

Comparative analysis of trade effects of anti-dumping measures targeting China vs. those initiated by China

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Using the numbers of anti-dumping cases both in China and around the world, the value of imports and exports from 1995 to 2012, and the anti-dumping index (ADI) proposed by Finger and Murray in 1999, this paper analyzes the characteristics of anti-dumping measures that target China and those imposed by China, and constructs a multiple linear regression model. We try to show the effect of anti-dumping measures in either direction on the total value of China's trade. This paper finds that both have great impact on export trade value. The intensity of the level of anti-dumping measures to which China is subject is positively correlated with total export value since this intensity, to a certain degree, can promote China's industrial upgrading and the increase of the export of high value-added products. This paper further analyzes different effects of anti-dumping measures based on the method of technological content classification of Lall (2000). Finally, we put forward policy suggestions on how to enhance China's export competitiveness by overcoming the effects of antidumping measures to which we are subject and by making proper use of antidumping measures on others.

Keywords: anti-dumping measures targeting China, anti-dumping measures initiated by China, technological content in export

1. Introduction

Since China was first targeted for anti-dumping measures imposed by the European Union in 1979, such investigations have continued to increase each year. China has since 1996 been subject to more anti-dumping actions than any other country in the world. In recent years, China has also protected its trade interests through imposing anti-dumping measures on other countries, especially after China's accession into WTO in 2001. Both types of cases are now occurring at greater frequency than ever before and their impact on China's trade has also grown. Scholars, both in China and abroad, have conducted research on the characteristics and effects of anti-dumping measures. In the research about the characteristics of anti-dumping, foreign scholars analyze the industrial characteristics of global anti-dumping measures in different time periods and have pointed out that the effects of anti-dumping investigations are influenced by

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the development level of the initiating country and target country. Some studies point out that anti-dumping is not only a means of trade protection in developed countries, more and more developing countries also use anti-dumping measures to protect their own trade interests (Thomas, 2005). Domestic scholars have also conducted related researches. For example, Hai (2011) observes some of the characteristics of foreign anti-dumping since China has entered WTO from the perspective of time, commodities, target countries, and ruling bodies. Researches on the total effects of anti-dumping distinguish between being subject to such measures and imposing them on other countries. Among the researches on the total effects of being their target, many foreign scholars begin to study the characteristics, determinants, and effects of developing countries' use of anti-dumping measures (Bown, 2008). Some scholars also conduct related research on China's anti-dumping strategies (LE Thi Thuy Van, 2009). Many Chinese scholars also analyze a series of trade effects of anti-dumping measures other countries impose on China. For example, Qi (2010) gives a comparative analysis of being the target of and imposing anti-dumping measures for China and India, observing the successful experiences of India's anti-dumping strategies. At the same time, we should see the positive impacts of anti-dumping measures, such as promotion of industrial upgrading and FDI development, and the improvement of current situation of trade imbalance (Li, 2007). In researches on the total trade effects of anti-dumping measures directed at other countries, scholars conduct further research on the macroeconomic trade effects of those taken by China. For example, China-initiated anti-dumping measures have significant trade restraint effect and investigation effect, but their trade diversion effects also compromise their overall impact (Bao, 2007). China's imposition of anti-dumping measures on others can promote productivity growth in China (Li & Shi, 2013). Arbitration ruling in favor of China-initiated anti-dumping measures can reduce enterprise performance while opposite rulings can improve their performance (Su, 2012). In addition, some scholars have put forward the idea of mutual influence between anti-dumping and competitiveness of export products. For example, Shen(2012) finds the optimization of China's export structure could promote China's exports to the US through the analysis of the dominant comparative advantage index RCA of China's export products, which can weaken to some degree the negative effects brought about by anti-dumping measures targeting China. The research of Yin & Li (2007) indicates that anti-dumping targeting China's sunset industries could be conducive to the promotion of domestic trade interests and social welfare. However, in previous studies, few literature compares the characteristics of anti-dumping measures in both directions, the effects on total trade volume, and the level of technologies of export products. We try to revisit these issues in this paper using the intensity of anti-dumping index, ADI, proposed by Finger and Murray (1993) and by constructing the multiple linear regression model. We also calculate the index of RCA of different export products with the technology classification (Lall, 2000) and put forward policy recommendations for enhancing the competitiveness of export commodities toward anti-dumping measures.

2. The situation and characteristics of anti-dumping measures targeting China and those initiated by China

2.1. The comparison between the amount of anti-dumping measures in either direction

China has always been the main target country of anti-dumping measures. From January 1, 1995, to December 31, 2012, there are total 4230 anti-dumping cases worldwide, among which, the number of anti-dumping cases targeting China is 916, accounting for 21.65% of the total. China is subject to more anti-dumping measures than any other single country in the world, and is the only one which accounts for more than 10% of the total number of cases (South Korea is in the second place, which has 306 cases and accounts for 7.23%). Table 1 reflects the top 10 countries or regions facing the most amounts of anti-dumping measures from July, 1996, to June, 2013. We can see that in the past 17 years, there are 16 years where China have the most anti-dumping cases targeting China and the number shows an increasing trend. In the top 10 countries, the majority is developing countries and the cases of anti-dumping in the early period are more dispersed than it is now. On the contrary, the anti-dumping cases have become more and more concentrated in a few countries. For example, the difference between the number of cases in China, the first place, and that of South Korea, the second place, is about 2 times more from June, 2012, to July, 2013. The difference with Indonesia, the tenth place, is more than 12 times.

