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**Working Paper**

## Invisible Trade Barriers: Trade Effects of US Antidumping Actions Against the People's Republic of China

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## **ABSTRACT**

We conduct an empirical analysis on the impact of the United States (US) antidumping actions against the People's Republic of China (PRC) on the bilateral trade and US imports from other trade partners. Using the data set based on the Harmonized System (HS) tariff code, we examine the trade patterns of the PRC and other countries, and find evidence for the trade restriction effect and the trade diversion effect. Further, we examine the intensity and duration of both restriction and diversion effects. The antidumping measures have effectively raised the prices of imports from the PRC and reduced US imports from the PRC only in the short term. Nevertheless, due to the coexistence of trade diversion effects, the overall remedy effect of antidumping actions on domestic industries is considerably limited. In addition, we investigate other factors that influence the efficiency of antidumping measures, such as the antidumping duty amount, the PRC's market position in the US, and the US market share in the PRC.

**Keywords:** antidumping duty, trade diversion effect, trade restriction effect, the PRC

**JEL classification:** F12, F13, F14





## I. INTRODUCTION

In recent years, invisible trade barriers have been frequently implemented to protect specific industry in local economy among many countries. The World Trade Organization (WTO) imposes strict requirements to qualify for tariffs protection via escape clause and tariffs will be granted only if rising imports are the most important cause of injury to the domestic industry. This criterion is difficult enough to establish that escape clause protection is not used frequently.

Alternatively, firms can file for import protection under the “antidumping” provision of the WTO. Antidumping deals with cases where it is believed that a foreign firm is selling goods in the home (importing) market at either a lower price than in its own market, or if there is no foreign prices to observe, then at less than its average costs of production. The criterion for antidumping case is much easier to meet than that for the escape clause case and it does not require the additional approval of the president. WTO member countries gradually adopted nontariff barriers as new trade protection strategies. The withdrawn and settled cases result in a significant increase in market prices, with losses for consumers in usual cases. These barriers are not only effective, but much concealed. There are three different categories of invisible barriers: antidumping, technical barriers, and environmental barriers. Undoubtedly, antidumping is the most direct measure; therefore, it gets the most attention.

The trade friction between the People’s Republic of China (PRC)—the largest targeting economy of antidumping, and the United States (US)—one of the leaders in increasing antidumping activities, naturally draws our attention. The PRC has been subject to antidumping investigation initiated mainly by the European Union (EU), India, and the US. Important questions that are well worth in-depth analysis can be whether the antidumping actions of these countries had a significant effect on the PRC’s export and do they really have trade remedy effects on domestic industries?

The empirical research on antidumping other than the PRC’s case has mostly focused on the antidumping law in the eurozone and the US while the existing literature in connection with the PRC mainly focus on the antidumping cases filed by the PRC. In order to shed more light on the efficacy of antidumping law, we focus on the antidumping cases in the US petitioned against the PRC. Analysis of the impact from these cases on the bilateral international trade between the US and the PRC helps provide a credible basis on the effectiveness of the US antidumping policy and the various factors that affect the final results of antidumping.

We present the evidence of the trade restriction effects. However, the efficacy of an imposition of antidumping tariff is short-lived and feeble while it creates trade diversion effects. Additionally, it effectively raises the price of the product concerned, especially price of imports from the PRC. We also find that the level of antidumping duty, PRC’s market position in US market, and the importance of US market share in the PRC significantly affect the impact of antidumping measures.

## II. BACKGROUND AND LITERATURE REVIEW

### A. Dumping and Antidumping

In the history of the development of international trade, the ideal of free trade, based on the principles of efficiency and welfare maximization has never been achieved in the real world. Gomory and Baumol (2000) considered that, there is an inherent conflict of interest in international trade. They tried to explain the causes of trade friction from the perspective of the developing and changing of productivity. In the modern world economy, the increase of productivity in one country usually undermines other countries' overall welfare. International trade is not likely to promote the welfare of all trading nations, but rather cause the interest conflict among the trading partners.

Specifically, an industrial country will benefit from the process of general increase of productivity caused by the development of emerging industries in notably backward trading partners. This process may continue until its trading partner reaches a much more important position in the global market. Since then, the industrial development in the trading partner would be detrimental to the developed countries. In other words, the trade effects to both sides in the international trade are uncertain. After a turning point, the targets of effective competition and free trade may be realized at the expense of decreasing the total welfare in one country, rather than maximizing the welfare in both countries as the ideal was.

The trade policy in one country inevitably designs to protect its domestic industries. The wave of trade protectionism has never been dissipated in the past decades. However, the forms of trade protectionism are showing new development trends and characteristics. The means of trade protection are becoming more and more subtle and diversified. Tariff and nontariff trade barriers such as quotas, licenses, etc., are widely used in various countries.

Accordingly, the study on the validity and rationality of trade restrictions and protections has never stopped.

The trend of the new trade protectionism quickly spreads over the world and the scope of trade friction is increasing. In addition to the trade conflicts among developed countries, the trade frictions between developed and developing countries get more attention. This paper examines the increasingly frequent trade frictions between the US and PRC from the perspective of antidumping.

According to the Article VI of General Agreement on Tariffs and Trade (GATT), dumping is defined as

...by which products of one country are introduced into the commerce of another country at less than the normal value of the products, is to be condemned if it causes or threatens material injury to an established industry in the territory of a contracting party or materially retards the establishment of a domestic industry.

Based on the Antidumping Agreement made by the WTO, dumping should have three significant characteristics. Dumping should be the behavior of selling products at the price less than the normal value of these products. This behavior brings substantial harm or threat of substantial damage to the relevant industries in the importing countries. The low-cost sales and damage to the industries should have a causal relationship.

Antidumping refers to the measures taken by one country against dumping of products from foreign countries or regions in its domestic market. When a country's dumping brings harm to the industry and market of the importers, the importing country or region can initiate an investigation, impose antidumping duties if necessary, and adopt other measures to restrict the imports of relevant products. According to Article VI of GATT, the importing country can impose antidumping duty that not exceeds the dumping margin. This provision is the earliest antidumping agreement. Since then, several negotiations were held, such as Kennedy Round in 1967, the Tokyo Round in 1979, and the Uruguay Round in 1993. After in-depth discussion, they amended the antidumping agreement and added more details to the conditions of antidumping initiation, investigation procedures, and antidumping measures.

In the US, the Import Administration of International Trade Administration of Department of Commerce (DOC) and the International Trade Commission (ITC) are responsible for the investigation and determination of antidumping cases. The investigation procedures include: Petition Filed; Initiation of Investigation; ITC Preliminary Determination; DOC Send Questionnaire; DOC Preliminary Determination; DOC On-Site Verification; DOC Final Determination; ITC Final Determination; and Antidumping Order.

## **B. Overview of Antidumping against the PRC**

Since the first antidumping investigation on the PRC in 1979, due to PRC's rapid economic development and international trade growth the amount of antidumping investigations and measures against the PRC have substantially risen. Also, the proportion of antidumping cases against the PRC to the total number of antidumping cases in the world has increased each year.

From 1 Jan 1995 to 31 Dec 2011, 4,010 antidumping investigations were initiated globally, of which 2,601 cases were imposed antidumping measures. In these cases, investigations and measures against the PRC reached up to 853 and 630, respectively (Table 1). Their respective shares of the total number of global antidumping investigations and measures were 21% and 24%. Both the overall quantity and the annual volume of cases against the PRC are among the first in the world. In addition, other countries have strengthened their efforts on antidumping against the PRC and the number of antidumping investigations and measures against the PRC has substantially increased since 1998. As the PRC's export growth is expected to be sustained and stable, it will inevitably face more trade frictions in the future. About 74% of all the antidumping investigations against the PRC end with implementing measures, which is almost 10% higher than the world average.

