four years. However, its shrinking degree is very small due to huge export volume increase from India and Iran. Chinese supply return to level of 4 year ago with 30.7% diminishing compared to previous year of 2017 due to relaxation of over-supply according to supply side reform, environment restriction as well as unpredictably strong domestic demand. Per each countries such as USA who pursue trade war, India, mid-east, Asean, South Korea, Most countries are reduced compared to those of 15 year peak.

China plays a role as driver to change Asian countries trade flow as well as global steel business improvement by reduction effect of over-supply. The target of this paper research is analyze steel industry and look for which country is more competitive between USA and CHINA

2. Present status and characteristic for USA-China steel industry

Reduction of Chinese export not only changes Asian countries trade flow through India & South-East origin import substitute but also contributes global steel business improvement by reduction of over-supply. According to professionals from Chinese major authorities, Chinese export will be between 70 million ton in 2018 and is expected

to be decreased continuously in the long term period. Crude steel production in India is at first over 100 million ton which is 6.2% increase compared to that of 2017. It deepens over-supply far from demand as annual average increase rate is 6.6% during past 10 years. Export in India gains reflective benefits from rapid decrease in Chinese export as well as successful enlargements in European and Asean markets which records 16.2 million ton and it is 58.2% increase compared to previous year 2017.

<Table 1> Chinese export trend towards major countries

(Unit: million Ton)

	2015	2016	2017	Increase rate
Korea	13.5	14.3	11.4	20.5%
India	4.8	3.3	2.5	23.2%
Japan	1.3	1.3	1.1	14.9%
Asean	34.6	38.9	23.3	40.3%
Mid-east	10.9	10.5	6.6	37.5%
USA	2.4	1.2	1.2	1.1%
Europe-28	8.6	6.4	4.2	35.3%

Source : China Customs Office(2017)

USA and Europe including neighborhood Nepal as well as Indonesia and Malaysia who are convenient sea-level trade business are increasing market share which predicts Asian trade structure change.

Demand of Asean 6 countries have been increasing 5.4% annually during 2007~2017 including Indonesia, Philippine and Vietnam as high-level growth, however, productions are only 1.8% increase during same period. Regarding to import for Asean 6 countries, it records 71.1 million ton which is at all time highs in 2016 as production can not come up with steel consumption.

<Table 2> ASEAN-6 Steel Demand & Supply accomplishment – 2016

(Unit: million Ton)

	Indonesia	Malaysia	Philippine	Singapore	Thailand	Vietnam	Asean-6
Production	4.7	2.8	1.1	0.5	3.8	7.8	20.7
Increase rate	2.2%	27.0%	11.1%	3.8%	2.9%	38.3%	6.5%
Export	1.6	1.4	0.0	1.7	1.5	2.5	8.8
Import	12.6	9.1	7.2	4.3	17.6	19.5	71.1
Net import	11.0	7.6	7.2	2.6	16.1	17.0	62.3

Dsteel, SEASI Footnote : Net Import = Import - Export

In the other hand, Asean-6 steel production reach the highest record with 15.7% increase as Vietnam launches the first operation of production facility in 2017 as well as it is expected that degree of steel self-support could be improved as it substitutes import products.

Worldwide steel trade quantity is anticipated to maintain stable level as export enlargement countries are appearing even though trade environments are deteriorated and Chinese export's rapid diminish

Asian union's trade structures are expected gradual change as it is downward continuously compared to that of Chinese export 80 million ton as well as over-supply from India and enlargement of production facility in Southeast Asian countries.

As Indian export will be increased by starting over-supplying, the quantity towards USA, who has no choice where to export due to G2 trade war are flowed into India, Europe and Southeast, etc, which are restricting continuous increase.

By interrelating Asian trade change directly and indirectly including deterioration of trade environment, there are expectations for 2 kind countries, the one is damaged country who suffers from tariffs imposed and the other is beneficiary country who receives profits.

Even though trade environment has been stable since financial crisis in 2008, the trade environments are worsen with trade conflicts are frequent during recent 2~3 years caused by enlargement of export quantity based on deepening of over-supply from China.

According to world steel association, even though the rate of steel product export compared to that of global total production are indicated stable trade quantity by below 30% during 2009~2014 and when it goes into over 30% after 2015.