Table 1

The top ten countries (regions) facing the most amounts of anti-dumping measures in the world from 1996 to 2013 and the case number

1996 ¹	China 31	USA 19	German 13	Chinese Taipei 11	Korea 11	India 9	Thailand 8	Russia 7	Japan 7	Brazil 5
1997	China 27	Korea 18	Chinese Taipei 13	India 11	USA 11	Russia 10	German 9	Indonesia 9	Japan 9	Brazil 7
1998	Korea 27	China 22	Russia 17	Chinese Taipei 15	USA 15	Japan 15	Brazil 11	Ukraine 11	German 11	Indonesia 10
1999	China 26	Korea 21	Indonesia 14	Chinese Taipei 13	Russia 11	Thailand 11	India 10	USA 10	Japan 9	Brazil 6
2000	China 53	Korea 20	Chinese Taipei 19	India 14	Indonesia 12	Brazil 11	Japan 11	Britain 11	Thailand 11	USA 10
2001	China 46	Indonesia 15	Korea 14	Brazil 13	Chinese Taipei 13	India 12	South Africa 11	Thailand 11	Japan 11	Singapore 11
2002	China 42	Korea 19	Chinese Taipei 13	Thailand 12	USA 12	India 12	Japan 10	German 8	Russia 8	Indonesia 7

¹ The specific time interval is from July 1996 to June 1997. Other time intervals in the table are similar to this.

2003	China 58	USA 23	Chinese Taipei 21	Korea 18	Japan 15	India 13	Thailand 9	European Union 8	Russia 8	Indonesia 7
2004	China 44	Korea 17	Chinese Taipei 16	USA 13	India 11	Thailand 10	Indonesia 10	Brazil 9	Malaysia 9	Japan 9
2005	China 57	Malaysia 10	Thailand 10	USA 9	India 8	Indonesia 8	Korea 8	Chinese Taipei 7	Japan 6	Brazil 5
2006	China 52	Chinese Taipei 11	Korea 10	Indonesia 9	Japan 8	Brazil 6	Singapore 6	USA 6	European Union 4	Argentina 4
2007	China 78	Thailand 15	Korea 12	Malaysia 9	Indonesia 8	Chinese Taipei 6	USA 6	Vietnam 5	India 4	Brazil 3
2008	China 68	USA 12	Indonesia 11	Chinese Taipei 11	Thailand 10	Brazil 9	Malaysia 9	Korea 8	India 5	European Union 5
2009	China 67	USA 14	Thailand 9	Chinese Taipei 9	India 7	Korea 7	Malaysia 7	Japan 7	Brazil 5	Indonesia 5
2010	China 41	USA 18	Korea 10	India 7	Mexico 7	Chinese Taipei 6	European Union 6	Turkey 5	Japan 5	Indonesia 4
2011	China 50	Korea 21	Chinese Taipei 19	Thailand 10	USA 9	Japan 8	Indonesia 7	India 6	Turkey 6	Vietnam 6
2012	China 62	Korea 20	Chinese Taipei 17	USA 13	Thailand 10	India 8	European Union 7	Argentina 6	Brazil 5	Indonesia 5

Source: WTO website.

Since joining WTO in 2001, along with the continuous development of import trade, China began to impose anti-dumping measures on other countries. Before 2001, the total case number of anti-dumping measures China initiated against other countries was 16, and it is 214 now, representing an average annual growth rate of 15.23%. The increasing number of cases of China-initiated anti-dumping measures not only helps to maintain the normal operation of domestic markets and protects certain industries against foreign countries or regions, but also restricts the abusive use of anti-dumping measures. From Figure 1, we can clearly see the trend of anti-dumping measures China is subject to and those it imposes on other countries or regions from 1995 to 2012. The former's proportion in the total increased first and then decreased. From 2001, with China's accession into WTO in 2005, the number of anti-dumping cases that China is involved in has seen obvious growth. Although the case number fluctuates, it remains high.

Although the number of anti-dumping cases initiated by China has increased rapidly, it is still much less compared with some of the world's major trading countries or regions. Table 2 lists the anti-dumping case numbers of the top ten countries (regions) which initiate anti-dumping measures in the world. We can see that although the number of China-initiated anti-dumping cases has ranked in the top ten in the world, compared with the US, European Union, developed

countries or regions, and developing countries such as India, Brazil, and others, we still have not taken good use of this instrument.

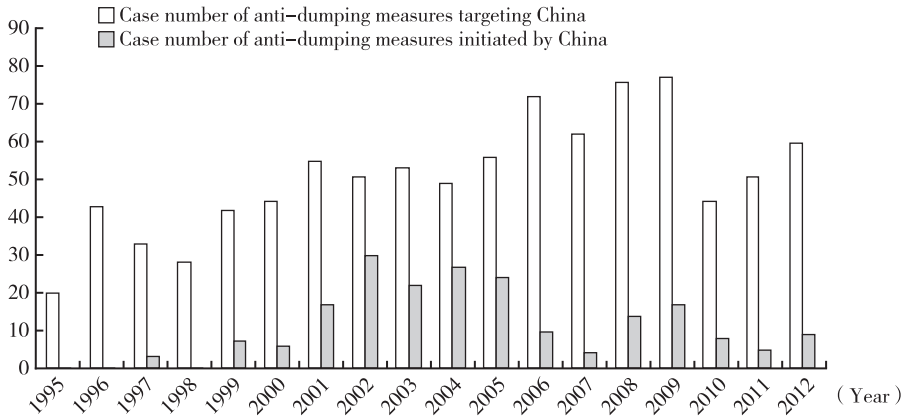


Figure 1. The trend of the number of anti-dumping measures targeting China and those initiated by China from 1995 to 2012

Source: Calculated according to the data of World Bank and the Website of China Trade Remedy Information.

