

# Trade Relations between Japan and Asian Countries

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## 1. Introduction

China promoted the reform policy of opening up to outside world in 1978, and introduced the new economic system “Socialist market economy” in 1993. China changed the economic system from the planning economy to the market economy. After introducing the market system and open economic system, China became to have high economic growth.

After these revolutions, China increased economic relations with neighboring countries. In pacific region, Japan, Korea, and other Asian countries promoted international trade with China. Especially, Japan increased international trade with China. By the international trade, China and other Asian countries changed the industrial structure and succeeded in getting the international competitive power, each other. It is assumed, an increasing of the competitive power is the main key of a high economic growth.

This paper analyzes an international competitive power and an international trade structure of Japan, China, and other Asian countries, Korea, Singapore, India, Indonesia from 1996 to 2011. This paper also analyses that each main Asian country is an international competitor or a complementary partner for Japan.

By our analysis, we got an interesting conclusion that China is recently not a complementary trade partner but a competitive trade partner for Japan.

## 2. Revealed Comparative Advantage

B. Balassa (1965) created the index to explain the international comparative power. It is called “Revealed Comparative Advantage (RCA)”. RCA is calculated as the ratio of share of a given product in one country’s exports to the share of the same product of the world.

RCA for country  $j$  in its exports of good  $i$  to the world can be expressed as follows.

$$RCA = \frac{X_{ij}/X_j}{X_{iw}/X_w}$$

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- $X_{ij}$  :  $j$  country's exports of goods  $i$   
 $X_j$  :  $j$  country's total goods exports  
 $X_{iw}$  : world's exports of goods  $i$   
 $X_w$  : world's total goods exports

When the value of RCA exceeds 1, then that country  $j$  has the more advantage of goods  $i$  than the average exports ratio of the world. Therefore, it is called, that country  $j$  has a comparative advantage for goods  $i$ . That is, the country  $j$  has an international competitive power about good  $i$ . On the other hand, when the value of RCA is smaller than 1, then the country  $j$  has a disadvantage of goods  $i$  than the average exports ratio of the world. It is called, that country has a comparative disadvantage for goods  $i$ . That is, that country  $j$  does not have an international competitive power about goods  $i$ .

All RCA values on this paper are calculated with the data, "United Nations Commodity Trade Statistical Database in 2012".

### Industrial Sectors

On this paper, according to the United Nations Database, we will analyze the following 10 sectors. They are 9 industries and re-import and re-export goods, gold.

- 0 sector: foods and live animals (included foods ,fish, flesh, etc.)
- 1 sector: beverages and tobacco (included drinks and tobacco)
- 2 sector: crude materials, inedible, except fuels (included timber, mineral ore, etc.)
- 3 sector: fuels, lubricants (included oil, gas, coal, etc.)
- 4 sector: animal oils, veg oils, fats, wax (included fat and oil of animals and plants)
- 5 sector: chemicals products (included medical goods, fertilizer, etc.)
- 6 sector: manufactured goods (included textile goods, metal goods, etc.)
- 7 sector: machines, transport, equipment (included machines, cars, electrical goods, etc.).
- 8 sector: miscellaneous manufactured articles (included furniture, bag, precision machines, etc.)
- 9 sector: re-import and re-export goods, and gold

The 0 sector goods are foods and fish etc., the 1 sector goods are tobacco and drinks etc., the 2 sector goods are crude materials except fuels, etc., the 3 sector goods are oil and gas etc., the 4 sector goods are animal oil and plants oil etc., the 5 sector goods are chemical fertilizer, medicine, chemical products etc., the 6 sector goods are products of light industries, etc., the 7 sector goods are machines, cars, equipment etc., the 8 sector goods are interior goods, bag, precision machines etc., the 9 sector goods are re-import and re-export goods and gold.

## 2.1 Japanese RCA

In 1996, Japan had an international competitive power only in the machines, transport, equipment industry. In 2010, Japan had an international competitive power in the machines, transport, equipment industry and a re-import and re-export goods, gold sector. During from 1996 to 2011, Japan had no change in export–import structure except a re-import and re-export goods, gold sector.

**Table 1 Japanese RCA**

	0	1	2	3	4	5	6	7	8	9
1996	0.05	0.08	0.20	0.07	0.03	0.75	0.70	1.75	0.65	0.84
1997	0.06	0.09	0.20	0.07	0.03	0.75	0.71	1.70	0.64	0.94
1998	0.06	0.09	0.22	0.06	0.03	0.72	0.71	1.64	0.63	1.16
1999	0.07	0.09	0.23	0.04	0.04	0.76	0.70	1.61	0.69	1.26
2000	0.07	0.08	0.23	0.03	0.06	0.82	0.71	1.66	0.74	0.90
2001	0.11	0.10	0.28	0.04	0.06	0.79	0.75	1.65	0.70	1.01
2002	0.08	0.09	0.29	0.04	0.05	0.77	0.76	1.66	0.67	1.04
2003	0.07	0.08	0.30	0.04	0.04	0.78	0.76	1.68	0.69	1.00
2004	0.07	0.08	0.33	0.04	0.04	0.80	0.75	1.67	0.76	1.03
2005	0.08	0.09	0.36	0.06	0.04	0.83	0.80	1.67	0.76	1.25
2006	0.08	0.08	0.36	0.07	0.04	0.87	0.81	1.69	0.74	1.25
2007	0.08	0.08	0.35	0.10	0.03	0.86	0.81	1.70	0.66	1.33
2008	0.08	0.09	0.37	0.15	0.03	0.85	0.91	1.79	0.68	1.12
2009	0.09	0.11	0.45	0.14	0.04	0.92	1.02	1.68	0.66	1.18
2010	0.09	0.11	0.35	0.13	0.03	0.91	0.99	1.70	0.69	1.19
2011	0.08	0.11	0.33	0.19	0.03	0.90	0.97	1.59	0.70	1.26

## 2.2 Chinese RCA

In 1996, China had an international competitive power only in the manufactured goods industry. But, in 2011 China has an international competitive power in the machines, transport, equipment industry, the miscellaneous manufactured articles industry, and the manufactured goods industry. For 15 years, China had an international competitive power in many industries and had a high economic growth.