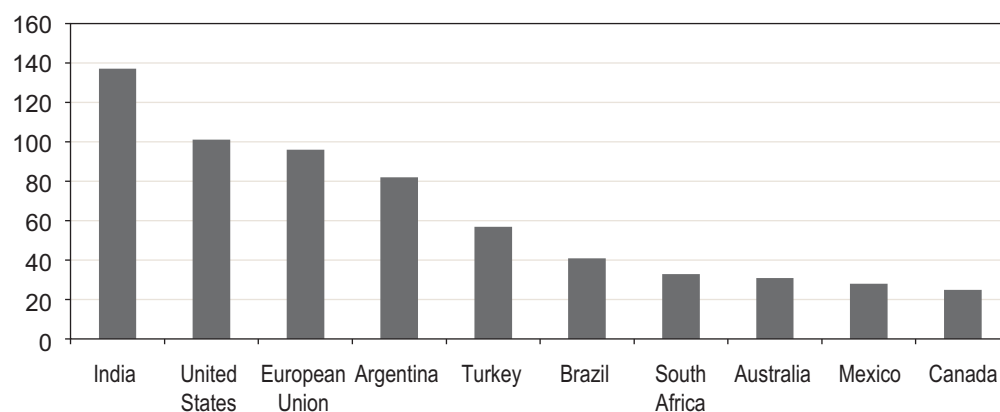
**Table 1: Descriptive Statistics of Antidumping Investigations and its Measures**

Year	Total Number of Global AD Investigations	Number of AD Investigations against the PRC	Percentage of the PRC (%)	Total Number of Global AD Measures	Number of AD Measures against the PRC	Percentage of the PRC (%)
1995	157	20	13	119	26	22
1996	226	43	19	92	16	17
1997	246	33	13	127	33	26
1998	266	28	11	181	24	13
1999	358	42	12	190	21	11
2000	298	44	15	237	30	13
2001	371	55	15	170	32	19
2002	315	51	16	218	36	17
2003	234	53	23	224	41	18
2004	220	49	22	154	44	29
2005	202	56	28	138	41	30
2006	203	72	35	140	38	27
2007	165	62	38	108	48	44
2008	213	76	36	139	53	38
2009	209	77	37	141	56	40
2010	171	43	25	123	53	43
2011	155	49	32	98	37	38
Total	4,010	853	21	2,601	630	24

AD = antidumping, PRC = People's Republic of China.

Source: WTO Trade Topics. [http://www.wto.org/english/tratop\\_e/adp\\_e/adp\\_e.htm](http://www.wto.org/english/tratop_e/adp_e/adp_e.htm)

Most antidumping cases against the PRC are distributed among several main importing countries/regions in the world (Figures 1 and 2). Over the past decade, India, the US, the EU, Argentina, and Turkey were the top five countries/regions that initiated most antidumping cases against the PRC. These five countries/regions had one thing in common, having close bilateral trade relationship with the PRC.

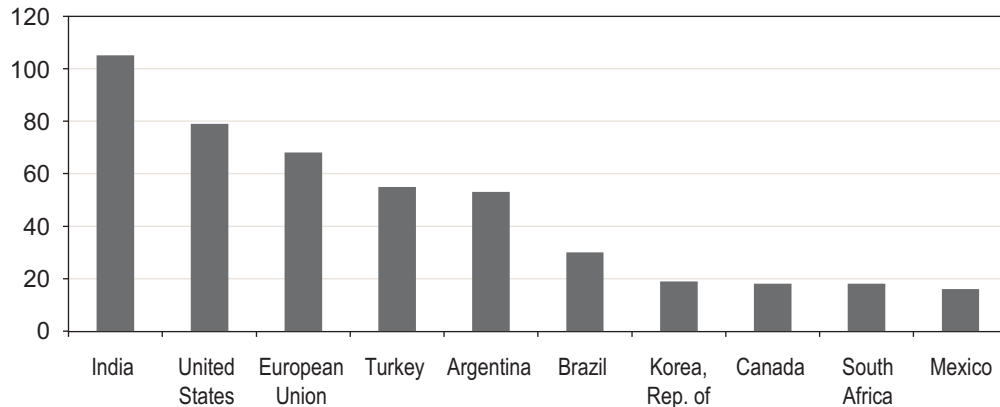
**Figure 1: Top 10 Countries/Regions that Initiated Most AD Investigations against the PRC\* (number of cases)**

AD = antidumping, PRC = People's Republic of China.

\* Based on the data published in WTO Website, from 1 Jan 1995 to 31 Dec 2011.

Source: [http://www.wto.org/english/tratop\\_e/adp\\_e/adp\\_e.htm](http://www.wto.org/english/tratop_e/adp_e/adp_e.htm)

**Figure 2: Top 10 Countries/Regions that Implemented Most AD Measures against the PRC\* (number of cases)**



Based on the data published in WTO Website, from 1 Jan 1995 to 31 Dec 2011.  
Source: [http://www.wto.org/english/tratop\\_e/adp\\_e/adp\\_e.htm](http://www.wto.org/english/tratop_e/adp_e/adp_e.htm)

The popularity of invisible trade barriers, in particular the antidumping laws, have spurred a large body of literature. In principle, the use of antidumping measures should be limited to instances of unfair foreign imports. However, James (2000) pointed out that although antidumping is legal according to the GATT (WTO) rules, it is a threat to the basic principles of reciprocity and nondiscrimination, to which we try to adhere for decades when building the multilateral trading system. Antidumping is the most important nontariff trade barrier and the intention of antidumping is to correct the unfair dumping practices (Zanardi 2004).

Nevertheless, it has been generally regarded as a success of new forms of protectionism, basically without any relationship with dumping. Aggarwal (2004) shared the view that antidumping is a protectionist tool and loses the contact with unfair trade practices of foreign companies. In the modern antidumping laws, antidumping is a form of protectionism which has been cleverly designed. It is also a major obstacle to free and fair trading relations (Prusa 2005). The US antidumping law was intended to prevent foreign companies selling goods at unfair prices in US market and ensure the fairness of competitions; notwithstanding, antidumping law becomes an excuse to shield some special interest groups at the expense of consumers and other businesses (Mankiw and Swagel 2005).

There are also some previous research focusing on the US antidumping barriers to trade and its development trends. The US has been a leader in reducing other forms of protection and, correspondingly, a leader in increasing antidumping activities. Due to the weakening of the standard definition of dumping, the US DOC always made affirmative decisions in antidumping cases (Blonigen and Bown 2003). Therefore, whether the antidumping measures implemented almost depended on the injury decisions made by the US ITC. The proportion of affirmative injury decisions made by the US ITC in all the cases showed an upward trend. It increased from 45% in the early 1980s to 60% in 2000 (Blonigen 2003). This change reflected the level of protection in the US against dumping was sharply increasing. Adjustment of the US antidumping laws after the Uruguay Round was considered as the reason why the number of antidumping investigations was increasing rapidly (Baldwin 2005). The Antidumping Law Amendment allowed US enterprises get import protection more easily through antidumping.

The PRC's WTO accession agreement contained a very strict antidumping and safeguard measures conditions. The PRC's trading partners can take advantage of these provisions and create a higher trade barrier, such as the use of nonmarket economy status in antidumping investigations against the PRC, the use of special transitional product-specific safeguard clause (Messerlin 2004). Jiang and Ellinger (2003) argue that antidumping laws are nonreciprocal for the PRC due to the following five reasons. The PRC's export subsidies exacerbated interprovincial price competition for overseas market share, which triggered a large number of antidumping investigations and the PRC is regarded as nonmarket economy and adopted Replacement Country System during investigations, which does not consider the inherent competitive advantage in the labor cost of PRC's products. The PRC's exporters lack defense capabilities and control abilities facing antidumping allegations, encouraging other countries to initiate more antidumping investigations against the PRC. The PRC's rapid growth of exports leads to the importing countries' defense. They tried to weaken the PRC's competitiveness of their products and protect local enterprises using antidumping strategy.