Table 2

The top 10 countries (regions) of initiating anti-dumping measures from 1996 to 2013

1996 ¹	European Union 26	Australia 22	India 20	USA 20	Brazil 19	Korea 18	Argentina 18	South Africa 11	Indonesia 9	Canada 8
1997	European Union 44	Australia 35	USA 28	South Africa 23	Brazil 12	India 11	Indonesia 11	Canada 10	Argentina 8	Mexico 8
1998	USA 43	European Union 41	India 38	South Africa 32	Australia 18	Canada 17	Argentina 15	Brazil 12	Mexico 12	Columbia 8
1999	European Union 49	India 26	Argentina 23	Australia 18	USA 17	Brazil 17	Indonesia 13	Canada 11	South Africa 11	Mexico 7
2000	USA 77	Argentina 44	Canada 41	India 37	European Union 29	Australia 20	South Africa 20	Brazil 10	Korea 5	New Zealand 5
2001	India 76	USA 58	Argentina 26	European Union 23	Brazil 16	Australia 16	Turkey 15	Mexico 11	Peru 11	Egypt 8
2002	India 67	USA 29	China 17	European Union 15	Australia 14	Thailand 14	Turkey 12	Korea 11	Brazil 9	Mexico 8
2003	USA 42	India 37	China 22	Turkey 19	European Union 17	Korea 17	Canada 13	Mexico 11	South Africa 10	Australia 9
2004	European Union 31	India 30	China 27	Turkey 20	South Africa 18	USA 9	Australia 9	Canada 7	Peru 7	Egypt 7
2005	European Union 25	Argentina 20	China 16	Australia 14	India 11	Turkey 9	Pakistan 9	USA 8	South Africa 7	Egypt 7

¹ The specific time interval is from July 1996 to June 1997. Other time intervals in the table.

2006	India 27	European Union 18	Brazil 13	Argentina 13	China 11	USA 8	Korea 8	Malaysia 8	Egypt 7	New Zealand 6
2007	India 44	USA 36	European Union 19	Turkey 19	Brazil 15	Argentina 15	Korea 14	Australia 5	Columbia 4	Canada 3
2008	India 59	Argentina 25	China 25	Brazil 17	Pakistan 17	Turkey 13	Indonesia 12	European Union 11	USA 9	Australia 6
2009	India 34	European Union 21	Argentina 19	USA 16	Brazil 13	Pakistan 12	Australia 9	China 7	Israel 7	Canada 4
2010	Brazil 43	India 34	European Union 15	Pakistan 13	Argentina 11	USA 10	Ukraine 7	Indonesia 6	Australia 5	China 4
2011	Brazil 31	Australia 22	India 16	European Union 16	USA 13	Argentina 13	Thailand 13	Canada 12	China 9	Chinese Taipei 9
2012	Brazil 38	India 31	Argentina 15	China 13	Turkey 12	USA 11	Australia 11	Canada 11	European Union 9	Columbia 9

Source: WTO website.

2.2. Comparison of the intensity of anti-dumping measures a country is subject to and those it imposes

Here we introduce the anti-dumping intensity index ADI that was proposed by Finger and Murray (1993) to calculate the intensity of anti-dumping a country is subject to in respect to export performance. The formula of the index is:

$$ADI_i = \frac{ADi(t, t+n) / ADw(t, t+n)}{EXi(t, t+n) / EXw(t, t+n)} \quad (1)$$

ADi represents the case number targeting one country in the period of $(t, t+n)$. ADw represents the worldwide case number in this period. EXi represents the country's total exports in this period, and EXw represents the total global exports in this period. If the ADI index in one country or one region is greater than 1, then the adverse effect of being targeted for anti-dumping is greater compared with its share of export markets. If the ADI index in one country or one region is less than 1, then the adverse effect of suffering anti-dumping is less compared with its share of the export market. If the ADI index in one country or one region is equal to 1, then the adverse effect of being subject to anti-dumping is consistent with its position in the global market.

Figure 2 shows the changing trend of the top 9 countries that are subject to anti-dumping investigations from 1995 to 2012. We can see that the US and Japan have the lowest reading on the ADI index. Other country's ADI are at a higher level, of which India and Indonesia have the highest index. China is in a middle position with a value of 4, and its index level decreases from 2010 to 2012, which is related to the enhanced ability to handle anti-dumping investigations and the effects of the global financial crisis on trade. We can see that although anti-dumping cases in

the US and Japan are more numerous, their adverse effect is milder in light of their export market position.