**Table 2 Chinese RCA**

	0	1	2	3	4	5	6	7	8	9
1996	0.96	0.77	0.72	0.54	0.53	0.63	1.21	0.59	2.93	0.04
1997	0.90	0.51	0.63	0.59	0.72	0.59	1.22	0.59	2.94	0.07
1998	0.89	0.49	0.58	0.51	0.32	0.57	1.16	0.65	2.91	0.00
1999	0.89	0.38	0.66	0.35	0.16	0.55	1.18	0.71	2.85	0.03
2000	0.94	0.34	0.59	0.32	0.15	0.54	1.24	0.80	2.81	0.05
2001	0.85	0.35	0.53	0.34	0.13	0.52	1.20	0.88	2.60	0.05

2002	0.80	0.32	0.46	0.29	0.08	0.46	1.18	0.96	2.48	0.05
2003	0.71	0.25	0.38	0.27	0.06	0.42	1.15	1.08	2.33	0.05
2004	0.00	0.24	0.32	0.24	0.06	0.42	1.20	1.15	2.23	0.04
2005	0.58	0.19	0.31	0.19	0.09	0.44	1.22	1.21	2.20	0.06
2006	0.55	0.16	0.24	0.14	0.10	0.45	1.28	1.25	2.22	0.06
2007	0.50	0.15	0.21	0.14	0.06	0.46	1.24	1.27	2.20	0.04
2008	0.44	0.14	0.22	0.14	0.07	0.53	1.34	1.36	2.27	0.02
2009	0.44	0.16	0.20	0.13	0.05	0.45	1.22	1.42	2.14	0.02
2010	0.46	0.16	0.18	0.13	0.05	0.49	1.20	1.41	2.16	0.02
2011	0.48	0.16	0.17	0.16	0.05	0.53	1.23	1.30	2.11	0.03

### 2.3 Korean RCA

In 1996, Korea had an international competitive power in manufactured goods industry, machines, transport, equipment industry, and re-import and re-export goods, gold sector. After 15 years, in 2012 Korea had an international competitive power in same industry manufactured goods industry, machines, transport, equipment industry. And for 15 years, Korea has gradually promoted an international competitive power in fuels, lubricants industry and chemicals products industry.

**Table 3 Korean RCA**

	0	1	2	3	4	5	6	7	8	9
1996	0.30	0.14	0.33	0.41	0.04	0.76	1.33	1.31	0.74	1.36
1997	0.29	0.14	0.36	0.61	0.06	0.83	1.38	1.23	0.68	1.53
1998	0.28	0.13	0.35	0.63	0.04	0.79	1.42	1.17	0.72	1.98
1999	0.30	0.13	0.35	0.59	0.02	0.77	1.34	1.27	0.74	0.79
2000	0.27	0.14	0.35	0.55	0.03	0.89	1.28	1.40	0.59	0.22
2001	0.26	0.19	0.36	0.57	0.04	0.86	1.30	1.42	0.59	0.18
2002	0.23	0.22	0.34	0.45	0.03	0.82	1.21	1.52	0.51	0.15
2003	0.20	0.25	0.34	0.38	0.03	0.83	1.14	1.57	0.50	0.24
2004	0.18	0.23	0.31	0.40	0.02	0.86	1.03	1.61	0.49	0.28
2005	0.17	0.23	0.31	0.45	0.02	0.92	1.04	1.59	0.62	0.03
2006	0.15	0.25	0.31	0.48	0.02	0.95	1.01	1.57	0.74	0.07
2007	0.14	0.24	0.32	0.53	0.02	0.95	0.97	1.57	0.78	0.05
2008	0.14	0.25	0.34	0.56	0.02	0.97	1.03	1.60	0.85	0.07
2009	0.15	0.26	0.32	0.50	0.02	0.89	1.05	1.64	0.87	0.14
2010	0.15	0.28	0.30	0.52	0.02	0.93	0.99	1.61	0.91	0.13
2011	0.16	0.29	0.33	0.91	0.02	0.96	1.01	1.48	0.74	0.12

### 2.4 Singapore's RCA

In 1996, Singapore had an international competitive power in beverages and tobacco industry, fuels, lubricants industry and machines, transport, equipment industry. In 2012, Singapore had an international competitive power in foods and live animals industry, fuels,

lubricants industry, chemicals products industry, machines, transport, equipment industry and re-import and re-export goods, gold sector. For 15 years, Singapore had a big change in economic and trade structure. This big change in industrial and trade structure had brought a big economic growth in Singapore.

**Table 4 Singapore's RCA**

	0	1	2	3	4	5	6	7	8	9
1996	0.26	1.29	0.30	1.31	0.63	0.60	0.37	1.66	0.58	0.35
1997	0.26	1.34	0.27	1.36	0.56	0.64	0.36	1.62	0.59	0.50
1998	0.25	1.36	0.29	1.35	0.51	0.66	0.30	1.57	0.62	0.95
1999	0.25	0.96	0.26	1.15	0.57	0.82	0.30	1.55	0.65	0.58
2000	0.24	0.91	0.23	0.74	0.52	0.78	0.28	1.62	0.66	0.84
2001	0.22	0.90	0.24	0.81	0.51	0.84	0.28	1.58	0.69	1.05
2002	0.23	0.84	0.23	0.87	0.47	0.90	0.28	1.57	0.68	0.99
2003	0.21	0.61	0.20	0.90	0.41	1.09	0.30	1.54	0.68	0.87
2004	0.21	0.66	0.20	0.97	0.35	1.09	0.29	1.54	0.66	0.81
2005	0.19	0.66	0.18	0.99	0.30	1.07	0.33	1.53	0.59	1.11
2006	0.19	0.68	0.19	0.97	0.29	1.10	0.30	1.53	0.59	1.19
2007	0.19	0.78	0.18	1.10	0.29	1.06	0.32	1.47	0.58	1.60
2008	0.20	0.82	0.18	1.14	0.34	0.91	0.34	1.47	0.61	1.66
2009	2.50	0.82	0.16	1.17	0.31	0.97	0.33	1.50	0.61	1.38
2010	2.43	0.88	0.14	1.21	0.25	1.00	0.29	1.46	0.63	1.62
2011	2.80	0.98	0.14	1.89	0.17	1.10	0.28	1.25	0.61	1.74

## 2.5 Indian RCA

In 1996, India had an international competitive power in many industries, that is, foods and live animals industry, crude materials, inedible, except fuels industry, animal oils, veg oils, fats, wax industry, manufactured goods industry and miscellaneous manufactured articles industry. In 2011, India had an international competitive power in foods and live animals industry, crude materials, inedible, except fuels industry, fuels, lubricants industry, manufactured goods industry and miscellaneous manufactured articles industry re-import and re-export goods, and gold sector. For 15 years, India changed in industrial and trade structures gradually. India is in the process to industrial country.