The countries who feel threat start to protect their own steel industries. Despite protectionism spread in 2016 and which cause to strengthen import restriction in USA, EU and India, the worldwide steel trade quantity records 470 million ton by 1.3% increase, of which turn out trivial impact.

On the other hand, per trade quantity in 2017, it is diminished due to rapid decrease of Chinese origin quantity as well as its ratio also drop to 29.4%.

Steel export from India and Iran have been increased each 47.0% and 40.1% annually during 2015~2017, of which quantity has been increased 12.4 million ton that the country's status is risen as a trade country.

Additionally, the exports of Canada, Brazil and Turkey have been increased 1.8 million ton, 1.6 million ton and 1.6 million ton respectively and even though it is trivial size, export of Thailand and Australia have been increased around 26%.

<Table 3> Major export increasing countries & its Rank

(Unit: million Ton)

	2015	2016	2017	Variation ('15~'17)
Turkey	15.0 (10)	15.3 (10)	16.6 (9)	+1.6
India	7.6 (17)	10.3 (14)	16.3 (10)	+8.7
Brazil	13.7 (11)	13.4 (12)	15.3 (11)	+1.6
Canada	6.0 (20)	5.8 (19)	7.8 (19)	+1.8
Iran	3.8 (24)	5.7 (20)	7.5 (20)	+3.7
Thailand	1.3	1.5	1.9	+0.6
Australia	0.8	0.8	1.0	+0.2

Source : Worldsteel, World Steel in Figures Footnote : () = Rank

The export of Chinese steel product in 2017 was diminished into 75.2 million ton by 30.7% decrease compared to that of previous year, which means it is returned to degree of 4 years ago.

The Chinese export in 2015 marks maximum degree with 112 million ton by complex effects such as over-supply of inside China, downward domestic demand caused by slowdown economic growth rate as well as export boost policy of government tax refund.

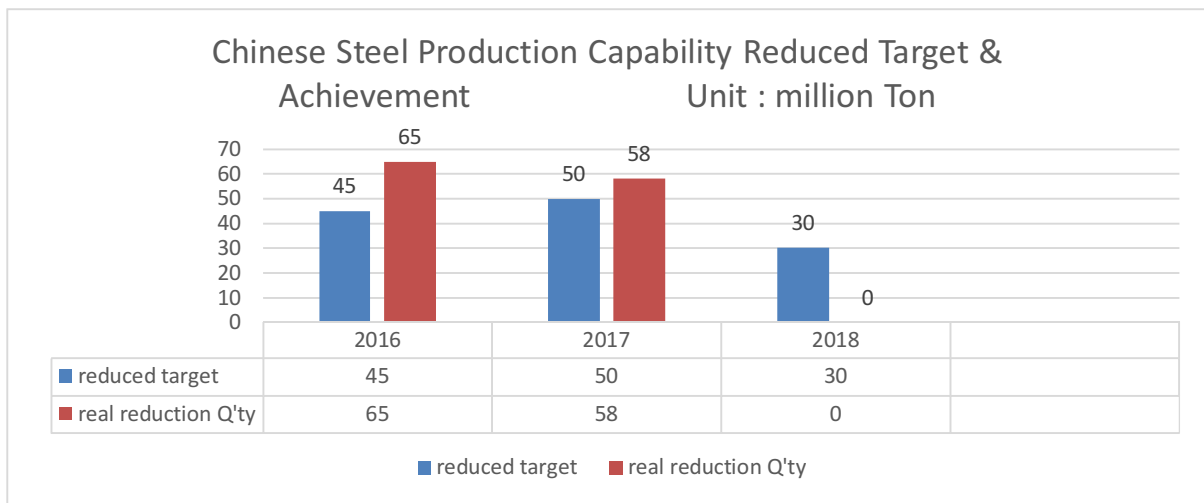
However, China is hit by strengthening trade protectionism of major countries such as USA and Europe in 2016, the export is diminished by 3.5% in 2016 and export quantity is downward to 80 million ton by diminishing approximately 33 million ton in 2017.