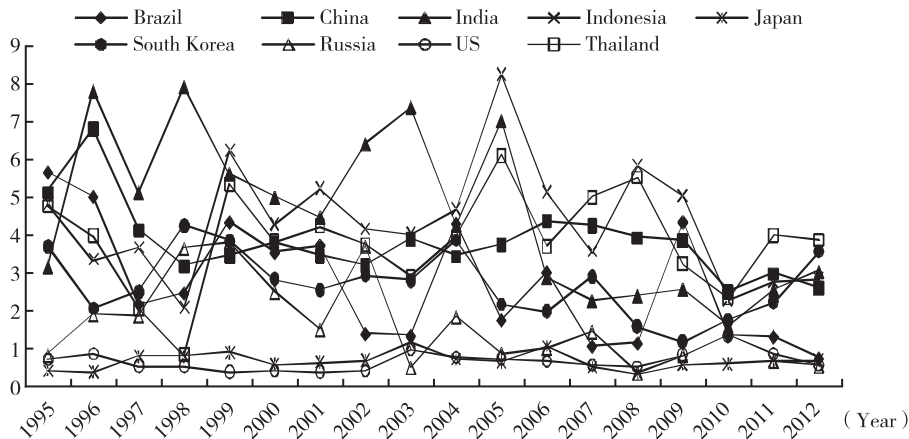


Figure 2. The ADI's changing trends of the top 9 countries that are subject to anti-dumping measures in the world from 1995 to 2012.

Source: Calculated according to the data of World Bank and the Website of China Trade Remedy Information.

Similarly, ADi_i is regarded as the case number of foreign anti-dumping trials in the period of $(t, t+n)$, and the denominator is replaced with the country's import value and the world's total import value, namely:

$$ADi_i = \frac{ADi(t, t+n) / ADw(t, t+n)}{IMi(t, t+n) / IMw(t, t+n)} \quad (2)$$

This formula can be a measure of a country or region's anti-dumping intensity with respect to import performance. A higher index indicates stronger anti-dumping initiative with respect to import performance. According to this index formula, we can get the externally directed anti-dumping ADI index since 1997 (See Table 3). From 1997 to 2012, there are 6 years in which the foreign ADI index is greater than 1 in China. The average value of China's ADI index over 16 years is 0.956, which indicates the intensity of anti-dumping in China is consistent with China's position in the global import market. Qi (2006) points out that the average value of ADI from 1995 to 2001 is 0.53, which is far less than the average value calculated in this paper. This indicates there is a progressive growth in protecting trade interests using foreign anti-dumping measures by China's competitors. The intensity of anti-dumping charges and sanctions targeting other countries or regions is consistent with their trading status. However, compared with other trading powers such as the US and India, China's foreign anti-dumping intensity is relatively weak.

Table 3

The ADI index of China-initiated anti-dumping measures from 1997 to 2012

Year	1997	1998	1999	2000	2001	2002	2003	2004
Outward ADI	0.49	0.00	0.70	0.60	1.22	2.18	1.79	2.09
Year	2005	2006	2007	2008	2009	2010	2011	2012
Outward ADI	1.97	0.77	0.36	0.96	1.03	0.52	0.32	0.44

Source: Calculated according to the data of WTO, World Bank and China Trade Remedy Information Website.

2.3. Other characteristics

Anti-dumping measures China is subject to and imposes on other countries have differences and connections in terms of objective countries and industry distribution. Table 4 summarizes the differences and connections.

Table 4

Differences and connections of anti-dumping measures targeting China and initiated by China

	Anti-dumping measures targeting China	China-initiated anti-dumping measures
Differences	1. Since 1996, China ranked number one in the world in terms of both the absolute number of anti-dumping measures targeting China and the share of the total. 2. Anti-dumping investigations targeting China are from both developing and developed countries. From the perspective of case number, developing countries initiate more cases on China than developed countries, while the trade volume of cases of developed countries is more than that of developing countries.	1. After the accession into WTO, China has quickly become an active country that conducted anti-dumping investigations and has already been one of the top 10 countries conducting anti-dumping investigations in the world. 2. Most of the target countries that China conducts anti-dumping measures are developed countries, while the number of anti-dumping investigation on developing countries is less.
Connections	1. The US, Japan, European Union, South Korea, and India are countries which have more trade friction with China. 2. The industry distributions of anti-dumping in either direction are similar, and chemistry, woods, textiles, steel and metal are the main industries involved.	

Source: According to relevant information summary.

3. The trade effect comparison of anti-dumping in either direction

3.1. The effect of anti-dumping in either direction on export trade value in China

Generally speaking, trade value has a positive correlation with the number of anti-dumping measures a country is involved with, which means the more one country participates in international trade, the greater the case number of anti-dumping trials there is. The correlations over different periods in a country show different characteristics. Figure 3 shows the changing situation of import value, export value, case numbers of anti-dumping sufferance, and outward anti-dumping. We can see that all these have increasing trends. However, in the period from 2007

to 2011, the trade value is negative correlated with the number of anti-dumping cases, which may in turn be related to trade protectionism brought on by the global economic crisis.

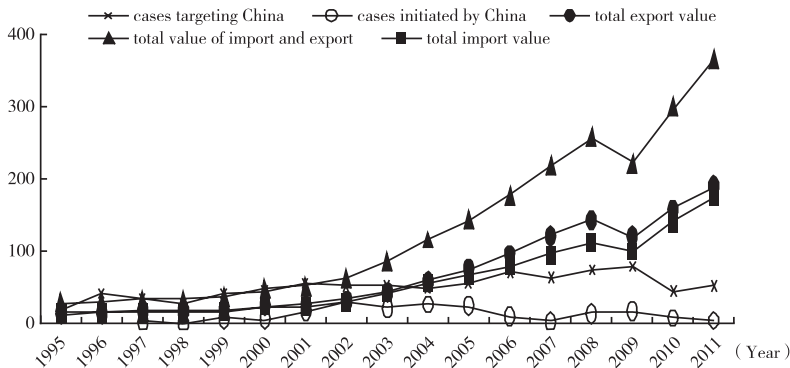


Figure 3. The changing situation of trade value, number of cases of anti-dumping in either direction of China

Note: The unit for anti-dumping case in either direction is “piece”; the unit for export and import trade value is “10 billion US Dollars”.

