

## **Is China's Antidumping More Retaliatory than that of the US?**

*Xiaohua Bao and Larry D. Qiu\**

### **Abstract**

Antidumping (AD) investigations are widespread. China and the US are two big users and targets of AD investigations. They, respectively, represent developing and developed countries on one hand, and new AD users and traditional AD users on the other. In this paper, using AD filing data of these two countries from 1991 to 2005, we explore whether China's AD is more retaliatory than that of the US. Our results obtained from negative binomial models with maximum likelihood techniques show that although both countries have some degree of retaliatory incentives in their AD filings, China is not more (or may even be less) retaliatory than the US. We also compare the two countries' similarities and differences in their AD responses to other factors such as macroeconomic conditions, contagions, and geographical distance.

### **1. Introduction**

Antidumping (AD) investigations have been growing rapidly since the inception of the WTO. According to the WTO Report (2007), from 1995 to 2005, there were 42 countries that launched a total number of 3044 AD investigations against 98 countries.<sup>1</sup> AD filings/investigations have two main features.<sup>2</sup> First, the pattern of AD users has changed significantly. Developing countries accounted for only about 20% of the total AD filing cases in the early 1990s, but since 1995 they have initiated over half of the total number of AD investigations. China, together with Argentina, Brazil, and India, are the heaviest AD users from developing countries. Today, AD is not only a major trade issue between the North and the South, but also a serious problem within the South. Second, there exists a severe asymmetry for a country as a plaintiff and as a defendant (see Figure 1). For example, China remains the most frequent target of AD investigations. During the period 1995–2006, China was subject to 536 (the largest number) AD investigations while it launched 133 AD investigations. During the same period, the US faced 175 AD investigations and initiated 373 AD investigations. India was the heaviest AD user in the world, having 457 AD investigations.

Given the above observations, an interesting question arises: Do countries have different AD motivations and therefore produce the observed dynamics and asymmetries? Our paper aims to provide an answer to this question by comparing China and the US.

---

\* Bao: Shanghai University of Finance and Economics, Shanghai, China, 200433. Tel: (86)136-4188-0727; E-mail: xiaohuabao77@163.com. Qiu: School of Economics and Finance, The University of Hong Kong, Hong Kong. Tel: (852)2859-1043; Fax: (852)2546-7820; E-mail: larryqiu@hku.hk. We are grateful to Jim Brander, Bo Chen, Keith Head, Mike Moore, Tom Prusa, John Ries, Barbara Spencer, and two anonymous referees for their helpful comments. We also benefit from presentation in Sauder School (UBC), at the 2008 Canadian Economic Association Meeting (Vancouver), at the 2008 Asia-Pacific Trade Seminars (Sydney), and at the 2009 Chinese Economist Society Meeting (Macao). This project receives financial support from RGC, Hong Kong SAR Government (HKU643108H), Social Science Foundation of China (08CJY029), Natural Science Foundation of China (70703021), and Shanghai Education Committee (08SG35).

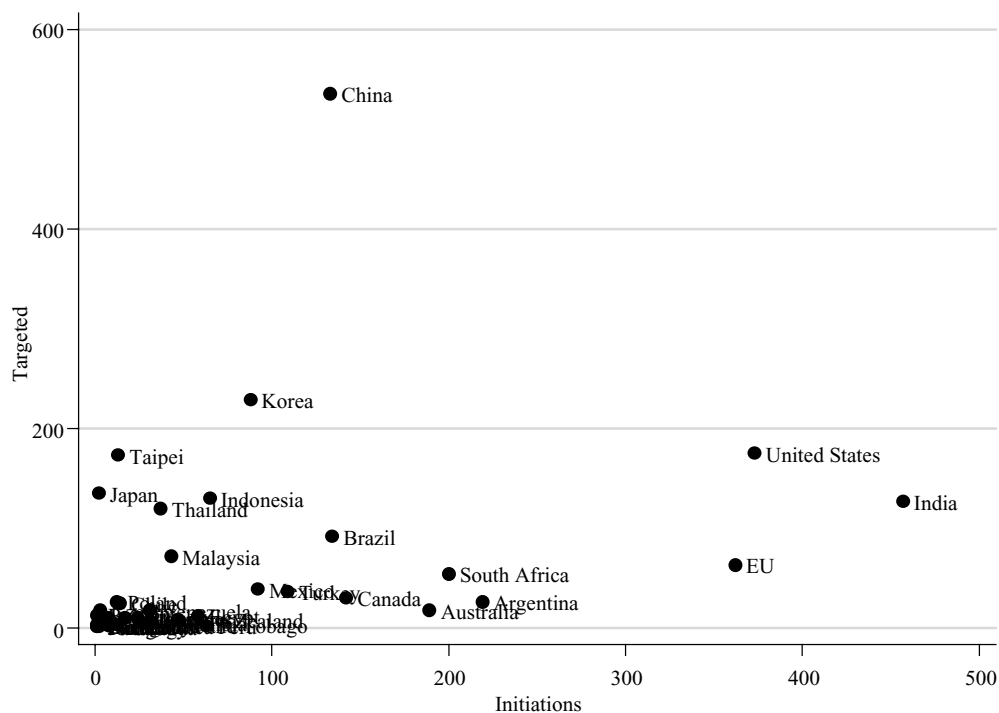


Figure 1. Asymmetry for a Country as a Plaintiff and as a Defendant

What factors determine a country's use of AD investigations? It is commonly believed that the widespread and rapid increase in the use of AD measures, including AD filings and positive AD decisions, is a result of the WTO. First, AD measures are used by importing countries to substitute tariffs that have been reduced continuously during various rounds of GATT/WTO negotiations (Deardorff and Stern, 2005; Feinberg and Reynolds, 2007). For this reason, AD is regarded as one of the most important protectionism measures nowadays. Second, AD measures are used by countries as a safety-valve because the WTO does not provide sufficient mechanisms to safeguard domestic import competing-industries (Moore and Zanardi, 2009). Third, AD is abused by many countries because the WTO does not have strong control on the use of AD measures (Hansen and Prusa, 1995). For whatever reasons, the increased use of AD investigations and AD duties has already had serious impacts on global trade flows.