The trade friction between the PRC, the largest targeting economy of antidumping and the US, being the leader in increasing antidumping activity, has naturally drawn a lot of attention. White and Jones (2000) found that the US antidumping duties imposed heavy burdens to the bilateral trade between the PRC and the US. The US exaggerated the dumping margin of the PRC's exports (Mallon and Whalley 2004). Blonigen and Bown (2003) examined the US antidumping actions and found that it seldom initiated investigations against the main importers of US products or those who adopted antidumping measures actively. On the contrary, the less US products exported to one country and the weaker capacity it had to take retaliatory antidumping actions, more likely the country would be the target of the US antidumping actions. The asymmetry of the antidumping capacities of the US and the PRC might contribute to the huge amount of the US antidumping cases against the PRC.

In this field, most empirical studies have focused on the paths and the effects of antidumping. This paper focuses on the latter. The economic impacts brought by antidumping exist in many aspects such as the trade restriction effect, the trade diversion effect, and its impacts on the public interests. The trade restriction effect and the trade diversion effect have a direct impact on the effectiveness of antidumping policy. Therefore, it aroused widespread concern.

Straiger and Wolak (1994) conducted empirical research on the trade effects of antidumping and analyzed statistics in accordance with the SIC classification of the US antidumping cases from 1980 to 1985. They found significant "harassment effect" (investigation effect) and import diversion effect, i.e., antidumping investigations significantly reduced imports from the named countries. At the same time, they caused the increase of the similar products' imports from the non-named countries. However, since they only collected data for only 1 year after the petition was filed, long-term effects were ignored.

Krupp and Pollard (1996) also examined the effects of antidumping actions using monthly product-specific data from the U.S. Chemicals and Allied Products industry (TSUSA) level import data in the chemical industry between 1976 and 1988. Their analogous results showed that in approximately half the number of cases, antidumping investigation itself and the affirmative decision reduced the imports from named countries, while increasing the import from the non-named countries. However, they did not address the general issue of diversion since they used the disaggregated data for only a single industry.

Prusa (1996) also controlled the aggregation issue using the time series data from 1978 to 1993, which comprised of 109 rejected cases and 126 cases where duties were levied. He examined the trade effects for named countries imports, non-named countries imports, and overall imports in the 5 years after the petition was filed. He found evidence of investigation effects, trade restriction effects and trade diversion effects. Later, Prusa (2001) added the data of settled cases into his data set on the basis of the preliminary studies. Comparing the trade effects in three different categories, which were settled cases, affirmative cases and rejected cases, he found that in either settled cases or cases resulted in duties, the value of imports from named countries fell by 50%–70% over the first 3 years of protection, and, even if the case was rejected, the imports fell by 15%–20%.

Brenton (2001) used a similar least squares regression on 98 cases of the EU from 1989 to 1994. He also found significant trade restriction effects and trade diversion effects. However, Lasagni (2000) and Konings, Vandebussche, and Springael (2001) did not find any significant trade diversion effect using data of antidumping cases in the EU during a different period.

### III. IMPACT OF ANTIDUMPING DUTIES

#### A. Data Description

In order to examine the trade effects of antidumping cases, the information of antidumping cases were collected and time series trade data for each case were constructed. We set the year that the preliminary dumping decision was made as the base year  $t_0$ . We collected the information of all the antidumping cases of the US against the PRC that were preliminary judged between 1996 and 2008. The data on antidumping investigations include information about products, the countries involved in each case, the date of each investigation procedure, and outcomes including details on the structure of measures.

In order to construct the time series trade data, we acquired the Harmonized System (HS) product code for each antidumping investigation filed for 13 years. Time series for products involved in the antidumping cases were constructed from 1994 to 2011. To examine the trade effects in the next 3 years following the preliminary dumping decision, we need the trade data of 6 years for each case. We had a pool of 114 items involved in 62 cases. In the pool, seven cases (13 items) were not affirmative in the preliminary judgment and 55 cases (101 items) were affirmative and to be imposed preliminary antidumping measure, which was ad valorem duty.

#### B. Descriptive Statistical Analysis

Considering the trade volume in some antidumping cases amounts to hundreds of millions while in others the trade volume is only in a few million and even less, the diversity of antidumping cases complicates matters. Percentage changes of all variables relative to their value in the base year, representing the preliminary dumping decision was made are compared with percentage changes relative to their value in the year  $t_{-2}$  in order to find the trade effect of antidumping investigation, since the investigation always happened in the year before the preliminary dumping decision was made.

The trade effects of antidumping include the investigation effect, the trade restriction effect, and the trade diversion effect. If antidumping investigation and measure have significant

restrictive impact on the trade from the target country, the antidumping action becomes efficient. However, if trade diversion effect is confirmed, the effect of antidumping is weakened since the increase of imports from non-named countries offsets the decrease of imports from named countries. The overall effect is uncertain since the direction of the change of domestic products' market share depends on the total imports from both named (target) countries and non-named (non-target) countries.

In this passage, we divide cases into two categories, the high-duty cases and the low-duty cases. The high-duty cases refer to the cases that are subject to the preliminary antidumping duties greater than the median duty in the data set, and the low-duty cases less than or equal to the median. The line labeled "Duties Levied" shows the average level of all the cases that are subject to preliminary antidumping duties. The case for high duty will likely have more significant impact on trade restriction and diversion than the case for low duty. Taking into account the huge fluctuations of individual trade data seriously affect the validity of the average, in order to avoid the interference and see the overall trend clearly, we remove the outliers whose fluctuation range exceeds 200% comparing with the base year (year  $t_0$  or year  $t_2$ ) amount in the descriptive statistical analysis.

From the analysis based on the antidumping cases of the US against the PRC from 1994 to 2009, we can clearly see the trade restriction and diversion effects. Since the number of rejected cases is much smaller than the number of duty levied cases, we focus on the duty levied cases in our analysis.

### 1. Impact of Antidumping Duties

The application of antidumping law can deteriorate the terms of trade and cause a welfare loss for importing countries. Antidumping duties are endogenously determined since their applications will depend on the prices charged by the exporting firms. Exporting firms will have an incentive to raise their prices even if there is only a threat of antidumping duties being imposed, and to raise them even further if the duties are actually imposed. In order to understand the impact of antidumping duties, we follow the administration procedure of the laws.

In the first period, the DOC compares the free on board (FOB) price received by the foreign exporter ( $P_1/T$ ) with its own home price  $P^*$ , where  $P_1$  denotes the cost, insurance, freight (CIF) price and  $T$  is an iceberg transportation cost. If  $P_1/T < P^*$  then the DOC recommends duties in the second period of  $(1+\tau_2) = P^*/(P_1/T) > 1$ . The exporter has an incentive to raise the CIF price  $P_1$  to lower the antidumping duty  $\tau_2$ . An increase in  $P_1$  occurs before the duty has been imposed; therefore, the importing country does not collect any tariff revenue and this price increase amounts to the terms of trade loss for the importer. For the withdrawal cases, the US firms negotiate with the PRC exporting firms on the level of prices and market share. The withdrawal cases have about the same impact on reducing import quantity as do actual duties.