**Table 5 Indian RCA**

	0	1	2	3	4	5	6	7	8	9
1996	2.37	0.58	1.62	0.21	1.23	0.96	2.35	0.21	1.49	0.58
1997	2.33	0.77	1.40	0.18	1.03	1.04	2.45	0.20	1.46	0.69
1998	2.42	0.54	1.23	0.08	1.00	0.96	2.45	0.17	1.71	0.88
1999	2.08	0.64	1.23	0.04	1.65	1.03	2.86	0.16	1.64	0.83
2000	2.15	0.52	1.24	0.34	1.85	1.14	2.91	0.18	1.72	0.49

2001	2.10	0.47	1.26	0.52	1.49	1.12	2.65	0.21	1.59	0.72
2002	2.06	0.48	1.51	0.52	0.89	1.08	2.75	0.21	1.50	0.58
2003	1.77	0.45	1.38	0.65	0.83	1.08	2.79	0.24	1.51	0.35
2004	1.72	0.45	1.96	0.79	1.11	1.09	2.48	0.25	1.55	0.28
2005	1.56	0.42	2.35	0.85	0.91	1.07	2.41	0.27	1.45	0.30
2006	1.57	0.44	2.08	1.10	0.75	1.13	2.16	0.29	1.44	0.26
2007	1.60	0.45	2.11	1.29	0.68	1.05	2.04	0.30	1.30	0.28
2008	1.66	0.57	1.90	1.12	0.62	1.08	2.00	0.39	1.16	0.33
2009	1.10	0.65	1.65	1.05	0.64	0.91	1.96	0.44	1.55	0.80
2010	1.23	0.59	1.72	1.29	0.66	0.95	2.16	0.41	1.11	0.41
2011	1.38	0.43	1.19	1.79	0.61	0.91	1.83	0.38	1.16	1.00

## 2.6 Indonesian RCA

In 1996, Indonesia had an international competitive power in many industries, that is, foods and live animals industry, crude materials, inedible, except fuels industry, fuels, lubricants industry, animal oils, veg oils, fats, wax industry, manufactured goods industry, and miscellaneous manufactured articles industry. In 2011, Indonesia had an international competitive power in crude materials, inedible, except fuels industry, fuels, lubricants industry, animal oils, veg oils, fats, wax industry. For 15 years, Indonesia changed in industrial and trade structures gradually. Indonesia is in the process to industrial country.

**Table 6 Indonesian RCA**

	0	1	2	3	4	5	6	7	8	9
1996	1.07	0.40	2.76	3.54	6.74	0.37	1.39	0.25	1.37	0.06
1997	0.99	0.42	2.23	3.81	8.68	0.37	1.18	0.21	1.00	4.24
1998	1.18	0.49	2.29	3.50	5.97	0.44	1.18	0.23	1.04	5.96
1999	1.24	0.45	2.28	3.34	8.67	0.50	1.56	0.26	1.30	1.14
2000	1.08	0.43	2.29	2.54	9.38	0.57	1.45	0.42	1.30	0.16
2001	1.02	0.56	2.51	2.69	8.31	0.52	1.45	0.40	1.31	0.19
2002	1.12	0.49	2.69	2.72	12.22	0.50	1.39	0.42	1.14	0.14
2003	1.07	0.40	2.91	2.72	11.99	0.52	1.34	0.40	1.12	0.12
2004	1.05	0.46	2.87	2.53	15.38	0.53	1.28	0.41	1.08	0.08
2005	1.04	0.50	3.31	2.25	15.80	0.49	1.21	0.41	1.04	0.07
2006	1.05	0.47	3.88	2.03	16.65	0.49	1.21	0.37	1.03	0.13
2007	1.01	0.50	3.72	2.04	20.34	0.53	1.14	0.36	0.95	0.15
2008	1.10	0.54	3.07	1.80	20.34	0.49	1.09	0.37	0.90	0.13
2009	0.98	0.62	2.98	2.18	20.25	0.43	1.16	0.40	0.87	0.14
2010	0.92	0.59	3.15	2.22	19.54	0.46	1.06	0.35	0.82	0.15
2011	0.89	0.53	2.62	3.23	16.85	0.50	0.91	0.29	0.71	0.23

### 3. Revealed Comparative Disadvantage (RCDA)

RCDA is an index of disadvantage of international trade and the definition is as follows.

$$RCDA = \frac{M_{ij}/M_j}{M_{iw}/M_w}$$

$M_{ij}$  :  $j$  country's import of goods  $i$

$M_j$  :  $j$  country's total goods export

$M_{iw}$  : world's exports of goods  $i$

$M_w$  : world total goods export

RCDA is calculated as the ratio of share of a given goods in one country's imports to the share of the same goods of the world. When  $RCDA > 1$ , then the country has the higher share of import more than the average share of the world, therefore, that country has disadvantage for that goods.

#### 3.1 Japanese RCDA

In 1996, Japan had disadvantage of international trade in foods and live animals industry, beverages and tobacco industry, crude materials, inedible, except fuels industry, fuels, lubricants industry and machines, transport, equipment industry. In 2011, Japan had disadvantage of international trade in foods and live animals industry, beverages and tobacco industry, crude materials, inedible, except fuels industry, fuels, lubricants industry and machines, transport, equipment industry, as before.

Table 7 Japanese RCDA

	0	1	2	3	4	5	6	7	8	9
1996	1.85	1.30	2.11	2.03	0.49	0.68	0.70	0.64	1.20	0.58
1997	1.85	1.30	2.17	2.17	0.52	0.70	0.72	0.64	1.15	0.53
1998	1.97	1.72	2.17	2.40	0.54	0.74	0.65	0.66	1.18	0.63
1999	2.02	1.55	2.15	2.23	0.51	0.74	0.66	0.67	1.18	0.63
2000	2.00	1.53	1.95	1.99	0.51	0.73	0.67	0.69	1.20	0.41
2001	1.92	1.40	1.90	2.02	0.50	0.72	0.65	0.69	1.23	0.48
2002	1.91	1.39	1.91	2.06	0.49	0.70	0.63	0.71	1.21	0.55
2003	1.78	1.33	1.86	2.06	0.46	0.70	0.65	0.72	1.20	0.46
2004	1.79	1.33	1.80	1.94	0.48	0.69	0.69	0.72	1.21	0.49
2005	1.69	1.32	1.78	1.88	0.51	0.67	0.67	0.69	1.20	0.56
2006	1.52	1.34	1.95	1.92	0.43	0.67	0.69	0.67	1.22	0.43
2007	1.42	1.17	1.99	1.97	0.45	0.67	0.69	0.67	1.16	0.48
2008	1.34	1.13	1.72	2.00	0.68	0.67	0.67	0.63	1.07	0.38
2009	1.40	1.30	1.76	1.92	0.44	0.74	0.66	0.67	1.21	0.45
2010	1.37	1.22	1.75	1.86	0.42	0.76	0.68	0.68	1.13	0.46
2011	1.40	1.41	1.58	1.83	0.46	0.77	0.70	0.62	1.08	0.50

### 3.2 Chinese RCDA

In 1996, China had disadvantage of international trade in crude materials, inedible, except fuels industry, animal oils, veg oils, fats, wax industry, chemicals products industry, manufactured goods industry, and machines, transport, equipment industry. In 2011, China had disadvantage of international trade in crude materials, inedible, except fuels industry, animal oils, veg oils, fats, wax industry, and machines, transport, equipment industry. For 15 years, China decreased in number of disadvantage industry.