The literature on AD is vast. Blonigen and Prusa (2003) have provided a useful review of this literature. We here discuss the studies most related to our paper. The key question asked in those studies is what factors affect a country's AD filings and AD decisions. They can be divided into two categories: macroeconomic factors and retaliatory factors.

The macroeconomic determinants that have been used in various studies include real GDP growth of the importing country, the import penetration ratio (i.e. import to GDP ratio) in the importing country, and real exchange rate between the importing and exporting countries' currencies.<sup>3</sup> Using AD filing data from four countries' (Australia, Canada, EU, and the US) data during the period 1980–98, Knetter and Prusa (2003) find that slower GDP growth in the importing countries results in more AD filings from those countries.<sup>4</sup> They also find that the importing country's currency appreciation

leads to more AD filings and approval.<sup>5</sup> Using the Tobit model to analyze the US AD petitions, together with countervailing duty petitions, against Brazil, Japan, Korea, and Mexico from 1982 to 1987, Feinberg (1989) finds that both slower GDP growth in the US and the US dollar depreciation are accompanied by increased AD cases from the US. However, it is observed that some of the results are sensitive to the models. Using the binomial model, Feinberg (2003) finds that the result with regard to exchange rate is reversed.<sup>6</sup> Sadni-Jallab et al. (2005) add the import penetration ratio to a set of macroeconomic variables to test their impacts on AD filings. Using the data from the EU and the US, they find that in both regions the effect of import penetration on AD is generally not statistically significant, but an appreciation of the real exchange rate has a positive and significant impact on AD filings. GDP changes have an impact on AD filings only in the US.<sup>7</sup> However, it is found by others (e.g. Blonigen, 2005; Deardorff and Stern, 2005) that an increase in the import penetration ratio has positive and statistically significant impacts on AD filings.

Some retaliatory factors have also been considered in the empirical AD literature. Based on AD cases filed by all GATT/WTO members from 1980 to 1998, Prusa and Skeath (2002, 2004) observe that an AD club exists in the sense that most AD cases are against those countries which have used AD before, or most AD users are also AD targets. By running regressions for the traditional AD users and new AD users, respectively, they find that there are significant tit-for-tat retaliation motives for the traditional users' AD, but the motives for the new users are just the opposite. Both traditional and new users have more AD against AD club members than nonclub members. Using the US data on both AD filings and affirmative AD decisions, Blonigen and Bown (2003) find that the existence of AD laws in other countries helps discourage the US to use AD against the other countries, because those countries would be able to use AD to retaliate the US action. They also find that the WTO dispute settlement mechanism helps reduce the number of positive decisions on AD in the US. Niels and Francois (2006) find that among the AD filings in Mexico, the probability of getting AD duty imposed is three times higher for the filings towards those countries which have used AD against Mexico before than for the other filings. This clearly indicates the retaliation motives in the Mexican government's AD decisions. Feinberg and Reynolds (2006) use industry-level (20 HS categories) data to study AD retaliation by 40 importing countries against 72 exporting countries. Their study finds the existence of retaliation motives not only at the country level, but also at the industry level.

While our paper will examine the above factors in affecting AD in China and the US, we are particularly interested in knowing whether or not China's AD investigation is more retaliatory than the US. China promulgated its AD law in 1997. In Article 56, it states, "Where any country (region) takes discriminative anti-dumping measures on the products exported from the People's Republic of China, the People's Republic of China may, upon the actual circumstances, take corresponding measures against the country (region)." Although we are not experts to make any judgment on the legal base of this statement, everyone can clearly see retaliatory elements in China's AD law. This makes China special since, to the best of our knowledge, there is no other country's AD law making such a clear retaliation message. It is this observation, together with the heavy involvement of China as an AD user and target, which motivates us to ask: Is China more retaliatory than other countries? Such a kind of question has never been investigated in the literature. Since China and the US are two big users and targets of AD investigations, in this paper, we use AD filing data of these two countries from 1991 to 2005 to explore whether China's AD is more retaliatory than that of the US. Our results obtained from negative binomial models with maximum likelihood techniques

show that although both countries have some degree of retaliatory incentives in their AD filings, China is not more (or may even be less) retaliatory than the US. We also compare the two countries' similarities and differences in their AD responses to other factors such as macroeconomic conditions, contagions, and geographic distance.

Our paper has a number of features distinguishing itself from those in the literature. First, we include a more comprehensive set of explanatory variables to test AD filings. Note that the most comprehensive set of variables in the literature is used by Feinberg and Reynolds (2006). Their retaliation variables include club, deter and trade deflection effects, and their macroeconomic variables include import and exchange rates. In addition to those in Feinberg and Reynolds (2006), our study also includes growth rate of real GDP as a macroeconomic variable and a number of other control variables including geographical distance between the AD targets and users. The effects of those additional variables are found to be statistically significant. Second, we introduce some important control variables in our regression model so as to isolate the pure effect of retaliation. In particular, we try to disentangle the retaliation effect from the contagion effect and learning effect, which are often included in the retaliation effect by most studies in the literature.<sup>8</sup> Third, we compare AD filing behavior in China and the US. Existing studies either focus on AD filings and decisions from developed countries or developing countries.<sup>9</sup> In contrast, our study allows us to see whether AD filings are statistically different between developed and developing countries, and between traditional users and new users. We find that the two countries' AD filings are similar in some aspects and different in some others.

## 2. Model and Data

### *The Model*

Following our discussion of the related literature in the preceding section, we propose the following basic regression model:

$$AD_{ijt} = \alpha_0 + \alpha' \cdot e + \beta' \cdot r + \gamma' \cdot x + \varepsilon, \quad (1)$$

where the dependent variable  $AD_{ijt}$  is the total number of AD filings made by country  $i$  against the imports from country  $j$  in year  $t$ ,  $e$  a vector of macroeconomic variables,  $r$  a vector of retaliation variables, and  $x$  a vector of other control variables. The regression coefficients include  $\alpha_0$  (scale, constant) and vectors  $\alpha$ ,  $\beta$ , and  $\gamma$ . The last term,  $\varepsilon$ , is the error term.

Since the dependent variable, i.e. the number of AD filings, is a typical nonnegative count variable, following the standard practice, we use negative binomial models with the maximum likelihood techniques to analyze AD filings.<sup>10</sup> We have classified the explanatory variables into three groups: macroeconomic variables, retaliatory variables, and other control variables. Some of these variables have been considered by existing studies while others are new to the literature. We discuss their possible effects on AD filings below.