We consider a continuing investigation process, denoting that  $P_2$  is the antidumping duty inclusive import price. In the third period, the DOC review FOB price  $P_2/[T(1+\tau_2)]$  for the foreign exporter. If  $P_2/[T(1+\tau_2)] < P^*$ , then the antidumping duty to be imposed is



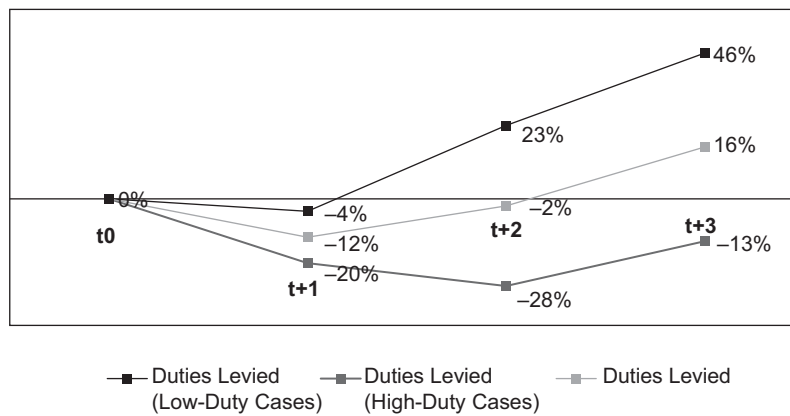
$(1 + \tau_3) = P^* / [P_2 / [T(1 + \tau_2)]] > 1$ , in which there is a built-in continuation of the antidumping duties, even if the foreign firm chooses  $P^* = P_2 / T$ . A charge of dumping can be avoided in the second period if and only if  $P_2 / [T(1 + \tau_2)] \geq P^*$ , or  $P_2 \geq P^* T(1 + \tau_2) > P_1(1 + \tau_2)$ . The foreign firm increases its second period price above what was charged in the first period and further increases  $P_2$  by the full amount of  $\tau_2$ . As we note from the following inequality  $P_2 / P_1 > (1 + \tau_2)$ , there will be more than complete antidumping tariff rate pass-through.

## 2. Trade Restriction Effects

Figures 3 and 4 present changes of quantity and value imported from the PRC to the US during the 3 years after the preliminary dumping decision was made. We find that the antidumping measures have immediate effects on both import quantity and value. Comparing with imports in the base year  $t_0$ , the imports from the PRC dropped markedly in the following year  $t_{+1}$ , in which the import quantity and value were reduced by 12% and 15% compared to the base year  $t_0$ , respectively. Nevertheless, the trade restriction effects are short-lived. The trade quantity and value exceeded their  $t_0$  level by the years  $t_{+3}$  and  $t_{+2}$ , respectively.

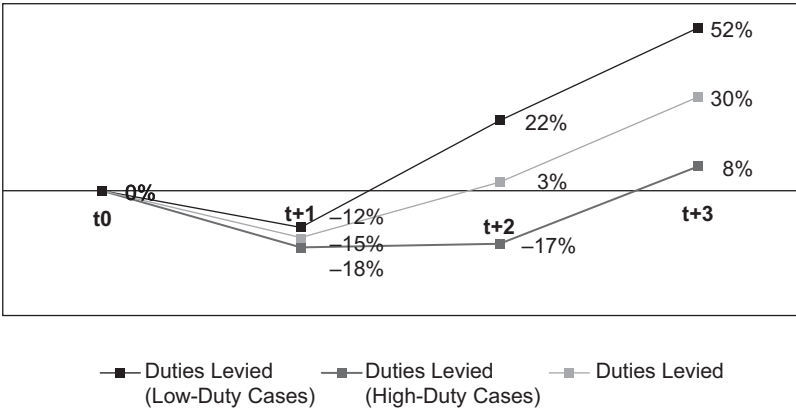
In particular, as expected, the amount of duty plays a key role in how restrictive an antidumping case is. Further, we compare those cases of duties greater than the median with those of duties smaller than the median. The restriction effect of antidumping measures for the cases with higher than the median is much more significant than for the cases with lower than the median, both on the quantity and value of trade. The duration of the restriction effect is extended for the cases of duties greater than the median.

**Figure 3: Quantity of US Imports from the PRC (3 years)**



PRC = People's Republic of China, US = United States.  
 Source: [http://www.wto.org/english/tratop\\_e/adp\\_e/adp\\_e.htm](http://www.wto.org/english/tratop_e/adp_e/adp_e.htm)

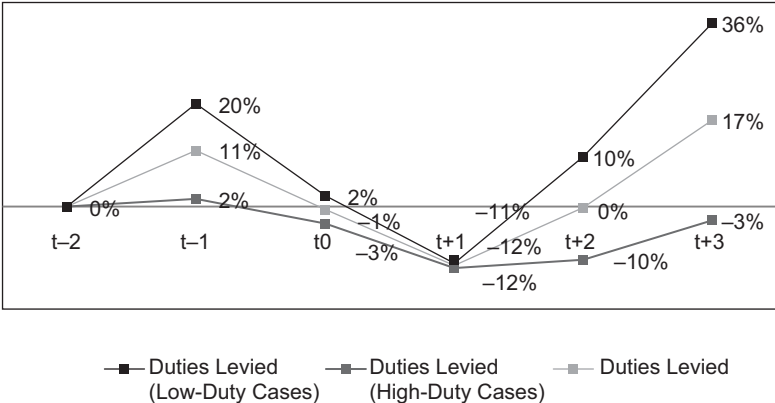
**Figure 4: Value of US Imports from the PRC (3 years)**



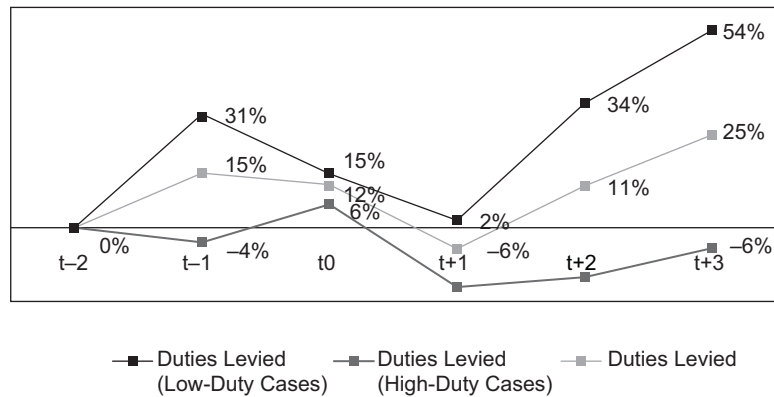
PRC = People’s Republic of China, US = United States.  
 Source: [http://www.wto.org/english/tratop\\_e/adp\\_e/adp\\_e.htm](http://www.wto.org/english/tratop_e/adp_e/adp_e.htm)

To examine the investigation and trade restriction effects, we plot the trade data of 2 years prior to and 3 years subsequent to preliminary decision was made into consideration. The antidumping investigations occur in the year  $t_{-1}$  and most filed cases are decided within 1 year except under unusual circumstances. Figures 5 and 6 present changes of quantity and value imported from the PRC to the US from  $t_{-2}$  to  $t_{+3}$ . Clearly, the year  $t_{-1}$  is a point of inflection. Since the year  $t_{-1}$ , the import quantity begins to turn down sharply. On the whole, the value of imports in duties levied cases also shows a decline after year  $t_{-1}$  and a further decline in the year  $t_{+1}$ , the year after antidumping measures imposed. The antidumping investigation itself has had some restriction effects on the related products. It is most apparent for high-duty cases, consistent with Straiger and Wolak (1994), and Prusa (1996). Since there is an expectation of antidumping duties, the exporters in the PRC may take the initiative to reduce their exports to the US and increase the price to avoid the punitive antidumping duties.