**Table 8 Chinese RCDA**

	0	1	2	3	4	5	6	7	8	9
1996	0.57	0.36	1.79	0.58	2.71	1.36	1.50	1.04	0.47	0.18
1997	0.46	0.23	2.01	0.85	2.63	1.40	1.52	0.96	0.46	0.21
1998	0.41	0.13	2.00	0.75	2.14	1.45	1.47	1.00	0.46	0.19
1999	0.35	0.13	2.16	0.74	1.95	1.46	1.45	1.02	0.44	0.29
2000	0.39	0.19	2.54	0.89	1.40	1.43	1.36	1.02	0.45	0.19
2001	0.35	0.18	2.66	0.72	1.00	1.31	1.28	1.11	0.48	0.18
2002	0.30	0.14	2.34	0.69	1.48	1.23	1.21	1.18	0.52	0.14
2003	0.25	0.13	2.46	0.69	1.75	1.08	1.15	1.21	0.63	0.09
2004	0.30	0.11	2.73	0.76	1.83	1.07	0.96	1.18	0.74	0.07
2005	0.28	0.15	2.98	0.71	1.37	1.08	0.91	1.19	0.79	0.10
2006	0.26	0.17	2.84	0.77	1.35	1.04	0.81	1.24	0.81	0.07
2007	0.23	0.19	3.08	0.78	1.87	1.03	0.77	1.20	0.83	0.07
2008	0.24	0.23	3.51	0.85	2.82	0.98	0.71	1.17	0.84	0.09
2009	0.24	0.22	3.65	0.86	1.52	0.94	0.88	1.19	0.74	0.07
2010	0.28	0.23	3.36	0.88	1.29	0.93	0.75	1.15	0.75	0.33
2011	0.31	0.28	3.28	0.90	1.34	0.90	0.70	1.08	0.69	0.92

### 3.3 Korean RCDA

In 1996, Korea had disadvantage of international trade in crude materials, inedible, except fuels industry, fuels, lubricants industry and re-import and re-export goods, and gold sector. In 2011, Korea had disadvantage of international trade in crude materials, inedible, except fuels industry, fuels, lubricants industry and re-import and re-export goods, and gold sector, as before. That is, there was no change of disadvantage of international trade in Korea.

**Table 9 Korean RCDA**

	0	1	2	3	4	5	6	7	8	9
1996	0.68	0.45	1.69	1.88	0.54	0.92	0.93	0.96	0.63	1.26
1997	0.68	0.46	1.72	2.22	0.55	0.94	0.90	0.87	0.62	1.47
1998	0.75	0.32	2.04	3.03	0.66	1.00	0.79	0.83	0.52	1.69
1999	0.74	0.32	1.98	2.65	0.71	0.95	0.88	0.89	0.55	0.98



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2000	0.75	0.39	1.77	2.31	0.58	0.90	0.84	0.92	0.60	0.35
2001	0.83	0.44	1.88	2.43	0.61	0.91	0.88	0.86	0.61	0.31
2002	0.86	0.48	1.83	2.27	0.60	0.87	0.93	0.89	0.68	0.31
2003	0.81	0.38	1.69	2.10	0.52	0.84	0.93	0.91	0.71	0.46
2004	0.77	0.29	1.67	1.99	0.59	0.84	1.00	0.88	0.73	0.43
2005	0.74	0.25	1.64	1.89	0.64	0.86	1.01	0.85	0.77	0.11
2006	0.75	0.25	1.72	1.92	0.55	0.84	1.00	0.82	0.77	0.09
2007	0.74	0.27	1.68	1.92	0.56	0.83	1.04	0.84	0.70	0.13
2008	0.72	0.27	1.55	1.87	0.84	0.79	1.13	0.79	0.64	0.07
2009	0.68	0.27	1.64	1.97	0.59	0.82	1.10	0.88	0.63	0.08
2010	0.69	0.26	1.59	1.87	0.56	0.84	1.05	0.85	0.69	0.09
2011	0.78	0.22	1.62	1.89	0.65	0.80	1.00	0.76	0.66	0.11

**3.4 Singapore's RCDA**

In 1996, Singapore had disadvantage of international trade in beverages and tobacco industry, fuels, lubricants industry, machines, transport, equipment industry. In 2011, Singapore had disadvantage of international trade in beverages and tobacco industry, fuels, lubricants industry, machines, transport, equipment industry, as before. For 15 years, Singapore had no big change of disadvantage in industrial and trade structures.

**Table 10 Singapore's RCDA**

	0	1	2	3	4	5	6	7	8	9
1996	0.39	1.30	0.24	1.09	0.62	0.62	0.65	1.52	0.81	0.40
1997	0.40	1.35	0.22	1.11	0.58	0.60	0.67	1.49	0.81	0.52
1998	0.40	1.35	0.21	1.25	0.62	0.61	0.59	1.49	0.75	0.54
1999	0.42	1.06	0.22	1.26	0.63	0.60	0.56	1.46	0.78	0.59
2000	0.41	1.00	0.22	1.18	0.53	0.61	0.52	1.51	0.75	0.28
2001	0.44	1.03	0.19	1.26	0.51	0.58	0.54	1.51	0.69	0.38
2002	0.45	0.90	0.20	1.42	0.56	0.60	0.36	1.54	0.70	0.42
2003	0.44	0.79	0.21	1.31	0.48	0.59	0.51	1.52	0.69	0.45
2004	0.41	0.79	0.19	1.32	0.44	0.58	0.50	1.53	0.71	0.36
2005	0.39	0.81	0.18	1.30	0.39	0.57	0.55	1.50	0.68	0.42
2006	0.37	0.81	0.19	1.29	0.37	0.57	0.54	1.50	0.65	0.69
2007	0.38	0.87	0.18	1.42	0.44	0.55	0.53	1.46	0.67	0.84
2008	0.36	0.89	0.18	1.56	0.72	0.49	0.57	1.40	0.63	0.75
2009	0.37	0.87	0.26	1.66	0.42	0.50	0.59	1.40	0.61	0.91
2010	0.39	0.95	0.15	1.69	0.45	0.58	0.49	1.35	0.65	0.97
2011	0.41	1.06	0.16	1.86	0.69	0.60	0.54	1.22	0.66	0.55

**3.5 Indian RCDA**

In 1996, India had disadvantage of international trade in many industries, that is, crude materials, inedible, except fuels industry, fuels, lubricants industry, animal oils, veg oils,

fats, wax industry, chemicals products industry, manufactured goods industry and re-import and re-export goods, and gold sector. In 2011, India had disadvantage of international trade in fuels, lubricants industry, animal oils, veg oils, fats, wax industry, manufactured goods industry, and re-import and re-export goods, and gold sector. That is, India decreased in number of disadvantage industry for 15 years.