The Chinese government is strongly conducting to solve excessive facilities and restructuring, of which eventually resulted in facility reduction for 123 million ton during 2016~2017. They made 83% target achievement for steel industry restructuring and excessive facilities reduction target for 2016~ 2020, of which the Chinese government announced in February, 2016. Additionally, they conduct unprecedented winter season diminishing production for excessive coal consumption industry as a part of environment restrictions, which eventually, turned out 50% steel reduced productions in 4 provinces and 28 cities until March, 2018.. Recently, Ministry of Ecology

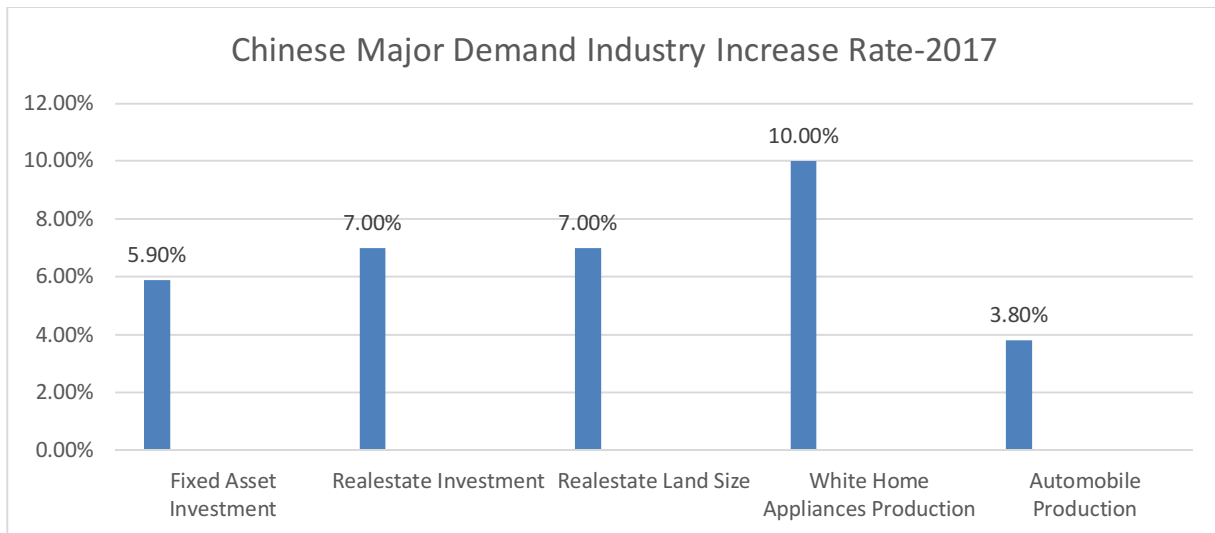
and Environment of Chinese government announced ultra-low emissions reform measures of steel enterprises in May, 2018, to make one-step reinforcement about pollution emission criteria of steel industries.

The economic growth rate records 6.9% in 2017 by the courtesy of Chinese government’s stimulative economic policy, which records exceed Chinese government’s original target figures, which contributes favorable tendency for steel demands.

Chinese government takes every positive efforts for stimulative economy because the year 2017 is finalized year during 5 years for the first period of Xi Jinping government as well as the year for change of supreme leader group, communist party committee members. However, for the time being, the necessity of stimulative economy is low because successive start for Xi Jinping government’s 2nd period, 5 years. The 2017 steel demand was increased to 3.0% due to investment increase tendency of real estate and manufacturing industry production increase, etc.



Source : Chinese government Development Reform Committee, Mysteel
<Figure 1> Chinese Steel Production Capability Reduced Target & Achievement



Source : CEIC / Footnote : White Home Appliances = Refrigerator, Air-conditioner
<Figure 2> Chinese Major Demand Industry Increase Rate-2017

The Chinese exports to USA and Europe are diminishing annually 30.2% and 30.3% respectively during last 2 years because of imposing anti-dumping duty and countervailing duty to lots of steel products.