**Figure 5: Quantity of US Imports from the PRC (5 years)**



PRC = People’s Republic of China, US = United States.  
 Source: [http://www.wto.org/english/tratop\\_e/adp\\_e/adp\\_e.htm](http://www.wto.org/english/tratop_e/adp_e/adp_e.htm)

**Figure 6: Value of US Imports from the PRC (5 years)**

PRC = People's Republic of China, US = United States.  
 Source: [http://www.wto.org/english/tratop\\_e/adp\\_e/adp\\_e.htm](http://www.wto.org/english/tratop_e/adp_e/adp_e.htm)

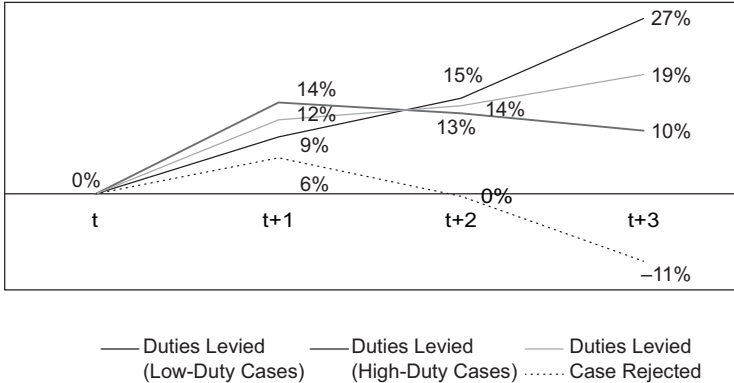
### 3. Trade Diversion Effects

Although the US antidumping actions restrict the imports from the PRC, they can lead to the increase of imports from other countries, which offset the trade remedy effects on domestic industries to a large extent. Krupp and Pollard (1996) and Prusa (1996) find the trade diversion effect that the non-named countries benefit from the antidumping actions against named countries, expanding their exports to the applicant state and increase their market share in the segment market. When duties are levied at  $t_{+1}$ , both the quantity and value of imports from other countries increase substantially while it is quite opposite when the case is rejected (Figures 7 and 8).

The overall growth trend of import value from other countries sustains until the year  $t_{-2}$ . Afterwards, the average value of imports flattens. This is opposite from the changes of imports from the PRC and consistent with the trade diversion effect theory. The restriction on imports from the PRC is gradually weakened over time. In the year  $t_{+3}$ , the value of imports from the PRC rebounds and exceeds the level of the year that preliminary decision was made followed by feeble trade diversion effects. The market share of other countries is no longer affected by the decrease of imports from the PRC and becomes stable, or even falls.

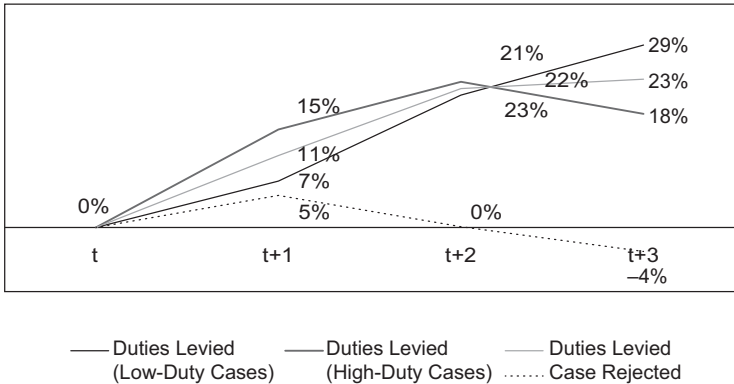
For the rejected cases, the value and quantity of imports begin to decline after a brief increase in the year  $t_{+1}$  and falls below the level in the base year  $t_0$ , due to the quick rebound and sustained growth of imports from the PRC. In addition, the diversion effect is stronger for high-duty cases than for low-duty cases. The imports in high-duty cases grow more significantly in the early years after duties imposed and decrease more substantially in the later year (Figures 7 and 8).

**Figure 7: Quantity of US Imports from Other Countries (3 years)**



US = United States.  
 Source: [http://www.wto.org/english/tratop\\_e/adp\\_e/adp\\_e.htm](http://www.wto.org/english/tratop_e/adp_e/adp_e.htm)

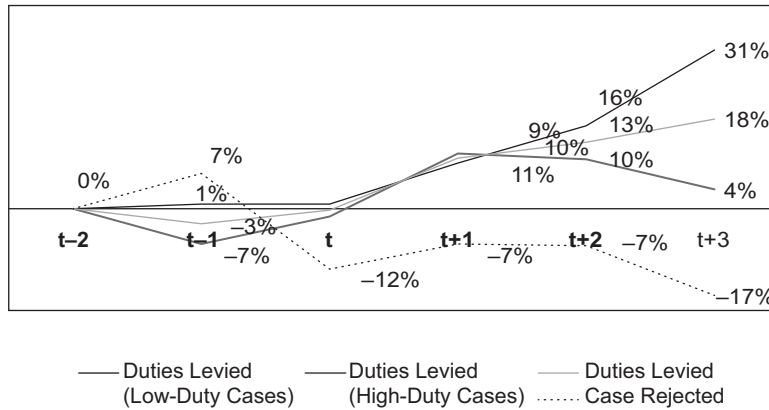
**Figure 8: Value of US Imports from Other Countries (3 years)**



US = United States.  
 Source: [http://www.wto.org/english/tratop\\_e/adp\\_e/adp\\_e.htm](http://www.wto.org/english/tratop_e/adp_e/adp_e.htm)

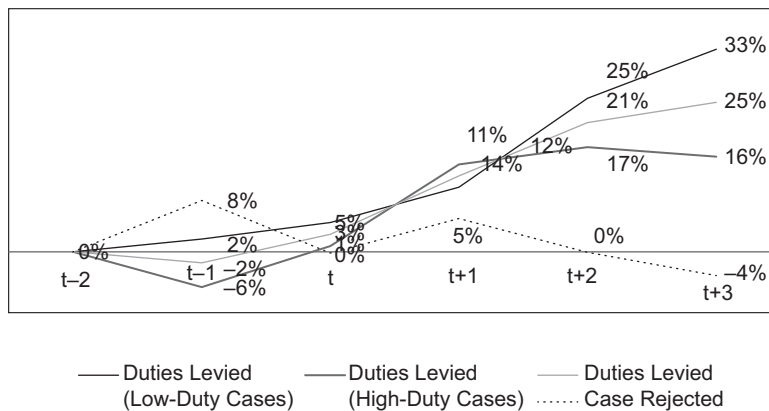
Similarly, the trade diversion effect has occurred even before duties are imposed. The imports from non-named countries in duties levied cases began to increase from the base year  $t_0$  (Figures 9 and 10). The imports in high-duty cases show a greater increase in the base year  $t_0$  comparing with that in low-duty cases. We can see the influence of investigation more clearly for the rejected cases. In the year  $t_{-1}$ , the investigation year, the quantity and value of imports from other countries in rejected cases have significant increases. However, in the year the antidumping measures are imposed, the imports fall back to the level in the year  $t_{-2}$ , or even less. After then, the import in rejected cases never exceeds that during investigations. The increase of imports in rejected cases in the year  $t_{-1}$  can be interpreted as the investigation itself has a certain impact on the trade diversion. The diversion effect during investigation period is much more substantial in the rejected cases, which is consistent with Prusa’s (1996) finding. It bears further study; however, there are not enough samples of rejected cases in our data set.