**Table 11 Indian RCDA**

	0	1	2	3	4	5	6	7	8	9
1996	0.31	0.03	1.43	3.42	5.29	1.32	1.22	0.49	0.21	2.48
1997	0.47	0.02	1.45	2.85	4.74	1.37	1.25	0.46	0.27	3.60
1998	0.49	0.04	1.47	2.95	9.50	1.24	1.21	0.39	0.29	5.97
1999	0.39	0.03	1.65	4.00	9.83	1.16	1.31	0.35	0.27	3.67
2000	0.28	0.03	1.63	3.56	9.02	0.94	1.27	0.37	0.30	2.22
2001	0.35	0.03	1.81	2.95	9.23	0.91	1.15	0.37	0.76	2.80
2002	0.41	0.03	1.71	3.31	8.35	0.90	1.31	0.46	0.35	2.08
2003	0.32	0.05	1.58	2.93	8.53	0.86	1.23	0.53	0.34	2.36
2004	0.31	0.08	1.46	2.80	6.29	0.85	1.18	0.53	0.31	2.63
2005	0.29	0.08	1.40	2.40	4.83	0.88	1.19	0.54	0.32	2.90
2006	0.28	0.08	1.67	2.37	3.72	0.85	0.90	0.63	0.32	2.24
2007	0.36	0.08	1.49	2.38	2.98	0.87	0.95	0.61	0.34	2.41
2008	0.22	0.07	1.22	2.09	3.28	1.02	0.91	0.62	0.24	2.18
2009	0.30	0.06	1.15	2.15	3.78	0.86	1.16	0.64	0.32	2.41
2010	0.28	0.07	1.07	2.05	3.79	0.86	1.24	0.53	0.27	3.32
2011	0.22	0.08	0.99	1.94	4.13	0.80	1.22	0.49	0.28	4.59

### 3.6 Indonesian RCDA

In 1996, Indonesia had disadvantage of international trade in many industries, that is, foods and live animals industry, crude materials, inedible, except fuels industry, fuels, lubricants industry, chemicals products industry, manufactured goods industry and machines, transport, equipment industry. In 2011, Indonesia had disadvantage of international trade in foods and live animals industry, crude materials, inedible, except fuels industry, fuels, lubricants industry, chemicals products industry, and manufactured goods industry. That is, Indonesia had no big change of disadvantage industry for 15 years.

**Table 12 Indonesian RCDA**

	0	1	2	3	4	5	6	7	8	9
1996	1.28	0.52	1.87	1.00	0.52	1.46	1.03	1.07	0.25	0.00
1997	1.08	0.60	1.70	1.14	0.62	1.47	1.05	1.09	0.25	0.00
1998	1.44	0.34	2.26	1.53	0.35	1.52	1.10	0.90	0.26	0.00
1999	2.14	0.65	2.93	2.15	0.32	1.89	1.01	0.58	0.22	0.00
2000	1.54	0.64	2.82	1.77	0.46	1.87	1.10	0.68	0.23	0.01

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2001	1.40	0.83	3.01	1.79	0.41	1.73	1.02	0.74	0.20	0.01
2002	1.56	0.71	2.59	2.23	0.45	1.57	1.00	0.70	0.20	0.01
2003	1.66	0.56	2.37	2.29	0.38	1.49	0.95	0.68	0.22	0.01
2004	1.52	0.49	2.09	2.26	0.37	1.50	0.97	0.69	0.21	0.00
2005	1.35	0.44	1.65	2.22	0.34	1.28	1.00	0.71	0.20	0.00
2006	1.57	0.50	1.60	2.14	0.38	1.35	0.93	0.69	0.23	0.00
2007	1.80	0.58	1.50	2.10	0.29	1.24	0.92	0.71	0.24	0.00
2008	1.17	0.51	1.37	1.35	0.34	1.16	1.18	1.00	0.27	0.01
2009	1.22	0.50	1.34	1.37	0.27	1.02	1.19	1.08	0.29	0.01
2010	1.28	0.52	1.19	1.31	0.27	1.07	1.20	1.01	0.32	0.32
2011	1.50	0.49	1.13	1.31	0.25	1.09	1.19	0.94	0.29	0.34

#### 4. Relative Revealed Comparative Trade Advantage (RTA)

The Relative Revealed Comparative Trade Advantage is an index of international trade advantage in total. RTA is a comparison between export and import. The definition of RTA is as follows.

$$RTA = RCA - RCDA$$

In the case of  $RTA > 0$ , then that industry has comparative advantage in total. In the case of  $RTA < 0$ , then that industry has comparative disadvantage in total.

##### 4.1 Japanese RTA

In 1996, Japan had relative revealed comparative advantage in chemicals products industry, chemicals products and re-import and re-export goods, and gold sector. In 2011, Japan had relative revealed comparative advantage in chemicals products industry, manufactured goods industry and re-import and re-export goods, and gold sector. Japan had almost same revealed comparative advantage in trade relation form 1996 to 2011.