Source: According to the *China Statistical Yearbook* from 1995 to 2011 and the data of China Trade Remedy Information website.

In order to further study the effect of anti-dumping measures in either direction on export value, we select the ADI_1 and ADI_2 from 1995 to 2011, exchange rate, FDI, K/L, and Tech budgeting (expenditures of R&D in GDP) as explanatory variables to empirically analyze the variable of China's total exports (EX) with a multiple linear regression model. All the descriptive statistics for all variables are shown in Table 5 and the predicted results and related theories of all explanatory variables are shown in Table 6.

Table 5

Descriptive statistics of all variables

	ADI_1	ADI_2	EX	EXCHANGE RATE	FDI	K/L	TECH
Mean value	-14.2308	1.6923	7595.3766	-22.0231	53.8400	9.9336	87.6923
Intermediate vale	-12	-10	6831.3414	-0.2	58.65	7.0784	80
Maximum value	61	96	24993.1489	544.8000	176.27	139.4464	290
Minimum value	-137	-120	-18365.2475	-291.1	-51.44	-42.2312	-20
Standard deviation	57.7367	60.6896	10781.1259	201.5880	69.9263	47.1460	75.4049
Observation value	N=13	N=13	N=13	N=13	N=13	N=13	N=13

Regression analysis for the Multiple-linear model and the results are calculated as follows:

$$EX = 30.59ADI_1 - 48.45ADI_2 - 16.29EXCHANG\ RATE + 43.96FDI + 68.96Tech - 40.22K/L$$

$$t\text{-statistic} \quad (1.26) \quad (-3.07) \quad (-1.71) \quad (2.39) \quad (6.78) \quad (-1.25)$$

$$R^2 = 0.9461 \quad \bar{R}^2 = 0.9077 \quad F\text{-statistic} = 20.4981 \quad DW = 1.2573$$

Table 6
Predicted results of all explanatory variables and theoretical interpretation

Explanatory variable	Definition	Predicted results	Theoretical interpretation
ADI ₁	The index of anti-dumping sufferance (%)	-	Suffering targeted anti-dumping measures makes the tax rate of export commodities increase, prices rise, competitiveness decline, and export volume decrease.
ADI ₂	The index of outward anti-dumping (%)	Unknown	Outward anti-dumping makes the tax rate of import commodities increase, prices rise, competitiveness decline, and import volume decrease. It can play a protective role in domestic import competitive industries. On the one hand, it can provide a peaceful development environment for enterprises in the industry. On the other hand, it weakens mechanisms of survival of the fittest, which are not conducive to the improvement of an enterprise's technology innovation and productivity and will decrease the exporting industry's competitive level in international market.
FDI	Total international direct investment (100 million US dollars)	+	Multi-national corporations can promote the growth of export trade from two aspects: trade between parent and subsidiary companies, creating export of subsidiary company itself.
Exchange rate	Exchange rate (yuan/thousand dollars)	-	Rising exchange rates mean a country's currency appreciation, which makes the price of export commodities rise, competitiveness decline, and export volume decrease.
Tech	Technical level (one hundred thousand yuan/ten million yuan)	+	The technical level is measured by the proportion of R&D in GDP. A bigger proportion means higher technical level. A higher technical level can promote productivity improvement and trade development.
K/L	Per capita capital (yuan/person)	+	Per capita capital reflects one country's factor endowment. The process of gradual increasing per capita capital reflects one country's transformation from a labor-intensive country to a capital-intensive rich country. And corresponding export product will transform from a labor-intensive product to a capital-intensive product. The added value of general capital-intensive product is higher than that of labor-intensive product. Thus, the country's exports will subsequently get promotion and development.

Sources: ADI₁, ADI₂ is calculated according to the WTO website, World Bank and China Trade Remedy Information website. FDI, Exchange rate, and Tech are calculated according to the relative data of *China Statistical Yearbook*. K/L comes from the data of *China Statistical Yearbook*. The capital stock data in K/L from 1952 to 2008 comes from Ye (2010). The data is predicted according to mobile average growth rate from 2009 to 2011.

Then, we apply the Grainger cause and effect test to determine the total amount of China's total export, ADI₁, and ADI₂. The test results are shown in Table 7.

Table 7
The results of Grainer cause and effect test of EX, ADI₁, ADI₂

Variable	Null hypothesis	F Statistic	P Statistic	Conclusion
EX	The Index for being targeted for anti-dumping investigation is not the cause of export value	0.9780	0.4127	The index of anti-dumping in either direction is the cause of export value.
ADI ₁ ADI ₂	The externally directed anti-dumping index is not the cause of export value	1.9293	0.2151	

The measurement results are explained in the following two aspects. (1) The changes in the intensity of anti-dumping cases a country is subject to and those it imposes on other countries affect changes in export value. These two variables form a causal relationship. (2) From the view of the t value of explanatory variables in the model, the interpretation of anti-dumping directed at a country on that country's export value is not obvious, while that for externally directed anti-dumping value is. From these results, we can see that the intensity of anti-dumping measures a country is subject to has had a positive relationship with export value while the intensity of externally directed anti-dumping has a negative relationship with export value, which means that the higher the intensity of the latter is, the less the export value is, the higher the intensity of the former is, and the more the export value will be. The reason may be explained by the following three factors.