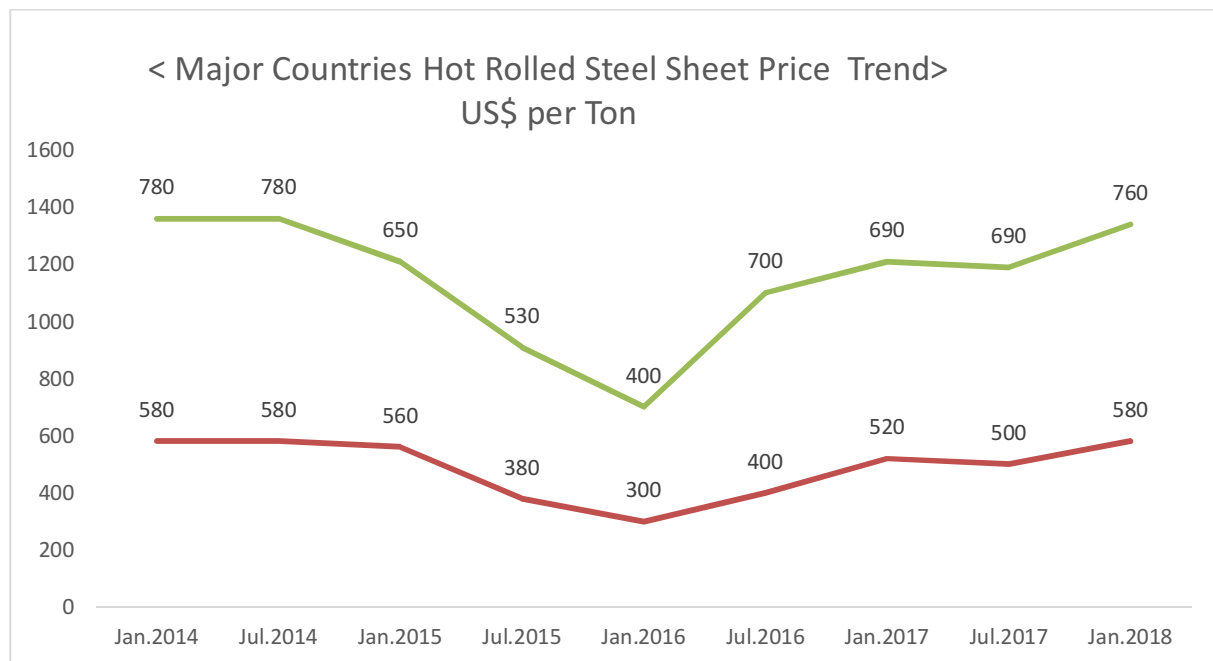
The Chinese exports to Asean countries such as Indonesia, Thailand and Malaysia, etc are diminishing to 40.3% in 2017 compared to that of previous year with quantity 23.3 million ton as round bar steel export has been reduced to half quantity.

The 2nd largest country that Chinese export is Vietnam which is diminishing 34.6% and records 7.6 million ton in 2017 after peak point 11.7 million ton in 2016.

The Chinese exports to the Middle East are diminishing annually 22.3% last 2 years as exports for round bar steel products and other steel products are decreased.

In case of USA, import of the Chinese origin steel products is diminishing annually 41.5% during 2016~2017. The flat steel products of Chinese origin are substituted by Canada origin and Mexican origin and round bar products of Chinese origin are substituted by Southeast Asian countries such as Indonesia, Thailand and Vietnam as well as the Middle East origin such as Bahrain. Additionally, semi-finished products are importing from Brazil and Russia last year in 2016, which Brazil origin reaches half quantity in USA market. In Asean-6 market, Chinese origin steel products are substituted by Australian steel products, Indian origin products and Russian origin products. In terms of steel product market of Asean-6 countries in 2016, Australian origin is increased 146%, Indian origin 58.9% and Russian origin 32.4%. In terms of regional union trade, the imports from Indonesia and Thailand to USA are increased.

Eventually, the reduction of excessive supply made not only Asian market conditions but also global steel market condition to be improved. On the other hand, as Chinese exports are rapidly diminished, hot rolled steel sheet price of USA and Southeast Asia are increased 92.9% and 69.2% respectively and record US\$617 per ton and US\$521 per each.



Source : Worldsteel, Chinese Customs Office Directory

Footnote : Green(US hot rolled steel price based on FOB Midwest), Red(Southeast hot rolled steel import price based on CFR)

<Figure 3> Major Countries Hot Rolled Steel Sheet Price Trend

During January~May in 2018, Chinese export achievement was diminished 16.3% as approximately 28.5 million ton. According to metallurgical industrial economic research center, united steel network and Mysteel, Chinese export volume is around 65~70 million ton during September 2017~May 2018. It is forecasted that Chinese export volume will be decreased in the long-term view.