### **Macroeconomic Variables: Vector $e$**

$grgdp_{it}$ : (Importing) country  $i$ 's real GDP growth rate in year  $t$ . When a country's economy slows down, domestic firms are more likely to turn to protectionist measures in order to fight for market shares and sales. In addition, as the domestic firms' profitability goes down, it becomes easier for the importing country to prove an injury

when the domestic firms file for AD protection.<sup>11</sup> These incentives tend to suggest that a decrease in the importing country's real GDP growth may cause an increase in its AD filings.

*rex<sub>ij</sub>*: The change of real average rate between country *i*'s currency and country *j*'s currency in year *t*, measuring country *i*'s real currency appreciation against country *j* (real). The appreciation of a country's currency weakens the domestic firms' competitiveness against imports. Similar to the GDP slowdown situation, the domestic firms are more likely to seek for protection and it is easier to prove an injury. However, domestic currency appreciation makes it more difficult to show imports below fair value because production costs are calculated based on the weaker currency of the exporting country. Therefore, the net effect of currency fluctuation on AD filings is ambiguous, in theory.

*rimp<sub>ij</sub>*: The ratio of country *i*'s imports from country *j* in country *i*'s GDP in year *t*. This is also called the import penetration ratio. Holding GDP constant, the higher is the penetration ratio, the more intensified competition comes from country *j*. Holding country *i*'s total import constant, the penetration ratio also reflects the relative degree of competition from country *j*. Increased competition from country *j* induces the domestic firms to seek for protection against imports from country *j*. Hence, we expect that the penetration ratio would result in more AD filings against the corresponding countries.

#### Retaliatory Variables: Vector *r*

*tit-for-tat<sub>ij(t-1)</sub>*: A dummy variable, equal to one if country *j* has AD filing against country *i* in year *t-1*, and zero otherwise. This variable is used to capture the "tit-for-tat" retaliation effect found by Prusa and Skeath (2004).<sup>12</sup>

*ad\_club<sub>j(t-1)</sub>*: The total number of AD filings made by country *j* (against all countries) in year *t-1*. A large value of this variable indicates that country *j* is a heavy user of AD filings. It has two conflicting effects on country *i*'s AD filings. On the one hand, facing a heavier AD user, country *i* may use fewer AD filings for fear of retaliation (Feinberg and Reynolds, 2006). On the other hand, a large value of the variable means that country *j* is a member in the "antidumping club" and so country *i* is more likely to use AD filings against country *j*, as suggested by the "antidumping club" effect found by Prusa and Skeath (2004).

*general\_retaliation<sub>i(t-1)</sub>*: The total number of AD filings initiated by all other countries against country *i* in year *t-1*. This variable captures a general level of retaliation, as opposed to the target-specific retaliation variable *tit-for-tat<sub>ij(t-1)</sub>*. It means that country *i* would initiate more AD filings if in the previous year it was a heavy target by other countries.

*deter<sub>ij(t-1)</sub>* = *ad\_club<sub>j(t-1)</sub>* \* *dep<sub>ij(t-1)</sub>*; *deter* is the interaction term between *ad\_club* and *dep*, where *dep<sub>ij(t-1)</sub>* is the share of country *i*'s exports to country *j* in country *i*'s total exports in year *t-1*. At the country level, if country *i*'s share of export to country *j* is very large, country *i* is more concerned about those exports. Anticipating that it might get retaliation from country *j* (next year) if it imposes AD duties on imports from country *j* this year, country *i* is more reluctant to use AD against imports from country *j*. The interaction term captures the effects of both dependence and the "antidumping club." That is, a country is less likely to initiate AD filings against another country, if the latter's market is an important export market for the former and the latter is a heavy user of AD policy. For this reason, we would expect this variable to have a negative coefficient.

**Other Control Variables: Vector  $x$** 

*deflection<sub>ij(t-1)</sub>*: The total number of AD filings against country  $j$ 's exports by all countries other than country  $i$  in year  $t-1$ . This can be considered as the "deflection" effect. Cases filed against one country (country  $j$ ) may divert its trade flows elsewhere, leading to more import protection including AD filings being sought by third countries (country  $i$ ). Bown and Crowley (2006) find this trade deflection effect by examining the effects of the US AD actions against Japan on Japanese exports to the US and Europe. They find when Japanese exports to the US are reduced, they are deflected to Europe, resulting in increased quantities and reduced prices of Japanese goods in the European market, which might lead to the EU's AD filings against Japan. So the coefficient is expected to be positive.

*echoing<sub>ij</sub>*: The total number of AD filings against country  $j$ 's exports by all countries other than country  $i$  in year  $t$ . This can be considered as the "echoing" effect.<sup>13</sup> Suppose the EU (a third country) initiates an AD filing against China (country  $j$ ). Then, firms in the US (country  $i$ ) become aware of Chinese dumping or they believe the chance to get affirmative decisions from their government is increased. Therefore, the American firms also file an AD complaint against China. This behavior may be strategic, but it may also be because of information transmission, from the EU to the US in the above example. It is important to note that even if Chinese dumping occurs in the EU market, it does not necessarily occur in the US market. Nevertheless, the "third country" effect captures the possible AD chain effect and the corresponding coefficient is expected to be positive.

*diversion<sub>ij(t-1)</sub>*: The total number of AD filings imposed by country  $i$  against all countries other than  $j$  in year  $t-1$ . Apart from the trade deflection effects (i.e. increasing exports from countries imposing AD to the yet unprotected markets), there is still a possibility of increased exports to protected markets by unrestricted countries, which can be considered as the trade "diversion" effect. Bown and Crowley (2006) find the evidence of increased Japanese exports to the US when competing exports are restricted by the US AD. The increased Japanese exports then may invoke the US AD against Japan. This is another way in which AD spreads through a different type of contagion. The coefficient is expected to be positive. The empirical literature has ignored this diversion effect in examining the causes of AD actions, but it is important to distinguish it from the often asserted retaliation effects because there is no retaliatory motive associated with it.