**Table 13 Japanese RTA**

	0	1	2	3	4	5	6	7	8	9
1996	-1.79	-1.21	-1.91	-1.97	-0.46	0.07	0.00	1.11	-0.55	0.26
1997	-1.79	-1.21	-1.97	-2.10	-0.49	0.05	-0.01	1.06	-0.50	0.41
1998	-1.90	-1.63	-1.95	-2.34	-0.51	-0.02	0.05	0.98	-0.55	0.53
1999	-1.96	-1.46	-1.93	-2.19	-0.47	0.02	0.04	0.94	-0.49	0.64
2000	-1.93	-1.45	-1.73	-1.96	-0.45	0.09	0.04	0.96	-0.47	0.49
2001	-1.80	-1.30	-1.62	-1.98	-0.44	0.07	0.10	0.96	-0.53	0.54
2002	-1.83	-1.30	-1.62	-2.03	-0.44	0.07	0.13	0.95	-0.54	0.50
2003	-1.70	-1.25	-1.56	-2.02	-0.42	0.08	0.11	0.97	-0.52	0.54

2004	-1.72	-1.25	-1.47	-1.90	-0.45	0.10	0.07	0.96	-0.45	0.55
2005	-1.61	-1.23	-1.42	-1.82	-0.47	0.16	0.13	0.98	-0.44	0.69
2006	-1.43	-1.26	-1.59	-1.85	-0.40	0.20	0.13	1.02	-0.48	0.82
2007	-1.34	-1.08	-1.63	-1.87	-0.42	0.18	0.11	1.02	-0.49	0.84
2008	-1.26	-1.04	-1.35	-1.86	-0.66	0.18	0.24	1.17	-0.39	0.74
2009	-1.30	-1.19	-1.32	-1.78	-0.40	0.17	0.36	1.01	-0.54	0.73
2010	-1.28	-1.11	-1.41	-1.73	-0.38	0.14	0.31	1.02	-0.45	0.73
2011	-1.31	-1.30	-1.25	-1.64	-0.43	0.12	0.27	0.97	-0.38	0.75

#### 4.2 Chinese RTA

In 1996, China had relative revealed comparative advantage in foods and live animals industry, beverages and tobacco industry, and miscellaneous manufactured articles industry. In 2011, China had relative revealed comparative advantage in foods and live animals industry, manufactured goods industry, machines, transport, equipment industry and miscellaneous manufactured articles industry. China had a big change in relative revealed comparative advantage in trade relation form 1996 to 2011. This is an engine of the Chinese big economic growth.

**Table 14 Chinese RTA**

	0	1	2	3	4	5	6	7	8	9
1996	0.39	0.40	-1.06	-0.04	-2.17	-0.73	-0.29	-0.45	2.46	-0.14
1997	0.45	0.29	-1.38	-0.26	-1.91	-0.81	-0.30	-0.37	2.48	-0.15
1998	0.48	0.37	-1.42	-0.24	-1.82	-0.87	-0.31	-0.35	2.45	-0.19
1999	0.54	0.25	-1.50	-0.40	-1.80	-0.91	-0.27	-0.31	2.41	-0.26
2000	0.55	0.15	-1.96	-0.58	-1.25	-0.89	-0.12	-0.22	2.36	-0.14
2001	0.49	0.17	-2.14	-0.38	-0.86	-0.79	-0.07	-0.24	2.12	-0.13
2002	0.49	0.18	-1.87	-0.40	-1.40	-0.78	-0.03	-0.22	1.96	-0.09
2003	0.46	0.12	-2.08	-0.42	-1.68	-0.66	0.00	-0.13	1.70	-0.04
2004	-0.30	0.13	-2.41	-0.52	-1.77	-0.65	0.24	-0.03	1.49	-0.03
2005	0.30	0.05	-2.67	-0.52	-1.28	-0.64	0.31	0.02	1.41	-0.04
2006	0.29	-0.01	-2.59	-0.64	-1.24	-0.59	0.47	0.01	1.41	-0.01
2007	0.26	-0.04	-2.87	-0.64	-1.81	-0.57	0.48	0.07	1.37	-0.03
2008	0.20	-0.09	-3.29	-0.72	-2.75	-0.45	0.63	0.19	1.43	-0.06
2009	0.20	-0.07	-3.45	-0.73	-1.46	-0.49	0.34	0.24	1.41	-0.05
2010	0.18	-0.07	-3.18	-0.75	-1.24	-0.44	0.45	0.27	1.41	-0.31
2011	0.17	-0.12	-3.10	-0.74	-1.29	-0.38	0.53	0.22	1.42	-0.90

#### 4.3 Korean RTA

In 1996, Korea had relative revealed comparative advantage in manufactured goods industry, machines, transport, equipment industry, miscellaneous manufactured articles industry and re-import and re-export goods, and gold sector. In 2011, Korea had relative

revealed comparative advantage in beverages and tobacco industry, chemicals products industry, manufactured goods industry, machines, transport, equipment industry, miscellaneous manufactured articles industry and re-import and re-export goods, and gold sector. Korea had a big change in relative revealed comparative advantage in trade relation form 1996 to 2011.

**Table 15 Korean RTA**

	0	1	2	3	4	5	6	7	8	9
1996	-0.38	-0.31	-1.36	-1.48	-0.51	-0.16	0.41	0.35	0.11	0.10
1997	-0.39	-0.32	-1.36	-1.61	-0.49	-0.11	0.49	0.36	0.06	0.06
1998	-0.46	-0.19	-1.69	-2.40	-0.61	-0.21	0.63	0.34	0.19	0.29
1999	-0.44	-0.19	-1.62	-2.06	-0.69	-0.18	0.46	0.39	0.19	-0.20
2000	-0.48	-0.25	-1.42	-1.77	-0.54	-0.01	0.45	0.49	-0.01	-0.13
2001	-0.57	-0.25	-1.53	-1.86	-0.57	-0.05	0.43	0.55	-0.02	-0.13
2002	-0.63	-0.26	-1.49	-1.82	-0.57	-0.05	0.28	0.62	-0.16	-0.17
2003	-0.61	-0.13	-1.34	-1.73	-0.49	-0.02	0.21	0.67	-0.21	-0.22
2004	-0.59	-0.06	-1.35	-1.59	-0.57	0.01	0.03	0.73	-0.24	-0.15
2005	-0.57	-0.03	-1.33	-1.44	-0.62	0.05	0.02	0.74	-0.15	-0.08
2006	-0.60	-0.01	-1.41	-1.45	-0.53	0.10	0.01	0.75	-0.03	-0.03
2007	-0.60	-0.04	-1.36	-1.39	-0.55	0.11	-0.07	0.73	0.09	-0.08
2008	-0.58	-0.02	-1.21	-1.31	-0.82	0.19	-0.09	0.81	0.21	0.00
2009	-0.53	-0.01	-1.32	-1.47	-0.57	0.07	-0.05	0.76	0.25	0.06
2010	-0.54	0.02	-1.30	-1.34	-0.54	0.09	-0.07	0.77	0.22	0.04
2011	-0.62	0.07	-1.29	-0.97	-0.62	0.16	0.01	0.72	0.07	0.01

#### 4.4 Singapore's RTA

In 1996, Singapore had relative revealed comparative advantage in crude materials, inedible, except fuels industry, animal oils, veg oils, fats, wax industry, and machines, transport, equipment industry. In 2011, Singapore had relative revealed comparative advantage in chemicals products industry, and re-import and re-export goods, and gold sector. Singapore had a big change in relative revealed comparative advantage in trade relation form 1996 to 2011. Especially Singapore had a big change in relative revealed comparative advantage of re-import and re-export goods, and gold sector.