**Figure 9: Quantity of US Imports from Other Countries (5 years)**



US = United States.  
 Source: [http://www.wto.org/english/tratop\\_e/adp\\_e/adp\\_e.htm](http://www.wto.org/english/tratop_e/adp_e/adp_e.htm)

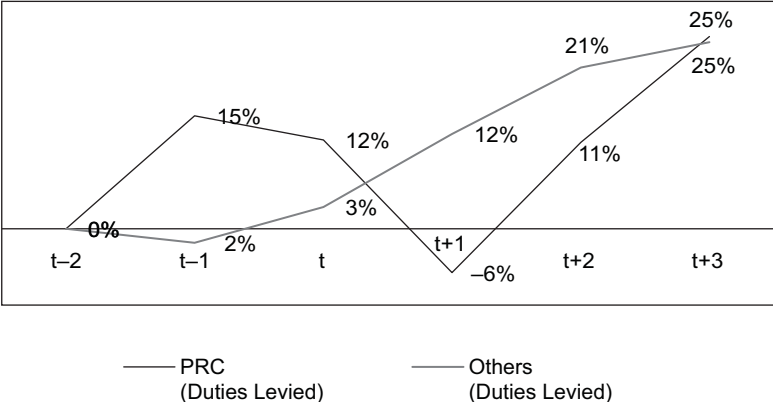
**Figure 10: Value of US Imports from Other Countries (5 years)**



US = United States.  
 Source: [http://www.wto.org/english/tratop\\_e/adp\\_e/adp\\_e.htm](http://www.wto.org/english/tratop_e/adp_e/adp_e.htm)

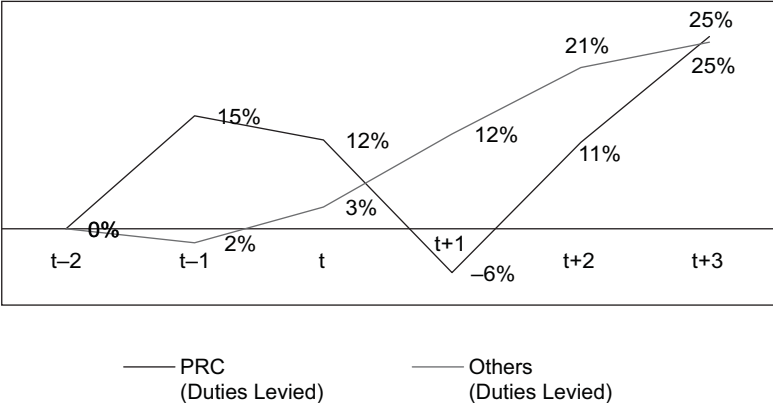
In order to better observe the trade diversion effect, we make comparison of imports from the PRC and other countries in duty levied cases (Figures 11 and 12). It is more perceivable in these figures that there is a negative correlation between imports from the PRC and imports from other countries during the investigation and the early days after duty levied. In the year the preliminary decision is made, there is a substantial decline in the US imports from the PRC, while the US imports from other countries are growing. The same happens in the year  $t_{+1}$ . From the year  $t_{+2}$ , the imports from the PRC rebound. Accordingly, the growth rate of imports from other countries begins to fall, a process of the disappearing of trade diversion effects along with the weakening of trade restriction effects.

**Figure 11: Quantity of Imports in Duty Levied Cases (PRC vs. other countries)**



PRC = People's Republic of China.  
 Source: [http://www.wto.org/english/tratop\\_e/adp\\_e/adp\\_e.htm](http://www.wto.org/english/tratop_e/adp_e/adp_e.htm)

**Figure 12: Value of Imports in Duty Levied Cases (PRC vs. other countries)**

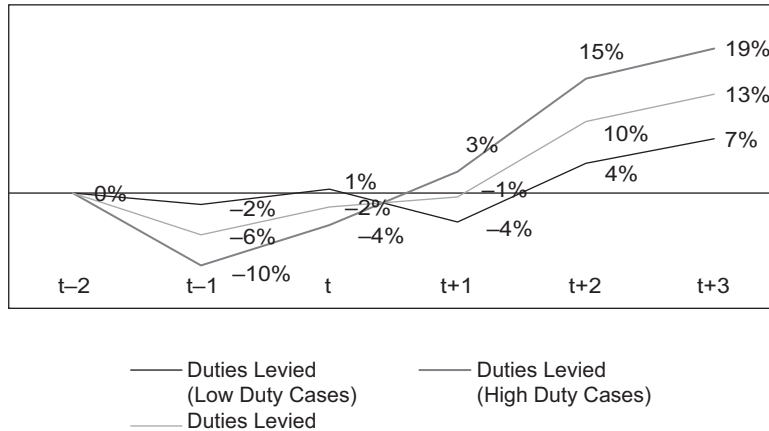


PRC = People's Republic of China.  
 Source: [http://www.wto.org/english/tratop\\_e/adp\\_e/adp\\_e.htm](http://www.wto.org/english/tratop_e/adp_e/adp_e.htm)

**4. Analysis of the Effects on Unit Value**

The application of an antidumping law can deteriorate the terms of trade for the importing nation, (i.e., the US). Would antidumping measures improve the prices of the PRC's products effectively? We investigate its effects on prices by examining the changes in unit value and the antidumping duty seems to improve the prices of the products concerned. Figure 13 depicts the effects of antidumping actions on unit values in duty levied cases. The overall unit value in duty levied cases is 10 percentage points higher than that in the year  $t_{-2}$ , one year before petition was filed. The higher the duty is levied, the larger the increase in unit value is.

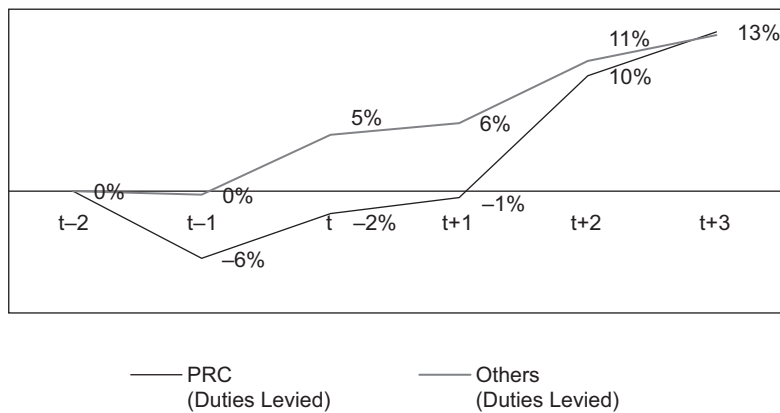
**Figure 13: Unit Value in Duty Levied Cases (PRC)**



PRC = People's Republic of China.  
 Source: [http://www.wto.org/english/tratop\\_e/adp\\_e/adp\\_e.htm](http://www.wto.org/english/tratop_e/adp_e/adp_e.htm)

In Figure 14, we compare the average price change of import from the PRC with that of import from non-named countries. Before the petition is filed, the unit value of the PRC's products declines, affected by the dumping actions while the unit value of non-named countries' products remains stable. However, from the year  $t_{-1}$ , when the petition was filed, the unit values of imports from both the PRC and non-named countries steadily rose. The antidumping actions have significant impact on the prices of imports. The adoption of antidumping duties rapidly improves the prices of the imports from the PRC. It also spurs price increases by other foreign rivals.

**Figure 14: Unit Value in Duty Levied Cases (PRC vs. other countries)**



PRC = People's Republic of China.  
 Source: [http://www.wto.org/english/tratop\\_e/adp\\_e/adp\\_e.htm](http://www.wto.org/english/tratop_e/adp_e/adp_e.htm)

#### IV. EMPIRICAL ESTIMATION RESULTS

##### A. Regression Models

Based on the model in Prusa's (1996) paper, we modify regression models.

$$\begin{aligned} \ln q_{i,t_j} = & \alpha + \beta_0 \ln q_{i,t_{j-1}} + \beta_1 \ln(q_{i,t_{j-1}} / q_{i,t_{j-2}}) + \beta_2 \text{Named}_i + \beta_3 \ln \text{Duty}_i + \beta_4 \text{WTO} \\ & + \beta_5 t_j + \beta_6 t_j * \text{Dec}_i + \beta_7 \text{ImPerc}_{i,t_j} + \beta_8 \text{ExPerc}_{i,t_j} + \varepsilon_{i,t_j}, j = 0, 1, 2, 3. \end{aligned} \quad (1)$$

$$\begin{aligned} \ln v_{i,t_j} = & \alpha + \beta_0 \ln v_{i,t_{j-1}} + \beta_1 \ln(v_{i,t_{j-1}} / v_{i,t_{j-2}}) + \beta_2 \text{Named}_i + \beta_3 \ln \text{Duty}_i + \beta_4 \text{WTO} \\ & + \beta_5 t_j + \beta_6 t_j * \text{Dec}_i + \beta_7 \text{ImPerc}_{i,t_j} + \beta_8 \text{ExPerc}_{i,t_j} + \varepsilon_{i,t_j}, j = 0, 1, 2, 3. \end{aligned} \quad (2)$$