*learning<sub>ij(t-1)</sub>*: The total number of AD filings made by country  $i$  against country  $j$ 's exports (to country  $i$ ) in year  $t-1$ . This can be considered as learning effects. Prior AD experience leads to more filing activities and greater likelihood of affirmative decisions. The study on firm learning and AD process by Blonigen (2006) finds strong evidence that at least some US firms become more effective at "working the system." In his view this indicates that firm learning leads to lower costs of filing and therefore willingness to file cases with low expected payoffs. We use the one-year lagged value of the dependent variable to capture the learning effect and the coefficient is expected to be positive.<sup>14</sup>

*dist<sub>ij</sub>*: The distance between country  $i$  and country  $j$ , measured by the distance between the two respective capital cities. It has been widely observed and explained in the trade literature that distance has negative effects on trade flows. However, it is not clear how this geographical factor affects trade policies in general and AD filings in particular. On the one hand, distance reduces trade flows and as a result may reduce AD filings. In addition, for two countries which are far apart, the firms in the importing

country may have less information about the exporting firms and so AD complaints may be less likely to be filed. On the other hand, longer distance is associated with larger transaction costs (e.g. transport costs and insurance costs). This may allow import-competing firms to manipulate the cost calculation more easily. In that case, longer distance would lead to more AD filings. To summarize, the impact of distance on AD filings is not clear.

Finally, we include time,  $t$ , to capture the possible trend effect. The value of  $t_i$  is equal to 1 in the first year of the sample period for country  $i$  and adds 1 for each subsequent year. In China's case,  $t_i = 1, 2, 3, \dots$ , represent 1997, 1998, 1999,  $\dots$ , respectively.

### *The Data*

This study requires a large dataset from many sources. For the dependent variable ( $AD_{ijt}$ ), we use China and the US, respectively, as the importing countries. In the China regression, the panel data start from 1998 and end in 2005 with 23 target countries. In the US (as the importing country) regression, the panel data cover (annual) time series, from 1991 to 2004, of AD filings against 39 countries. Although the WTO website ([www.wto.org](http://www.wto.org)) provides information about the number of each country's AD filings against *all* other countries in every year, we need data on the number of AD filings by China and the US, respectively, against *each* foreign country. Such country-level information for the US AD filings can be found from Global Antidumping Database version 2.1 constructed by Chad Bown ([http://people.brandeis.edu/~cbown/global\\_ad/](http://people.brandeis.edu/~cbown/global_ad/)). The country-level information for China's AD filings is available from China Trade Remedy Information website (<http://www.cacs.gov.cn/>).

Real GDP data ( $gdp_{it}$ ) and its annual growth rates ( $grgdp_{it}$ ) are obtained from the USDA Economic Research Service (<http://www.ers.usda.gov/>). The Economic Research Service of the US Department of Agriculture provides bilateral real exchange rate indices ( $rex_{ijt}$ ) (<http://www.ers.usda.gov/Data/exchangerates/>). Calculation of the import penetration ratios ( $rimp_{ijt}$ ) and export shares ( $dep_{ijt}$ ) requires data on bilateral trade, both imports from and the exports to the named countries. China's bilateral trade data can be found from China's *Statistical Yearbooks*. The US bilateral trade data are available from the USITC website (<http://dataweb.usitc.gov/>). Country distance ( $dist_{ij}$ ) can be calculated from the following website: <http://www.mapcrow.info/>.

## **3. Estimation Results**

The regression results for China and the US are reported in Tables 1 and 2, respectively. We run regressions based on different sets of explanatory variables.<sup>15</sup>

### *The Regression Results on China's AD Filings*

Table 1 reports the regression results on China's AD filings. Basically, we find that a 1% increase in real GDP growth in China will reduce the following year's AD filings by 9.3% to 16.6% and a 1% rise in import penetration ratio will result in 29.1% to 56.7% increase in China's AD filing in the following year. A 10% reduction in geographical distance between China and the importing country results in 3.20% to 5.95% increase in China's AD filings against the corresponding countries. However, changes in exchange rates do not have a significant effect on AD filings.<sup>16</sup>

Table 1. Results for China

<i>AD-China</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>t</i>	0.290 (3.75)***	0.284 (3.68)***	0.309 (4.07)***	0.151 (1.24)	0.161 (1.39)	0.164 (1.41)	0.190 (1.60)	0.247 (1.99)**	0.226 (1.95)*
<i>grgdp</i>	-0.166 (2.73)***	-0.166 (2.74)***	-0.138 (2.37)**	-0.096 (1.63)*	-0.093 (1.66)*	-0.090 (1.57)	-0.084 (1.37)	-0.038 (0.57)	-0.044 (0.70)
<i>rimp</i>	0.551 (4.09)***	0.567 (4.18)***	0.460 (3.52)***	0.473 (3.81)***	0.347 (2.86)***	0.341 (2.78)***	0.327 (2.64)***	0.303 (2.46)**	0.291 (2.38)***
<i>rex</i>	-0.154 (0.24)	-0.097 (0.15)	0.024 (0.04)	-0.118 (0.18)	-0.046 (0.08)	-0.036 (0.06)	-0.164 (0.24)	-0.073 (0.11)	-0.223 (0.32)
<i>dist</i>	-0.358 (2.28)**	-0.306 (1.87)*	-0.532 (2.96)***	-0.498 (2.89)***	-0.595 (3.61)***	-0.577 (3.26)***	-0.440 (2.44)**	-0.399 (2.25)**	-0.320 (1.76)*
<i>developing</i>	-0.130 (0.41)	0.051 (0.14)	-0.236 (0.62)	-0.197 (0.53)	-0.140 (0.39)	-0.175 (0.45)	-0.488 (1.20)	-0.525 (1.30)	-0.468 (1.16)
<i>tit-for-tat</i>		0.302 (0.99)	-0.107 (0.32)	-0.074 (0.23)	0.061 (0.19)	0.051 (0.16)	-0.000 (0.00)	-0.013 (0.04)	-0.074 (0.23)
<i>ad_club</i>			0.020 (2.93)***	0.018 (2.83)***	-0.004 (0.36)	-0.004 (0.35)	-0.007 (0.60)	-0.007 (0.58)	-0.006 (0.50)
<i>general_retaliation</i>				0.044 (1.55)	0.044 (1.61)	0.044 (1.62)	0.057 (2.15)**	0.078 (2.59)***	0.076 (2.62)***
<i>deter</i>					0.002 (2.77)***	0.002 (2.59)***	0.001 (2.15)**	0.001 (2.01)**	0.001 (1.80)*
<i>deflection</i>						0.006 (0.26)	-0.011 (0.42)	-0.010 (0.40)	-0.009 (0.39)
<i>echoing</i>							0.072 (2.93)***	0.075 (3.03)***	0.074 (3.30)***
<i>diversion</i>								-0.037 (1.34)	-0.040 (1.47)
<i>learning</i>									0.074 (1.31)
Observations	184	184	184	184	184	184	184	184	184