**Table 16 Singapore's RTA**

	0	1	2	3	4	5	6	7	8	9
1996	-0.13	-0.02	0.07	0.22	0.01	-0.01	-0.29	0.14	-0.23	-0.04
1997	-0.14	-0.01	0.05	0.25	-0.02	0.05	-0.31	0.13	-0.23	-0.02
1998	-0.15	0.01	0.08	0.11	-0.11	0.05	-0.29	0.08	-0.13	0.42
1999	-0.17	-0.09	0.04	-0.11	-0.06	0.21	-0.26	0.09	-0.14	-0.01
2000	-0.16	-0.09	0.01	-0.44	-0.01	0.16	-0.24	0.11	-0.09	0.56

2001	-0.21	-0.12	0.06	-0.46	-0.01	0.26	-0.26	0.07	0.00	0.68
2002	-0.22	-0.06	0.03	-0.55	-0.09	0.30	-0.08	0.03	-0.02	0.57
2003	-0.23	-0.18	-0.01	-0.41	-0.07	0.50	-0.20	0.02	-0.01	0.41
2004	-0.20	-0.13	0.01	-0.35	-0.09	0.51	-0.21	0.01	-0.05	0.44
2005	-0.20	-0.15	0.00	-0.30	-0.09	0.50	-0.23	0.03	-0.10	0.69
2006	-0.17	-0.13	0.01	-0.32	-0.08	0.53	-0.24	0.03	-0.06	0.49
2007	-0.19	-0.09	0.00	-0.32	-0.15	0.50	-0.21	0.01	-0.08	0.76
2008	-0.17	-0.07	0.00	-0.42	-0.38	0.42	-0.24	0.07	-0.02	0.92
2009	2.13	-0.05	-0.09	-0.49	-0.11	0.47	-0.26	0.11	0.00	0.47
2010	2.03	-0.07	-0.01	-0.48	-0.20	0.42	-0.20	0.11	-0.02	0.65
2011	2.39	-0.08	-0.02	0.03	-0.52	0.50	-0.26	0.03	-0.05	1.18
	-0.21	-0.07	-0.05	-0.28	-0.59	0.52	-0.28	-0.02	-0.06	1.18

#### 4.5 Indian RTA

In 1996, India had relative revealed comparative advantage in foods and live animals industry, beverages and tobacco industry, crude materials, inedible, except fuels industry, manufactured goods industry, and miscellaneous manufactured articles industry. In 2011, India had relative revealed comparative advantage in in foods and live animals industry, beverages and tobacco industry, crude materials, inedible, except fuels, lubricants industry, chemicals products industry, manufactured goods industry, and miscellaneous manufactured articles industry. India had a change in relative revealed comparative advantage in trade relation form 1996 to 2011. That is, India gradually moved from a developing country to a modern industrial country.

**Table 17 Indian RTA**

	0	1	2	3	4	5	6	7	8	9
1996	2.06	0.55	0.19	-3.21	-4.05	-0.36	1.13	-0.29	1.28	-1.89
1997	1.87	0.74	-0.05	-2.67	-3.70	-0.32	1.19	-0.27	1.19	-2.91
1998	1.94	0.50	-0.24	-2.87	-8.51	-0.29	1.24	-0.22	1.42	-5.09
1999	1.69	0.62	-0.42	-3.96	-8.17	-0.13	1.55	-0.19	1.37	-2.83
2000	1.87	0.49	-0.39	-3.22	-7.17	0.20	1.64	-0.19	1.42	-1.73
2001	1.75	0.44	-0.54	-2.43	-7.74	0.21	1.51	-0.16	0.83	-2.08
2002	1.66	0.45	-0.20	-2.79	-7.47	0.18	1.44	-0.25	1.14	-1.50
2003	1.44	0.40	-0.20	-2.28	-7.70	0.21	1.56	-0.29	1.17	-2.01
2004	1.41	0.38	0.50	-2.01	-5.18	0.24	1.30	-0.27	1.24	-2.35
2005	1.27	0.34	0.95	-1.55	-3.92	0.19	1.22	-0.27	1.13	-2.59
2006	1.29	0.37	0.41	-1.27	-2.97	0.28	1.25	-0.34	1.12	-1.98
2007	1.24	0.37	0.62	-1.09	-2.30	0.18	1.09	-0.31	0.96	-2.13
2008	1.44	0.50	0.68	-0.98	-2.65	0.06	1.09	-0.22	0.92	-1.85
2009	0.80	0.59	0.50	-1.11	-3.14	0.05	0.80	-0.20	1.23	-1.61
2010	0.95	0.52	0.65	-0.76	-3.13	0.09	0.92	-0.12	0.84	-2.91
2011	1.16	0.35	0.21	-0.15	-3.51	0.11	0.61	-0.12	0.88	-3.60

#### 4.6 Indonesian RTA

In 1996, Indonesia had relative revealed comparative advantage in crude materials, inedible, except fuels industry, fuels, lubricants industry, animal oils, veg oils, fats, wax industry, manufactured goods industry, miscellaneous manufactured articles industry., and re-import and re-export goods, and gold sector. In 2011, Indonesia had relative revealed comparative advantage in beverages and tobacco industry, crude materials, inedible, except fuels industry, fuels, lubricants industry, animal oils, veg oils, fats, wax industry, and miscellaneous manufactured articles industry. Indonesia had a small change in relative revealed comparative advantage in trade relation form 1996 to 2011.

**Table 18 Indonesian RTA**

	0	1	2	3	4	5	6	7	8	9
1996	-0.20	-0.12	0.88	2.55	6.21	-1.09	0.37	-0.82	1.12	0.06
1997	-0.09	-0.18	0.53	2.67	8.06	-1.10	0.13	-0.88	0.75	4.24
1998	-0.27	0.15	0.03	1.97	5.62	-1.08	0.08	-0.67	0.78	5.96
1999	-0.91	-0.20	-0.65	1.19	8.35	-1.38	0.56	-0.32	1.08	1.14
2000	-0.46	-0.21	-0.54	0.77	8.92	-1.31	0.34	-0.27	1.07	0.15
2001	-0.38	-0.27	-0.51	0.90	7.90	-1.21	0.44	-0.34	1.12	0.18
2002	-0.44	-0.22	0.11	0.49	11.76	-1.07	0.39	-0.28	0.94	0.13
2003	-0.59	-0.17	0.54	0.43	11.61	-0.97	0.39	-0.28	0.91	0.11
2004	-0.46	-0.03	0.79	0.27	15.01	-0.98	0.31	-0.28	0.88	0.08
2005	-0.31	0.06	1.66	0.04	15.46	-0.79	0.21	-0.30	0.84	0.06
2006	-0.52	-0.03	2.29	-0.11	16.27	-0.86	0.28	-0.32	0.80	0.13
2007	-0.79	-0.07	2.21	-0.06	20.05	-0.71	0.22	-0.36	0.71	0.14
2008	-0.07	0.03	1.70	0.44	20.00	-0.67	-0.08	-0.63	0.63	0.12
2009	-0.25	0.12	1.64	0.81	19.98	-0.59	-0.04	-0.68	0.58	0.14
2010	-0.36	0.07	1.96	0.91	19.28	-0.61	-0.14	-0.65	0.50	-0.17
2011	-0.61	0.04	1.50	1.92	16.61	-0.60	-0.28	-0.65	0.42	-0.11