First, since what the model measures is the effect of anti-dumping a country is subject to and imposes on other countries on export value, anti-dumping has occurred in some industries. Due to the great total value of export trade, the increasing or decreasing level of cases in any single industry will have no great effect on the total value. Second, from the perspective of industries, if the export of some commodities that have been targeted for anti-dumping measures decreases, then the domestic enterprises would take some measures to decrease the losses that anti-dumping measures may lead to. For example, they may further process and then export, or directly export, raw materials, which contributes to the positive correlation between the intensity of anti-dumping a country is subject to and export value. Finally, from the perspective of the positive effects of anti-dumping measures, if industries or commodities that are targeted for anti-dumping measures are those have no comparative advantages, then anti-dumping investigations will promote the industry's upgrading to some degree, and will move up the value chain from low-end to high-end products. The decreasing exports of some industries may lead to the increasing exports of industries with high added value. If the increasing amount is higher than the decreasing amount, then total exports will increase. Figure 4 reflects the changing trend of export growth rates of high-tech products and of the intensity of anti-dumping cases a country is subject to. In order to keep the figure clear, we divide the ADI index by 10. Table 8 is the result of applying the Grainger causality test of the ADI index and export growth rate of high technology products. From Figure 4, we can see that the changing trends of these two variables are basically the same, which indicates that the higher the intensity of anti-dumping sufferance is, the higher the export growth rate will be. Table 8 reflects that the intensity of anti-dumping a country is subject to is the cause of changing high technology products. This also verifies that the above causal analysis of positive correlation between the intensity of anti-dumping measures a country is subject to and that country's export value, which indicates that being targeted for anti-dumping measures can promote industrial upgrading and export of high added-value products, and thereby promotes the healthy development of China's export.

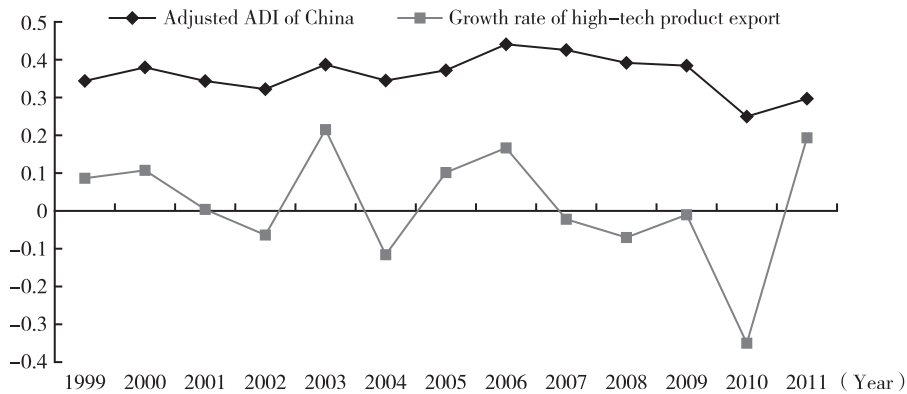


Figure 4. Changing trend of ADI of China and growth rate of high-tech product export

Source: Calculated according to relative data from WTO, World Bank, China Trade Remedy Information website and “Chinese Statistic Yearbook of High Technology Products”.

Table 8

Causal test of export growth rate of high technology products and intensity of anti-dumping measures being subject to

Variables	Null hypothesis	F Statistic	P Statistic	Conclusion
RATE ADI _t	The index of anti-dumping measures being subject to is not the cause of export growth rate of high technology products.	2.3375	0.1776	The index of anti-dumping measures being subject to is the cause of export growth rate of high technology products.

3.2. The impact of anti-dumping in either direction on products with different levels of technology

The export structure changes are embodied in the technological content of export products. This paper takes the scale economy, trade barrier, proportion of R&D spending, and the study effect into consideration to study the effect on comparative advantages of export products through the methods by Lall (2000).

On the basis of SITC 3 digit work, more than 200 products under the SITC classification from 0 to 9 are divided into five categories and 10 small categories.¹ This paper also calculates the RCA index² of low-technology products, middle-technology products, and high-technology products from 1996 to 2012. Figure 5 reflects the changing trend of products with different technological contents. We get the following conclusions: export products under the classifications of LT1, LT2, MT3, and HT1 have comparative advantages in the international market. The RCA indexes of low technology products (LT1) shows a declining trend while the RCA indexes of middle

¹ To see the specific classification, see Lall (2000).

² The RCA index reflects the dominant comparative advantage of a country's export products. The calculation formula is $RCA_{ij} = (X_{ij}/X_j) / (X_{iw}/X_{tw})$. Among them, X_{ij} represents the export value of products i in the country j . The subscript w represents the world's export. If RCA is less than 1, it indicates that this product has no dominant comparative advantage. If RCA is greater than 1, it indicates that this products has dominant comparative advantage. The higher the value of RCA, the stronger the comparative advantage.

and high technology products (MT3, HT1) show a rising trend. Moreover, the products of MT3 and HT1 are transferred from products without comparative advantage to the products with comparative advantages in 2005 and 1998. In addition, we can see from Figure 7 that the RCA in various kinds of products have significant changes from 2001 to 2002 and the RCA of various kinds of products have showed slight fluctuations since 2008.