Notes: Absolute values of z-statistics in parentheses. Some explanatory variables are lagged one year and so there are 8 \* 23 (=184) observations.  
\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Table 2. Results for the US

<i>AD-US</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>t</i>	-0.042 (2.88)***	-0.064 (4.40)***	-0.066 (4.50)***	-0.077 (4.90)***	-0.078 (4.95)***	-0.096 (6.10)***	-0.089 (5.67)***	-0.112 (6.39)***	-0.106 (6.00)***
<i>grgdp</i>	-0.122 (3.36)***	-0.131 (3.77)***	-0.127 (3.66)***	-0.114 (3.23)***	-0.116 (3.30)***	-0.101 (2.96)***	-0.111 (3.24)***	-0.045 (1.15)	-0.040 (1.02)
<i>rimp</i>	1.521 (11.11)***	1.545 (12.21)***	1.547 (12.23)***	1.541 (12.27)***	1.708 (11.71)***	1.175 (7.62)***	1.108 (7.15)***	1.181 (7.60)***	1.061 (6.53)***
<i>rex</i>	0.101 (0.65)	0.133 (0.82)	0.140 (0.86)	0.143 (0.88)	0.103 (0.65)	0.109 (0.69)	0.101 (0.64)	0.062 (0.41)	0.055 (0.36)
<i>dist</i>	0.450 (4.22)***	0.633 (6.18)***	0.613 (5.99)***	0.612 (6.03)***	0.420 (3.21)***	0.100 (0.74)	0.052 (0.38)	0.043 (0.32)	0.043 (0.32)
<i>developing</i>	0.477 (3.83)***	0.481 (4.04)***	0.526 (4.37)***	0.529 (4.41)***	0.558 (4.65)***	0.320 (2.65)***	0.281 (2.32)**	0.302 (2.51)**	0.295 (2.46)**
<i>tit-for-tat</i>	0.738 (6.24)***	0.738 (6.24)***	0.591 (4.54)***	0.588 (4.53)***	0.577 (4.44)***	0.390 (3.06)***	0.366 (2.88)***	0.379 (2.99)***	0.371 (2.94)***
<i>ad_club</i>			0.012 (2.71)***	0.012 (2.74)***	0.019 (3.53)***	0.017 (3.41)***	0.018 (3.60)***	0.018 (3.63)***	0.017 (3.39)***
<i>general_retaliation</i>				-0.019 (1.95)*	-0.018 (1.78)*	-0.028 (2.84)***	-0.024 (2.45)**	-0.050 (3.90)***	-0.051 (3.96)***
<i>deter</i>					-0.003 (2.27)**	-0.002 (1.83)*	-0.002 (1.86)*	-0.003 (2.22)**	-0.002 (1.98)**
<i>defection</i>						0.053 (6.34)***	0.027 (2.12)**	0.028 (2.24)**	0.028 (2.27)**
<i>echoing</i>							0.030 (2.62)***	0.028 (2.46)**	0.017 (1.42)
<i>diversion</i>								0.013 (3.21)***	0.011 (2.86)***
<i>learning</i>									0.074 (2.43)**
Observations	546	546	546	546	546	546	546	546	546

Notes: Absolute values of z-statistics in parentheses.

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

The focus of our attention is on the retaliatory variables. China does not seem to have the tit-for-tat retaliation towards its trading partners. However, other retaliatory effects are significant. An increase in one more AD filing in a country will lead to a 1.8% to 2.0% increase in China's AD filing against that country in the following year (*ad\_club*). An increase in one more AD filing by a country against China's exports will raise 5.7% to 7.8% more AD filing in China in the following year, not necessarily against that country, (*general\_retaliation*). *deter* has a positive and significant effect on China's AD filings, indicating that China is more likely to target its major exporting countries who use AD against China.

The echoing effect is significant in China's AD filings, but there is no strong evidence for the deflection effect in China. When a country receives one more AD investigation from other countries, China will launch 7.2% to 7.5% more AD filings against that country within the same year. If we use the one-year lag *echoing* variable (*deflection*), the effect is not significant. There is no significant diversion effect in China's AD filings either. Thus, we conclude that China's AD filings spread due to echoing but not deflection or diversion. However, we find that prior AD experience does not raise future propensity to file, indicating no learning effects.

#### *The Regression Results on the US AD Filings*

Table 2 reports the regression results on the US AD filings. There are significant direct tit-for-tat retaliatory effects. Other things equal, the US will launch 36.6% to 73.8% more AD filings against those countries which have had AD against the US before than those that have never had AD against the US. An increase in one more AD filing by a country, the US will have 1.2% to 1.9% more AD filings against that country in the following year (*ad\_club*). This indicates "club effect" in the US. Moreover, it seems that the US tries to avoid punishing other countries that use AD against it in the previous year. An increase in one AD investigation against the US by other countries in the previous year, the US AD filing will decrease by 1.8% to 5.1% (*general\_retaliation*). *deter* has a negative significant effect on the US AD filing. It suggests that the US initiates fewer filings against those exporting countries which are big AD users and have large shares in the US market.

The echoing effect and deflection effect are both significant in the US AD filings. When a country receives one more AD investigation from other countries, the US will launch 2.8% to 3.0% more AD filings against that country within the same year. If we use the one-year lag *echoing* variable (*deflection*), the increase in the US AD filing is 2.7% to 5.3%. There is a significant but very small diversion effect in the US AD filings. Hence, the contagion effect in the US appears in all three ways, i.e. echoing, deflection, and diversion. We find that prior AD experience leads to an increase in future propensity to file. This confirms the result of Bown and Crowley (2006) that US firms are learning how to "work the system."