### 5. Competitive and Complementary Relationships of Trade

Next, we consider the competitive and complementary relationships of trade between of two countries. The international economic theory defined the competitive and complementary relationships of trade. The value of correlation coefficient of one country's RCA of all industry sectors and the other country's RCA is positive, it is said that the trade relation of two countries is competitive. On the other hand, the value of correlation coefficient is negative, it is said that the trade relation of two countries is complementary to each other.

In statistics, the correlation coefficient (typically denoted by  $r$ ) is a measure of the strength and the direction of a linear relationship between two variables, giving a value

between +1 and -1 inclusive.

A set of observations  $(X, Y) = \{(X_i, Y_i)\} (i= 1,2,\dots, n)$  is given by the formula

$$r = \frac{\sum_{i=1}^n (X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^n (X_i - \bar{X})^2} \sqrt{\sum_{i=1}^n (Y_i - \bar{Y})^2}} .$$

Where  $r$  is the value of correlation coefficient,  $\bar{X}$  is the mean of  $X = \{X_i\}$  and  $\bar{Y}$  is the mean of  $Y = \{Y_i\}$ .

The value of  $r$  is such that  $-1 < r < +1$ . The + and - signs are used for positive linear correlations and negative linear correlations, respectively.

When  $r < 0$ , then the Trade relation of two countries is complementary.

When  $r > 0$ , then the Trade relation of two countries is competitive.

Using above definition, we analyze the trade relationship of all countries.

### 5.1 Japanese correlation coefficient of RCA

In 1996, Japan had a complementary trade relationship with India, and Indonesia. But, in 2011, Japan had a complementary trade relationship with Singapore, India, and Indonesia. On the other hand, Japan has had a competitive trade relationship with China and Korea for 15years. That is, China is not a complementary trade partner for Japan.

**Table 19 Japanese value of correlation coefficient of RCA**

	China	Korea	Singapore	India	Indonesia
1996	0.01	0.84	0.33	-0.31	-0.54
1997	0.00	0.80	0.31	-0.27	-0.38
1998	0.02	0.79	0.36	-0.19	-0.16
1999	0.10	0.79	0.40	-0.21	-0.48
2000	0.23	0.75	0.68	-0.24	-0.45
2001	0.24	0.70	0.68	-0.24	-0.50
2002	0.27	0.74	0.68	-0.19	-0.45
2003	0.36	0.81	0.71	-0.16	-0.45
2004	0.50	0.82	0.66	-0.27	-0.43
2005	0.41	0.67	0.69	-0.26	-0.44
2006	0.42	0.69	0.70	-0.31	-0.43
2007	0.39	0.65	0.69	-0.37	-0.42
2008	0.48	0.75	0.61	-0.28	-0.42
2009	0.48	0.76	0.06	-0.05	-0.43
2010	0.49	0.74	0.12	-0.21	-0.43
2011	0.45	0.62	-0.03	-0.16	-0.47



## 5.2 Chinese correlation coefficient of RCA

In 1996, China is in a complementary trade relationship with Korea, Singapore and Indonesia. But, in 2011, China had a complementary trade relationship with only Indonesia. That is, China had a competitive trade relationship with many Asian countries after 15 years. This is an evidence that China changed form a developing country to an industrial country.

**Table 20 Chinese value of correlation coefficient of RCA**

	Japan	Korea	Singapore	India	Indonesia
1996	0.01	-0.01	-0.16	0.41	-0.08
1997	0.00	-0.07	-0.21	0.40	-0.23
1998	0.02	-0.06	-0.25	0.46	-0.44
1999	0.10	0.28	-0.16	0.39	-0.26
2000	0.23	0.32	-0.12	0.43	-0.22
2001	0.24	0.37	-0.11	0.40	-0.24
2002	0.27	0.38	-0.06	0.42	-0.30
2003	0.36	0.43	0.06	0.44	-0.31
2004	0.50	0.52	0.20	0.26	-0.27
2005	0.41	0.57	0.03	0.28	-0.30
2006	0.42	0.63	0.02	0.28	-0.29
2007	0.39	0.65	-0.06	0.19	-0.31
2008	0.48	0.70	-0.07	0.19	-0.29
2009	0.48	0.74	-0.08	0.36	-0.31
2010	0.49	0.74	-0.10	0.17	-0.32
2011	0.45	0.60	-0.20	0.10	-0.35

## 6. Concluding Remarks

According to our analysis, our paper got the following conclusions.

- (1) Japan had an international competitive power only in the machines, transport, equipment industry, and except re-import and re-export goods, during from 1996 to 2011. Japan had no change in export–import structure for 15 years.
- (2) Japan had a complementary trade relationship only with India and Indonesia. Japan, on the other hand, had a competitive trade relationship with China, Korea. Especially, China had not been a complementary trade partner but a competitive trade partner for Japan.
- (3) China has been getting a powerful international competitive power in the machines, transport, equipment industry, the miscellaneous manufactured articles industry, and the manufactured goods industry during 15 years from 1996 to 2011, China had a big change in a trade structure and had a high economic growth.
- (4) China had a complementary trade relationship with Singapore and Indonesia in 2011.

But, China became in a competitive trade relationship with Japan and Korea. This is an evidence that China changed form a developing country to an industrial country.

- (5) Korea was an industrial country and was a competitive trade partner for Japan for recent 15 years.
- (6) Singapore was a high industrial country and a competitive trade partner for Japan for 14 years. But, in 2011, Singapore became a complementary trade partner for Japan.
- (7) India has been shifting from a developing country to industrial country and was a complementary trade partner for Japan for 15 years.
- (8) Indonesia has been moving form a developing country to industrial country and was a good complementary trade partner for Japan for 15 years.

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