The variables  $q_{i,t_j}$  and  $v_{i,t_j}$  are the quantity and value of import for product  $i$  in the antidumping case at time  $t_j$ , respectively, where  $t_0$  corresponds to the base year that the preliminary dumping decision was made, and  $t_1$  through  $t_3$  are the years following the outcome. The variable  $\text{Named}_i$  is a dummy variable (= 1 when three or more countries were named in the correspondent case and zero otherwise). Previous literature pointed out that the number of countries named might have an effect on the strength of trade diversion effects. The variable  $\text{Duty}_i$  denotes the size of the duty. We set  $\text{Duty}_i$  equal to 1 for the rejected cases. Considering the influence of the PRC's accession to WTO in 2001, we add a dummy variable,  $\text{WTO}$  (= 1 from year 2001), to capture the WTO membership effect. The variable  $\text{Dec}_i$  is the decision dummy variable (= 1 if duties were levied).

The variable  $\text{ImPerc}_{i,t_j}$  denotes the PRC's market share of product  $i$  in the US. The market share can be calculated by the import quantity (value) of product  $i$  from the PRC to the US divided by the import quantity (value) to the US from the world. The variable  $\text{ExPerc}_{i,t_j}$  is defined by the export quantity (value) of product  $i$  from the PRC to the US divided by the total export quantity (value) of product  $i$  from the PRC to the world, representing the importance of US market to the PRC.

It should be noted that, when we run regressions on different explained variables,  $q_{i,t_j}$  and  $v_{i,t_j}$  denote imports from different countries. For example, when we run a regression on the US imports from the PRC,  $q_{i,t_j}$  and  $v_{i,t_j}$  denote imports from the PRC. Likewise, when we do regression on the US imports from the other countries,  $q_{i,t_j}$  and  $v_{i,t_j}$  denote imports from the other countries.

The larger market share the PRC takes in the US market, the higher degree of the US dependence on import from the PRC. Even with antidumping duties and higher prices, the import from the PRC might not decrease sharply. The effects of antidumping measures will be weak for those products with large market shares. Similarly, if the US is one of the main trading partners of the PRC, the exporters in the PRC might not be able to switch from the US market to other countries' markets in a short term. Therefore, the larger  $\text{ExPerc}_{i,t_j}$  is, the weaker effect of antidumping measures would have.



## B. Estimation Results

### 1. US Imports from the PRC

The impacts of antidumping measures on imports from the PRC are shown in columns (1), (2), (7), and (8) in Table 2 and Table 3. The general trends depicted in the figures in the previous section also emerged from the regressions.

First, the antidumping duties have significant restriction effects on both the quantity and the value of imports. In all the four regressions, the coefficients of  $InDuty_i$  are negative and in columns (1), (7), and (8), the coefficients are significant at 5%. However, the trade restriction effect appears only in the first year after the preliminary decision was made, which is the year  $t_1$ , and then disappears after year  $t_2$ . Among all the three time dummies, only the partial regression coefficients of  $t_1$  are negative. After the second year, the imports from the PRC rebound significantly. Apparently, the impact of antidumping measures on trade between the PRC and the US is quite short lived. The cross effects are negative in year  $t_1$  and  $t_3$ . Especially, the cross effect in year  $t_3$  is large and significant, revealing that the decisions of imposing antidumping duties can enhance the restriction effects in the years following year  $t_0$ , especially in year  $t_3$ . The cross effect has a certain time lag.

Second, we can observe that although the trade has a certain continuity, there is a change of the trade trends in year  $t_0$ . The positive correlation between the imports in year  $t_0$  and that in year  $t_{-1}$  is high and significant. Meanwhile, the coefficients of  $\ln(q_{i,t_{j-1}}/q_{i,t_{j-2}})$  and  $\ln(v_{i,t_{j-1}}/v_{i,t_{j-2}})$  are negative and significant, implying that the trade has continuity. On the other hand, the trade trend has already changed in year  $t_0$ , which may be caused by the direct effects of antidumping measure or the antidumping investigation itself in year  $t_{-1}$ .

Third, the PRC's market share in the US market and the importance of the US as a trade partner would significantly affect the efficiency of antidumping measures imposed on the PRC. The coefficients of  $ImPerc_{i,t_j}$  and  $ExPerc_{i,t_j}$  are positive and significant, reflecting the larger market share the PRC takes in the US market, the weaker the restriction effects would be; the larger proportion the US takes in the PRC's overall exports, the weaker the restriction effects will be. It is reasonable from the market dependence and the trade diffusion effect points of view explained in the previous section.

### 2. US Imports from Other Countries/Overall Imports

The impacts of antidumping measures on imports from the other countries are shown in columns (5), (6), (11), and (12) in Tables 2 and 3. The results are consistent with our findings on trade diversion effects in the descriptive statistical analysis section.

First, the antidumping measures increase the quantity and the value of imports from other countries. The coefficients of  $InDuty_i$  in all the four regressions are positive. The one in the regression on import value is even significant. Moreover, the time effect dummies are all positive and in particular, the time effects in year  $t_1$  and  $t_2$  are significant while their coefficients are declining as time goes by. These findings provide evidence for the trade diversion effect.

There is trade diversion during the 3 years of our investigation and the effect is particularly strong in the first 2 years following year  $t_0$ . The impact is most substantial in year  $t_1$  and becomes weaker as time goes by. The cross-effects are positive too, presenting that the affirmative dumping decisions enhance the trade diversion effects in the following years.

Second, the imports from other countries in year  $t_0$  have significant positive correlation with that in the previous year. The partial regression coefficients of  $lnq_{i,t_{j-1}}$  and  $lnv_{i,t_{j-1}}$  are large and statistically significant at 1% level. On the one hand, this fact reflects that the trade has continuity while it suggests that the impact on US imports from other countries in the year that preliminary decision was made is limited.

Third, correspond to the impact of variable  $ImPerc_{i,t_j}$  on the trade restriction effect, the larger market share the PRC takes in the US market, the stronger the trade diversion effect is. However, the coefficients are small and that of  $ExPerc_{i,t_j}$  is even positive. It is not surprising taking into account that we used the trade data of all the exporters other than the PRC instead of the trade data of the non-named countries. Nevertheless, the coefficients are not significant; therefore, the direction of influence of  $ImPerc_{i,t_j}$  and  $ExPerc_{i,t_j}$  on the trade diversion effect cannot be identified in this case.

Finally, antidumping actions' impacts on US overall imports are small and insignificant. In regressions (3), (4), (9), and (10), the effects of  $Duty_i$  are small and insignificant and the signs of coefficients are mixed. Therefore, the effects of antidumping measures on US overall imports are not significant and the direction of influence is not certain because of the opposite impacts of the trade restriction effect and trade diversion effect. In summary, the US antidumping actions against the PRC cannot realize the protection of domestic enterprises.