In terms of India, economic growth rate has been maintaining around 6% high-level growth, of which it contributes enlargement of steel demand by the courtesy of India government's infrastructure investment as well as fostering the manufacturing industries. According to World Steel Association, India's steel demand has been

increased 4.3% in 2017 because of favorable tendency in the industries such as construction, automobile, durable consumption goods.

India's crude steel production has been increased 6.2% to achieve 100 million ton at first record. Annual average increase rate has been 6.6%, which has been over domestic steel demand and deepens excessive over-supply during last 10 years.

3. Revealed Comparative Advantage Index for USA - China Steel Industry

When we look at the above RCA index, we can realize that USA steel industry is pretty much strong against China steel industry, which means that USA got a advantage in the international trade with China steel industry in 2000. It is the maximum advantage in the US steel industry against Chinese Steel industry as index figure is 1.39544835723 in 2005. After 2005, US comparative advantage against China in the steel industry is downward as index figure is 0.8632512591 in 2010.

<Table 4> Export volume of steel to China from United States

(Unit: US\$)

Period	Trade Flow	Reporter	Partner	Code	Trade Value
2000	Export	USA	China	<u>72</u>	\$269,752,847
2005	Export	USA	China	<u>72</u>	\$1,596,035,061
2010	Export	USA	China	<u>72</u>	\$2,013,852,470
2015	Export	USA	China	<u>72</u>	\$895,978,050
2017	Export	USA	China	<u>72</u>	\$1,068,261,161

Source : Author's own calculation based on UNCOMTRADE database

<Table 5> Export volume of steel to World community

(Unit: US\$)

Period	Trade Flow	Reporter	Partner	Code	Trade Value
2000	Export	World	World	<u>72</u>	\$125,222,364,246
2005	Export	World	World	<u>72</u>	\$281,839,926,840
2010	Export	World	World	<u>72</u>	\$381,593,798,905
2015	Export	World	World	<u>72</u>	\$323,624,009,688
2017	Export	World	World	<u>72</u>	\$325,247,985,875

Source : Author's own calculation based on UNCOMTRADE database

<Table 6> Total commodity Export to China from United States

(Unit: US\$)

Period	Trade Flow	Reporter	Partner	Code	Trade Value
2000	Export	USA	China	<u>Total</u>	\$16,184,679,302
2005	Export	USA	China	<u>Total</u>	\$41,190,674,556
2010	Export	USA	China	<u>Total</u>	\$91,910,977,238
2015	Export	USA	China	<u>Total</u>	\$116,071,708,830
2017	Export	USA	China	<u>Total</u>	\$129,893,514,886

Source : Author's own calculation based on UNCOMTRADE database

However, RCA index is still closer to +1 rather than 0 or -1 which means that US steel industry is still stronger than Chinese steel industry. In 2015 and in 2017, the RCA index figures are 0.38515789436 and 0.37780884352 respectively. We can easily find out RCA index between USA and China steel industry far away from 1 and its indexes are closer to 0, which means that US steel industry is getting disadvantage against Chinese steel industry

from 2015 to 2017 compared to those of 2000, 2005 and 2010. Based on above data and indexes, US steel industry needs reform as well as restructuring process to overcome these comparative disadvantage situations.

<Table 7> Total commodity Export to the World

(Unit: US\$)

Period	Trade Flow	Reporter	Partner	Code	Trade Value
2000	Export	World	World	Total	\$6,280,112,853,131
2005	Export	World	World	Total	\$10,150,157,059,117
2010	Export	World	World	Total	\$15,034,128,604,537
2015	Export	World	World	Total	\$16,147,620,925,815
2017	Export	World	World	Total	\$14,941,588,294,005

Source : Author's own calculation based on UNCOMTRADE database

<Table 8> Revealed Comparative Advantage Index for USA-China Steel Industry

Period	①Export volume of steel to China in the United States/ Export volume of steel to World community	②Total commodity Export to China in the United States/ Total commodity Export to the World	① / ② RCA for US-CHINA Steel Industry
2000	0.00215419066	0.00257713192	0.83588684121
2005	0.00566291327	0.00405813174	1.39544835723
2010	0.00527747693	0.00611348883	0.8632512591
2015	0.00276857719	0.00718816161	0.38515789436
2017	0.00328445127	0.00869342083	0.37780884352

Source : Author's own calculation based on UNCOMTRADE database

However, when we analyze total value of RCA during whole research period 2000~2017 as RCA values are more close to +1 in 2000, 2005 and 2010, US steel industry is more competitive rather than that of Chinese steel industry.