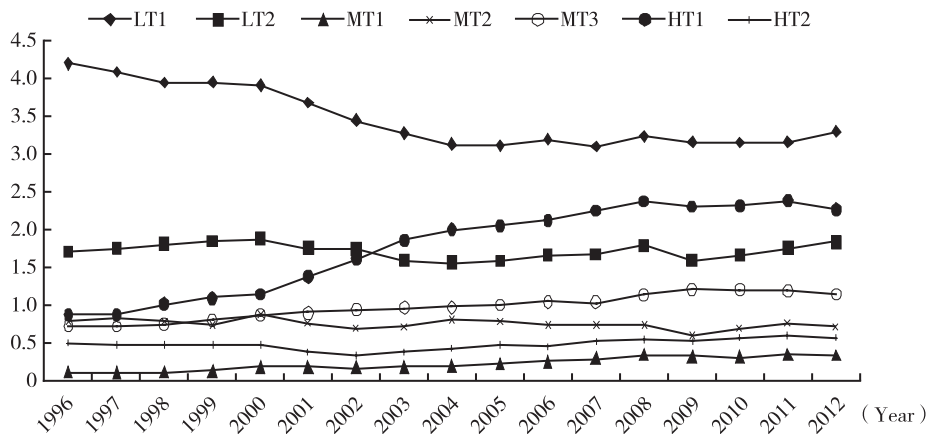


Figure 5. The changing trend of RCA in various kinds of products from 1996 to 2012

Source: Calculated according to relative data from the database of UNCOMTRADE.

3.2.1. The effect of anti-dumping measures targeting China on export structures

The anti-dumping measures China has been subject to are numerous, highly intensive, and widely distributed in various industries. It almost covers all industries in the Lall classification every year (See Figure 6). Industries that have the biggest proportion of anti-dumping sufferance are LT1, LT2, and MT3. According to the relative analysis, these three industries in China have comparative advantages. But the index of the RCA of LT1 shows a downward trend while MT3 shows an upward trend, which indicates anti-dumping sufferance in middle or low-technology industries can promote the upgrading of exports and promote the total technological level of exports. In 2009, the number of cases of anti-dumping sufferance in the HT2 classification reached their peak with 14 pieces and the RCA index of products decreased in the same year. Therefore, suffering anti-dumping in high-technology industries is not conducive to its development.

Here we introduce Lester's theory of protecting infant industries to explain the effects of anti-dumping measures a country is subject to and those it imposes on other countries for products with different technology contents. This theory holds that a country should protect an industry that is in the initial stage of development and has development potential through measures such as tariff relief and removal of other trade barriers. The time and degree of protection are not unlimited, however. For the industries that are in the stage of maturity and recession, a policy of free trade should be adopted, which will be conducive to achieving a market-based mechanism

of survival of fittest and industrial upgrading. As a common trade barrier and protection method, anti-dumping measures can be analyzed with the introduction of this theory. Foreign anti-dumping measures are means that a country can adopt to protect exports. Foreign countries can use anti-dumping measures to hinder export. From another point of view, anti-dumping can be regarded as the policy that foreign countries use to promote equal, free trade. According to the above theory, we can predict that carrying on externally directed anti-dumping measures in high-technology industries and being targeted for anti-dumping measures in low-technology industries can be conducive to the development of high-technology industries, help improve the comparative advantage of export products and promote the upgrading of industrial structures. Considering the above analyses' conclusions of RCA index and distributions of industries that anti-dumping sufferance and foreign anti-dumping measures belong to, we can analyze the effect of being subject to anti-dumping measures and imposing them on other countries on export trade structures.

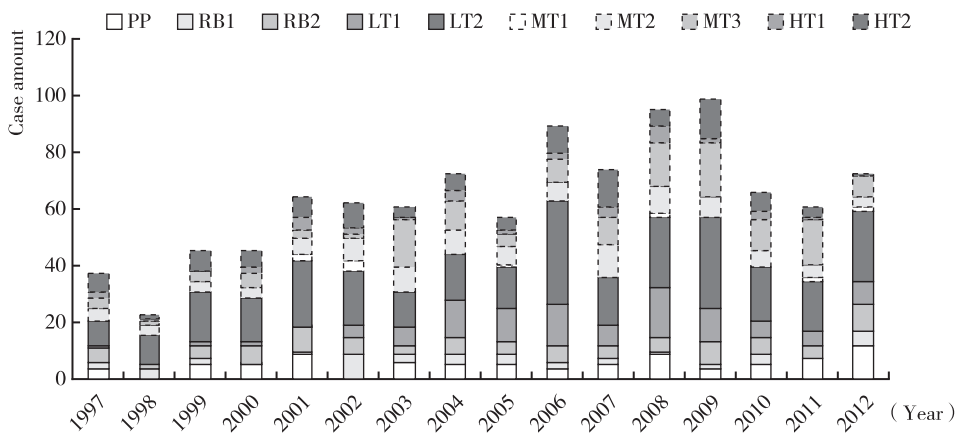


Figure 6. The distribution of industries that suffered anti-dumping from 1997 to 2012 in China

Source: According to relative data from the database of Bown.