#### *Comparisons*

By comparing Tables 1 and 2, we can see some similarities and differences between AD filings in China and the US. However, in order to see whether the differences are statistically significant, we pool China and the US data together and run the following regression:

$$AD_{ijt} = \lambda_0 + A'X + \lambda_{us} + B'X * us, \quad (2)$$

where the explanatory variables, vector  $X$ , are those in our main regression model given in subsection “The Model” and the dummy variable,  $us$ , is equal to 1 for the US and 0 for China.

Our interest is on whether the coefficients of explanatory variables for China’s AD filings are significantly different (in statistical sense) from those for the US AD filings. Accordingly, we test the null hypothesis  $H_0: b_{\text{China}} = b_{\text{US}}$ , for each coefficient  $b$ . To save space, we do not report the detailed results. Instead, we report the test results in the column “Pooled data test” in Table 3, with Y indicating that the two countries are significantly different and N that they are not. In Table 3, we also report the sign of each coefficient based on Tables 1 and 2 and compare them to the existing studies in the literature. There are three general observations. First, our study confirms some of the results reported elsewhere in the literature while differences remain in some aspects. Second, our study adds some new effects to AD filings. Third, our study shows that in China and the US some of the explanatory variables have similar effects on AD filings, yet some others have the opposite impacts.

Let us focus our comparison on the retaliatory variables. For the four retaliatory variables, the two countries are significantly different in only two of them. *tit-for-tat* is the most important retaliatory variable.<sup>17</sup> From Table 3, we do not find a consistent and statistically significant difference between the two countries in their tit-for-tat behavior. Recall that from the separate analyses, we find clear evidence of tit-for-tat motive behind the US AD filings, both statistically significant and quantitatively important (0.366–0.738), but no clear evidence to prove tit-for-tat behavior in China’s AD filings.

The second most important retaliatory variable is *general\_retaliation*. This reflects retaliation at the general level, not necessarily retaliation against the country which initiates the AD investigations. In this respect, the two countries are different. After receiving more AD investigations, China will file more but the US will file less in the subsequent year. However, the coefficient of China’s *general\_retaliation* is rather small (0.057–0.078). Our results suggest that the *general\_retaliation* effect of China may be statistically significant but not quantitatively important.

The other two variables, *ad\_club* and *deter*, are more related to the strategic behavior of AD filing. The club effects (*ad\_club*) are observed in both countries and the two countries are not significantly different. However, the two countries have opposite effects of *deter*: China strategically targets its trading partners that are heavy AD users, but the US does not.

In conclusion, China’s AD filing behavior reflects some degree of retaliation, but it is not much different from the US. In particular, although China’s AD law specifically stipulates that it will retaliate those countries which use AD unfairly against China (a clear message of tit-for-tat) which the US AD law does not, in practice, China’s AD filings are no more (and may be even less) retaliatory than that of the US.

### *Robustness Check*

In this subsection, we discuss the robustness of our results established in the previous subsections. Generally, we find that they are robust.

First, Tables 1 to 3 are results from negative binomial estimation. We have also run the regressions using Poisson estimation and obtained similar results. The corresponding tables are omitted to save space.

Second, we have tried different lag periods for macroeconomic factors. In the previous subsections, we use a one-year lag in order to account for the lag effects of the variables on AD filings and to avoid the possible reverse causality. Alternatively, we use

Table 3. Comparisons

	Variables	China	US	Pooled data test	Results from the literature
Macroeconomics	<i>grgdp</i>	-	-	N	-: Knetter and Prusa (2003); Blonigen (2005); Feinberg (2005); Sadni-Jallab et al. (2005); Mah and Kim (2006); Moore and Zanardi (2009)
	<i>rex</i>	-(ns)	-(ns)	N	ns: Vandenbussche and Zanardi (2008) -: Feinberg (1989)
	<i>rimp</i>	+	+	Y	+: Raafat and Salehizadeh (2002); Knetter and Prusa (2003); Blonigen (2005); Feinberg (2005); Irwin (2005); Sadni-Jallab et al. (2005); Niels and Francois (2006)
Retaliation	<i>tit-for-tat</i>	+(ns)	+	N	ns: Francois and Niels (2004); Vandenbussche and Zanardi (2008)
	<i>ad_club</i>	+	+	N	+: Herander and Schwartz (1984); Blonigen and Bown (2003); Blonigen (2005); Deardorff and Stern (2005); Irwin (2005); Mah and Kim (2006)
	<i>general_retaliation</i>	+	-	Y	ns: Leidy (1997); Sadni-Jallab et al. (2005)
	<i>deter</i>	+	-(ns)	Y	+/-: Prusa and Skeath (2004) +: Feinberg and Reynolds (2006, 2007)
Contagion (echoing, deflection, diversion)	<i>echoing</i>	+	+	N	+: Prusa and Skeath (2004); Feinberg and Reynolds (2006)
	<i>deflection</i>	+(ns)	+	N	+/: Aggarwal (2004)
	<i>diversion</i>	-(ns)	+	N	+: Feinberg and Reynolds (2006)
Learning	<i>learning</i>	+	+	N	Not in any previous study
Distance	<i>dist</i>	-	+	Y	+: Feinberg and Reynolds (2006, 2007); Moore and Zanardi (2007) Not in any previous study -: Leidy (1997); Becker and Theuringer (2001); Niels and Francois (2006) Not in any previous study

Notes: "+", "-", and "ns" respectively denote significantly positive, significantly negative, and not significant. "Y" indicates that China and the US are significantly different and "N" means that they are not.

two-year lag and three-year lag, respectively. The new estimates are not significantly different from the original ones except for the exchange rate effects. It is important to note that the conclusion on the retaliatory motive of China's AD filings does not change.

Third, China became a WTO member in November 2001. China's WTO membership may stimulate its imports and result in more AD filings. In order to see whether the WTO entry leads to a structural change in AD, we perform a Chow test by running one regression including a WTO dummy variable and its interactions with each of the explanatory variables in the basic model.<sup>18</sup> We then estimate the full model and test the WTO entry dummies (against 0) on the coefficients. The result shows that the null hypothesis cannot be rejected, which means there is no significant structural change after the WTO entry.