4. Trade Specialization Index for USA-China Steel Industry

The value of TSI index is located between maximum value +1 and minimum value -1. If the value is larger, it has the more competitiveness and if the value is 0, it means the export volume equals to the import volume. Additionally, the value is getting closer to -1, degree of import specialization is higher and the value is getting closer to +1, the degree of export specialization is higher. It is generally, used to analyze competitiveness in a certain market or between 2 countries or among world markets.

<Table 9> Export volume of steel to China from United States

(Unit: US\$)

Period	Trade Flow	Reporter	Partner	Code	Trade Value
2000	Export	USA	China	72	\$269,752,847
2005	Export	USA	China	72	\$1,596,035,061
2010	Export	USA	China	72	\$2,013,852,470
2015	Export	USA	China	72	\$895,978,050
2017	Export	USA	China	72	\$1,068,261,161

Source : Author's own calculation based on UNCOMTRADE database

<Table 10> Export volume of steel to the United States from China

(Unit: US\$)

Period	Trade Flow	Reporter	Partner	Code	Trade Value
2000	Export	China	USA	<u>72</u>	\$370,473,209
2005	Export	China	USA	<u>72</u>	\$1,074,693,947
2010	Export	China	USA	<u>72</u>	\$963,974,964
2015	Export	China	USA	<u>72</u>	\$1,499,184,893
2017	Export	China	USA	<u>72</u>	\$598,709,288

Source : Author's own calculation based on UNCOMTRADE database

<Table 11> Trade Specialization Index for USA against China

Period	①US export volume – China export volume	②US export volume + China export volume	① / ② Trade Specialization Index
2000	-100,720,362	640,226,056	-0.15731999824
2005	521,341,114	2,670,729,008	0.19520554592
2010	1,049,877,506	2,977,827,434	0.35256492502
2015	-603,206,843	2,395,162,943	-0.25184376068
2017	469,551,873	1,666,970,449	0.2816797822

Source : Author's own calculation based on UNCOMTRADE database

Therefore, when we evaluate above TSI table, in 2000, the TSI is -0.15731999824 which means US steel industry takes advantage of import specialization and from 2005 to 2010, the TSI are 0.19520554592 and 0.35256492502 respectively, of which means US steel industry takes advantage of export specialization.

In 2015, the TSI is -0.25184376068, again the value of TSI got a minus value which means US steel industry takes advantage of import specialization.

Last 2017, the TSI is plus value as 0.2816797822. That is US steel industry takes advantage of export specialization. Generally, when we analyze whole research years during 2000~2017, US steel industry is more competitive than that of Chinese steel industry.

5. Conclusions

When we evaluate 'Revealed comparative advantage index', In 2015 and in 2017, the RCA index figures are 0.38515789436 and 0.37780884352 respectively. We can easily find out RCA index between USA and China steel industry far away from 1 and its indexes are closer to 0, which means that US steel industry is getting disadvantage against Chinese steel industry from 2015 to 2017 compared to those of 2000, 2005 and 2010. Based on above data and indexes, US steel industry needs reform as well as restructuring process to overcome these comparative disadvantage situations.

However, when we analyze total value of RCA during whole research period 2000~2017 as RCA values are more close to +1 in 2000, 2005 and 2010, US steel industry is more competitive rather than that of Chinese steel industry. Additionally, When we evaluate 'Trade specialization index', in 2000, the TSI is -0.15731999824 which means US steel industry takes advantage of import specialization and from 2005 to 2010, the TSI are 0.19520554592 and 0.35256492502 respectively, of which means US steel industry takes advantage of export specialization.

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Last 2017, the TSI is plus value as 0.2816797822. That is US steel industry takes advantage of export specialization. Generally, when we analyze whole research years during 2000~2017, US steel industry is more competitive than that of Chinese steel industry

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