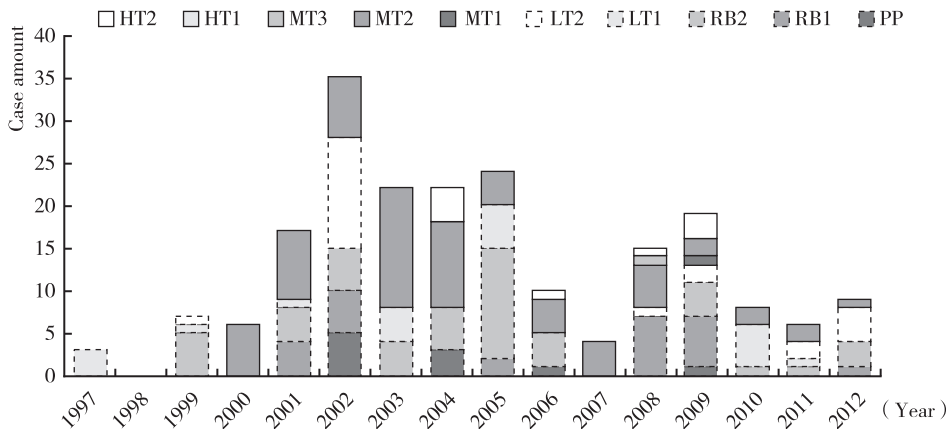


Figure 7. The distribution of industries that initiated anti-dumping measures from 1997 to 2012 in China

Source: According to relative data from the database of Bown.

3.2.2. The impact of anti-dumping measures initiated by China on export structure

From Figure 7, we can see that the anti-dumping investigations initiated by China are mainly distributed in the resource products (RB2) and middle-technology products (MT2). According to Figure 5 and Figure 7, externally directed anti-dumping investigations occurred in the classifications of LT1 in 1999, 2001, and 2005. However the index of the RCA in the classification of LT1 in recent years has decreased. In 2003 and 2004, the number of externally directed foreign anti-dumping cases in the classification of MT2 has been much higher, with 14 and 13, respectively. The index of RCA in the classification of MT2 in these two years has increased. In 2004, China began to initiate anti-dumping investigations in the high-technology industry HT2 and the RCA index over the same period has maintained a rising trend. This shows that launching anti-dumping in low-technology industries is not conducive to improving competitiveness of export products, while in high or middle-technology industries, it will be conducive to improving competitiveness. These two conclusions about the impact of anti-dumping measures in either direction on trade structure are consistent with Lester's theory of protecting infant industries.

4. Conclusions and policy recommendations

According to the comparative analysis of export effects of anti-dumping measures in either direction, we can see that from the perspective of total export value, the intensity of externally directed anti-dumping is negatively correlated with total export value, while the intensity of anti-dumping a country is subject to is positively correlated with total export value. From the perspective of export structure, initiating foreign anti-dumping investigations in the high-technology industries that are in their growing period and being targeted for anti-dumping investigations in the low-technology industries that are in recession periods are conducive to the optimization of export structures. Therefore, at the macro level, China should constantly improve the laws and regulations of anti-dumping and should pay more attention to industry selection when launching anti-dumping investigations. Protecting enterprise interests while taking industrial upgrading and trade structure optimization into consideration. At the same time, China should actively cope with the anti-dumping investigations initiated by other countries. At the micro level, enterprises should pay attention to the market trends and constantly adjust directions of investigation, improve production efficiency, and pay attention to the differences of production. Moreover, enterprises should make effort to improve their competitiveness and flexibility to actively respond to anti-dumping measures and reduce damage as much as possible.

References

- Bao, X. H. (2007). The trade remedy effect of anti-dumping policies. *Economic Research Journal(Jingji Yanjiu)*, 2, 71-84.
- Chad, P. B. (2008). The WTO and antidumping in developing countries. *Economics and Politics*, 20(2), 255-288.
- Hai, W., & Li, Q. L. (2011). The practical analysis of anti-dumping in China in ten years since China's accession into WTO. *International Business Research(Guoji Shangwu Yanjiu)*, 32(3), 37-44.
- Lall, S. (2000). The technological structure and performance of developing country manufactured exports, 1985-1998. *Oxford Development Studies*, 28(3), 337-369.
- Li, C. D. (2007). Reverse thinking: analysis of positive effects of China's foreign trade friction. *International Business(Guoji Shangwu)*, 3, 5-10.
- Li, C. D., Shi, X. J., & Fei, T. A. (2013). Production promotion effect of passive anti-dumping: evidence and interpretation. *Finance and Trade Economics(Caimao Jingji)*, 7, 68-78.
- Prusa, T. J. (2005). Anti-dumping: a growing problem in international trade. *The World Economy*, 28(5), 683-700.
- Qi, J. Y. (2006). Comparative analysis of the indexes for anti-dumping measures in either direction. *Finance and Trade Research(Caimao Yanjiu)*, 1, 37-41.
- Qi, J. Y. (2010). Symmetric comparative analysis of anti-dumping in China and India. *Finance and Trade Economics(Caimao Jingji)*, 5, 82-88.
- Shen, G. B. (2012). The dominant comparative advantage and trade effect of anti-dumping on China from USA. *World Economy(Shijie Jingji)*, 12, 62-82.
- Su, Z. D., Liu, L. Y., & Hong, Y. J. (2012). Can externally directed anti-dumping improve performance of Chinese enterprises? *Finance and Trade Economics(Caimao Jingji)*, 3, 68-75.
- Van LE, T. T., & TONG, S. Y. (2009). China and anti-dumping: regulations, practices and responses. *EAI Working Paper*, 149.
- Yin, X. S., & Li, C. D. (2007). The north-south asymmetry of international trade friction and the form of friction—based on the analysis of a 3-countries trade model. *Nankai Economic Studies(Nankai Jingji Yanjiu)*, 5, 53-66.
- Ye, Z. Y. (2010). Re-calculation of capital stock in China. *Statistics and Information Forum(Tongji Yu Xinxu Luntan)*, 7, 36-41.