Fourth, in any AD case, firms first file an AD complaint and then the government makes the AD investigation and finally makes its decision whether or not an AD duty will be imposed. Alternatively, we use the number of affirmative AD decisions (i.e. when AD duties are actually imposed) to replace the number of AD filings (by the firms) as the dependent variable and rerun the regression model. We find that the results are basically the same, especially for the retaliatory variables.

#### 4. Concluding Remarks

During the period 1995–2005, China and the US were among the few countries which launched most AD investigations and were subject to most AD investigations. It is important to explore and compare the determinants of AD filings from these two countries. Our empirical study confirms with the existing literature and finds that a country's AD filings are affected by macroeconomic conditions, retaliatory motives, and other factors. Compared to the existing studies, our study includes more control variables including geographical distance, time trend, and AD contagions.

An interesting contribution of this paper is the comparison between China and the US in their use of AD filings. China is a developing country and a relatively new (but also a large) AD user. In contrast, the US is a developed country and a traditional AD user. While the two countries have both similarities and differences in their AD responses to various factors, we find in particular that China's AD behavior is no more retaliatory than that of the US.

Our work represents one step forward to exploring full explanations for AD in the world. Our research can be extended to further analyze the underlying difference between developing and developed countries in AD filings and explore other factors that may affect AD filings, such as culture difference, language difference, and income gap. These analyses are more demanding on data (multi-country dataset, industry-level or even firm-level data, etc.) and left for our future research.

#### References

- Aggarwal, Aradhna, "Macro Economic Determinants of Antidumping: A Comparative Analysis of Developed and Developing Countries," *World Development* 32 (2004):1043–57.
- Baruah, Nandana, "An Analysis of Factors Influencing the Anti-Dumping Behavior in India," *The World Economy* 30 (2007):1170–91.
- Becker, B., and M. Theuringer, "Macroeconomic determinants of contingent protection: The case of the EU," *Zeitschrift für Wirtschaftspolitik* 50 (2001):230–47.
- Blonigen, Bruce A., "The Effects of (CUSFTA and) NAFTA on Antidumping and Countervailing Duty Activity," *The World Bank Economic Review* 19 (2005):407–24.

- , "Working the System: Firm Learning and the Antidumping Process," *European Journal of Political Economy* 22 (2006):715–31.
- Blonigen, Bruce A. and Chad P. Bown, "Antidumping and Retaliation Threats," *Journal of International Economics* 60 (2003):249–73.
- Blonigen, Bruce A. and Thomas J. Prusa, "Antidumping," in E. K. Choi and J. Harrigan (eds), *Handbook of International Trade*. Oxford: Blackwell (2003): 251–84.
- Bown, Chad P., "China's WTO Entry: Antidumping, Safeguards, and Dispute Settlement," in Robert C. Feenstra and Shang-Jin Wei (eds), *China's Growing Role in World Trade*, Chicago: University of Chicago Press for the NBER (2010): 281–337.
- Bown, Chad P. and Meredith A. Crowley, "Policy Externalities: How US Antidumping affects Japanese Exports to the EU," *European Journal of Political Economy* 22 (2006):696–714.
- Deardorff, Alan V. and Robert M. Stern, "A Centennial of Anti-Dumping Legislation and Implementation—Introduction and Overview," *The World Economy* 28 (2005):633–40.
- Debapriya, Aryashree and Tapan Kumar Panda, "Anti-Dumping Retaliation—A Common Threat to International Trade," *Global Business Review* 7 (2006):297–311.
- Falvey, R. and D. Nelson, "100 years of antidumping," *European Journal of Political Economy*, 22 (2006):545–53.
- Feinberg Robert, "Exchange Rates and Unfair Trade," *Review of Economic and Statistics* 71 (1989):704–07.
- , "Exchange Rates and US Dumping Petitions Revisited: Does Commerce Matter?" manuscript (2003).
- , "US Antidumping Enforcement and Macroeconomic Indicators Revisited: Do Petitioners Learn?" *Review of World Economics* 141 (2005):612–22.
- Feinberg, Robert M. and Kara M. Reynolds, "The Spread of Antidumping Regimes and the Role of Retaliation in Filings," *Southern Economic Journal* 72 (2006):877–90.
- , "Tariff Liberalization and Increased Administrative Protection: Is There a Quid Pro Quo?" *The World Economy* 30 (2007):948–61.
- Francois, Joseph F. and Gunnar Niels, "Political Influence in a New Antidumping Regime: Evidence from Mexico," CEPR Discussion Paper No. 4297, London (2004).
- Hansen, Wendy and Thomas J. Prusa, "The Road Most Traveled: The Rise of Title VII Protection," *The World Economy* 18 (1995):295–313.
- Herander, Mark G. and J. Brad Schwartz, "An Empirical Test of the Impact of the Threat of US Trade Policy: The Case of Antidumping Duties," *Southern Economic Journal* 51 (1984):59–79.
- Irwin, Douglas A., "The Rise of US Antidumping Activity in Historical Perspective," *The World Economy* 28 (2005):651–68.
- Knetter, Michael M. and Thomas J. Prusa, "Macroeconomic Factors and Antidumping Filings: Evidence from Four Countries," *Journal of International Economics* 61 (2003):1–17.
- Leidy, M. P., "Macroeconomic Conditions and Pressures for Protection under Antidumping and Countervailing Duty Laws: Empirical Evidence from the United States", International Monetary Fund Staff Paper No. 44 (1997).
- Levin, A., C. Lin and C. J. Chu, "Unit Root Tests in Panel Data: Asymptotic and Finite Sample Properties," *Journal of Econometrics* 108 (2002):1–24.
- Mah, Jai S. and Yong Dae Kim, "Antidumping Duties and Macroeconomic Variables: The Case of Korea," *Journal of Policy Modeling* 28 (2006):157–62.
- Messerlin, Patrick, "China in the World Trade Organization: Antidumping and Safeguards," *World Bank Economic Review* 18 (2004):105–30.
- Moore, Michael O. and Maurizio Zanardi, "Does Antidumping Use Contribute to Trade Liberalization? An Empirical Analysis," *Canadian Journal of Economics* 42 (2009):469–95.
- , "Trade Liberalization and Antidumping: Is There a Substitution Effect?" ETSG Conference Paper (2007). Forthcoming in *Review of Development Economics*.
- Niels, Gunnar and Joseph Francois, "Business Cycles, the Exchange Rate, and Demand for Antidumping Protection in Mexico," *Review of Development Economics* 10 (2006):388–99.
- Prusa, Thomas J. and Susan Skeath, "The Economic and Strategic Motives for Antidumping Filings," NBER working paper 8424 (2002):358–82.