Table 2: OLS Estimates of Quantity of US Imports

Variables	Imports from The PRC		Imports from World		Imports from Others	
	(1)	(2)	(3)	(4)	(5)	(6)
Ln(Quantity in $t_{j-1}$ )	0.857*** (0.0359)	0.920*** (0.0299)	1.005*** (0.0114)	0.999*** (0.0123)	0.995*** (0.00971)	0.993*** (0.00919)
% change in Quantity between $t_{j-1}$ and $t_{j-2}$	-0.142* (0.0796)	-0.157* (0.0856)	-0.0498 (0.0752)	-0.0389 (0.0741)	0.0208 (0.0592)	0.0198 (0.0593)
Number Named $\geq$ 3 (Dummy Variable)	-0.00551 (0.0368)	-0.0289 (0.0365)	-0.00377 (0.00895)	-0.00680 (0.00852)	-0.00294 (0.00846)	-0.00222 (0.00820)
Ln(Duty)	-0.131** (0.0598)	-0.0837 (0.0608)	-0.00701 (0.0163)	-0.00593 (0.0161)	0.0178 (0.0173)	0.0158 (0.0175)
WTO	0.0626 (0.108)	0.105 (0.113)	-0.0113 (0.0409)	0.00506 (0.0420)	-0.0412 (0.0384)	-0.0314 (0.0378)
Years Following P_Dump_Dec (Dummy Variables)						
t1	-0.202 (0.156)	-0.288* (0.170)	0.0513 (0.0525)	0.0496 (0.0543)	0.123*** (0.0458)	0.136*** (0.0454)
t2	0.109 (0.143)	0.0522 (0.153)	0.0888* (0.0520)	0.0885 (0.0540)	0.0589 (0.0479)	0.0731 (0.0489)
t3	0.338** (0.152)	0.326** (0.158)	0.0963* (0.0535)	0.0992* (0.0543)	0.0321 (0.0441)	0.0431 (0.0438)
Cross-effect: Years*Decision						
t1_dec	-0.252 (0.408)	0.0768 (0.411)	0.0142 (0.125)	0.0392 (0.124)	0.0652 (0.129)	0.0518 (0.129)
t2_dec	0.0487 (0.597)	0.403 (0.637)	0.0750 (0.123)	0.101 (0.124)	0.162 (0.123)	0.144 (0.124)
t3_dec	-1.036 (0.696)	-0.786 (0.738)	-0.137 (0.195)	-0.117 (0.194)	0.0140 (0.164)	-0.00159 (0.162)
ImPerc	1.776*** (0.375)		0.159* (0.0963)		-0.0721 (0.0693)	
ExPerc		0.185*** (0.0672)		0.0424*** (0.0120)		0.0490 (0.0145)
Constant	2.253*** (0.567)	1.504*** (0.519)	-0.119 (0.205)	0.00912 (0.220)	0.0240 (0.198)	0.0317 (0.186)
Observations	456	456	456	456	456	456
R-squared	0.821	0.806	0.963	0.963	0.972	0.972

OLS = ordinary least squares, PRC = People's Republic of China, US = United States, WTO = World Trade Organization.

Note: Robust standard errors in parentheses, \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Source: Authors' calculations.

**Table 3 : OLS Estimates of Value of US Imports**

Variables	Imports from The PRC		Imports from World		Imports from Others	
	(7)	(8)	(9)	(10)	(11)	(12)
Ln(Value in $t_{j-1}$ )	0.879*** (0.0358)	0.948*** (0.0281)	1.007*** (0.0114)	1.007*** (0.0112)	0.997*** (0.00942)	0.998*** (0.00916)
% $\Delta$ Value between $t_{j-1}$ and $t_{j-2}$	-0.0907 (0.0855)	-0.158* (0.0855)	-0.0256 (0.0778)	-0.0299 (0.0755)	0.0180 (0.0612)	0.00895 (0.0616)
Number Named $\geq$ 3 (Dummy Variable)	-0.0166 (0.0335)	-0.0410 (0.0344)	0.00389 (0.00769)	-0.00311 (0.00764)	0.00386 (0.00733)	-0.000426 (0.00734)
Ln(Duty)	-0.128** (0.0542)	-0.115** (0.0553)	0.0124 (0.0147)	0.00699 (0.0147)	0.0295* (0.0162)	0.0252 (0.0161)
WTO	0.142 (0.107)	0.0418 (0.114)	0.0243 (0.0386)	0.00267 (0.0397)	0.0110 (0.0360)	-0.00890 (0.0355)
Years Following P_Dump_Dec (Dummy Variables)						
t1	-0.206 (0.148)	-0.286* (0.156)	0.0465 (0.0418)	0.0452 (0.0431)	0.0952** (0.0391)	0.0984** (0.0394)
t2	0.248** (0.119)	0.197 (0.125)	0.107** (0.0419)	0.109** (0.0436)	0.0803** (0.0394)	0.0850** (0.0398)
t3	0.375*** (0.129)	0.396*** (0.140)	0.0612 (0.0464)	0.0776 (0.0472)	0.0117 (0.0393)	0.0233 (0.0389)
Cross-effect: Years*Decision						
t1_dec	-0.362 (0.367)	-0.0858 (0.364)	0.116 (0.113)	0.128 (0.112)	0.148 (0.117)	0.142 (0.118)
t2_dec	-0.0555 (0.558)	0.115 (0.544)	0.181 (0.141)	0.169 (0.141)	0.210 (0.142)	0.196 (0.147)
t3_dec	-1.070* (0.630)	-1.344** (0.680)	0.000654 (0.180)	-0.138 (0.184)	0.158 (0.149)	0.0326 (0.142)
ImPerc	1.838*** (0.415)		0.160 (0.103)		-0.0188 (0.0659)	
ExPerc		0.267** (0.114)		0.0468*** (0.0164)		0.0147 (0.0108)
Constant	2.045*** (0.597)	1.303** (0.523)	-0.255 (0.211)	-0.169 (0.214)	-0.0937 (0.200)	-0.0680 (0.196)
Observations	456	456	456	456	456	456
R-squared	0.852	0.846	0.971	0.972	0.975	0.976

OLS = ordinary least squares, PRC = People's Republic of China, US = United States, WTO = World Trade Organization.

Robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Source: Authors' calculations.

## V. CONCLUSION

In this paper, we present the evidence for the trade restriction effect and the trade diversion effect through the examination of the trade patterns of the PRC and the other countries. We find that during the antidumping investigations, the trends of the US imports from the PRC have already been affected, which is consistent with previous literatures on the investigation effect. After year  $t_0$ , the year that the preliminary decision was made, the imports from the PRC decrease sharply. However, the restriction effect is quite short lived. In addition, other countries benefit from the antidumping actions of the US against the PRC. Most of the protective effects of antidumping measures are offset by the increased imports from the countries other than the PRC. Overall, the impact of antidumping measures is insignificant on the total imports to the US. However, in another aspect, the antidumping measures do achieve some purpose: It effectively increases the prices of the products concerned, especially prices of imports from the PRC. In the other words, it is usually off-the-target from the policymakers and ends up raising the import prices which will negatively affect the consumers in the US.

Furthermore, some factors will significantly affect the impact of antidumping measures, such as the level of antidumping duty, the PRC's market position in US market, and the importance of the US market to the PRC. Higher duties lead to stronger trade restriction effects and diversion effects. The larger market share the PRC takes in the US market, the weaker the restriction effects will be. The larger proportion the US takes in the PRC's overall exports, the weaker the restriction effects will be.

In recent years, there has been an increase in antidumping cases against the PRC filed in the US. The fact leaves little doubt that US enterprises will continue to frequently use antidumping laws to reduce the fierce import competition from the PRC's exporters. The real effects of the US antidumping measures fall short of their expectations. The protection effect of antidumping actions is quite limited. For the PRC, the results suggest that increasing the market share the PRC takes and enhancing the PRC's market position in the US by legal means is a way to weaken the impacts of US antidumping measures against the PRC.

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## **Invisible Trade Barriers: Trade Effects of US Antidumping Actions Against the People's Republic of China**

This paper empirically examines the trade restriction and diversion effects of United States (US) antidumping actions against imports from the People's Republic of China (PRC). The results show that the antidumping measures raised the prices of imports from the PRC and reduced US imports from the PRC only in the short term. Overall, the evidence suggests that antidumping actions fail to protect US domestic industries but harm US consumers via higher import prices.

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