- , “Modern Commercial Policy: Managed Trade or Retaliation?” in James Hartigan (ed.), *Handbook of International Economics, Vol. II*, London: Blackwell (2004):358–82.
- Raafat, Feraidoon and Mehdi Salehizadeh, “Exchange Rates, Import Prices, and Antidumping Cases: An Empirical Analysis,” *International Trade Journal* 16 (2002):269–93.
- Sadni-Jallab, Mustapha, Rene Sandretto, and Robert Feinberg, “An Empirical Analysis of US and EU Antidumping Initiation and Decision,” working paper (2005). Available at <http://darkwing.uoregon.edu/~bruceb/Mus1.pdf>.
- Vandenbussche, Hylke and Maurizio Zanardi, “What Explains the Proliferation of Antidumping Laws?” *Economic Policy* 23 (2008):93–138.
- WTO, “AD Initiations: By Reporting Member.” Available at <http://www.wto.org/> (2007).

## Notes

1. Each initiation reported covers one product imported from one country. “Country” in each case refers to country or customs territory.
2. In a typical AD procedure, the firms from an importing country make the initial AD filings, then the importing country’s government undertakes an AD investigation, and finally the government makes its AD decision. Since AD filings and AD investigations normally have one-to-one correspondence, in this paper we use these two terms interchangeably.
3. Other related variables have also been tested in the literature, including import intensity, unemployment rate, and real GDP per capita.
4. Their finding is consistent with the theory prediction: slower economic growth in the importing country is associated with lower industry profits and weaker demand for imports, which makes dumping more easily found and AD duties more easily justified.
5. Existing theories do not provide a definite relationship between real exchange rate and AD. When the importing country’s currency appreciates, export price, in terms of the exporting country’s currency, will go up (pricing-to-market), which reduces the possibility of dumping. However, the export price will go up only partially (partial passthrough) and the import-competing firms’ market share and profit will be reduced, which makes it easier for the importing country to impose AD duties.
6. Feinberg (1989) is based on the US AD filings from 1982 to 1998.
7. It is expected that a larger import penetration ratio implies fiercer competition and so will result in more AD filings and AD duty impositions.
8. See Falvey and Nelson (2006) for arguments on the need to separate contagion effect from retaliation effect. Feinberg and Reynolds (2006) argue that retaliation is motivated by the need to maintain credibility in attempting to deter future AD, whereas learning simply reflects a changed awareness of the relative costs and benefits of bringing a case. There is a possibility that the retaliation which we observe is simply learning. Hence, it is important to disentangle these motivations.
9. Debapriya and Panda (2006) focus on India and China, Baruah (2007) on India, Francois and Niels (2004), Niels and Francois (2006) on Mexico, and Mah and Kim (2006) on Korea.
10. As to count data, which takes on nonnegative values, Poisson and negative binomial regression models are well suited for modeling those variables. The main difference is that Poisson distribution imposes a restriction that the variance of the dependent variable is equal to the mean of the dependent variable, whereas the negative binomial distribution allows the variance to differ from the mean. Examples of such papers using Poisson and/or negative binomial distributions to model the frequency of AD activity include Knetter and Prusa (2003), Aggarwal (2004), Blonigen (2005), Feinberg (2005), Sadni-Jallab et al. (2005) etc. Note that some literature finds that the two models yield similar results (Knetter and Prusa, 2003), while some report that the negative binomial specification allows a better fit of the data to the empirical model than Poisson (Blonigen, 2005). We also run the model using Poisson for robustness test.

11. In the case of global economic slowdown (i.e. the exporting country's economy also slows down), foreign firms have incentives to cut prices in order to maintain export volumes, which increases AD incidents from country *i*.
12. As a referee correctly points out, antidumping for retaliatory purposes is usually done quickly in reality. So a more accurate *tit-for-tat* variable should reflect the timing of retaliation, e.g. quarterly data or even monthly data. However, we do not have such detailed information in our dataset. Moreover, other studies in the literature also use annual data.
13. Messerlin (2004) observes that between 1980 and 1999, 75% of AD cases initiated against Chinese exports by the US and 68% by the EU were echoing cases in the sense that they echoed each other within a year or less.
14. To examine the effect of prior experience, Blonigen (2006) includes a dummy variable indicating whether the industry has had prior AD cases filed since 1980. For robustness check, he also uses a variable that measures the percentage of petitioners on a case as a proxy for prior experience, rather than a dummy variable, indicating only whether at least one petitioner has experience and the result does not change.
15. Since regression analyses using nonstationary variables may lead to spurious regression, we perform a unit-root test as a robustness check of our regression results to make sure the concerned variables are stationary. Because our panels for China and the US have large sections (countries) and short time series, we perform the "levinlin" panel unit-root test, developed by Levin, Lin, and Chu (LLC, 2002). The test assumes that each individual unit in the panel shares the same AR(1) coefficient, but allows for individual effects, time effects, and possibly a time trend. The test may be viewed as a pooled Dickey-Fuller test, or an augmented Dickey-Fuller (ADF) test when lags are included, with the null hypothesis of nonstationarity (I(1) behavior). Our test result indicates that the null hypothesis can be rejected and thus we can confidently accept that the variables are stationary.
16. Although the Chinese currency was basically fixed to the US dollar during the period 1994–2005, it fluctuated against other major currencies.
17. We think *tit-for-tat* is the most important one because it is the only country-to-country (specific) retaliation. Others capture retaliation at a more general level. Note that Chinese AD regulation empowers the government to take AD measures against the countries (regions) that carry out discriminative AD measures against China, which is a clear *tit-for-tat* motivation. Among the other three general-level retaliation variables, *general\_retaliation* reflects more directly about retaliation: a country launches more AD investigations after it receives more investigations. Hence, we consider this as the second most important one.
18. We appreciate the referees' suggestion on doing structural break tests.