

# THE NEXUS BETWEEN ANTIDUMPING PETITIONS AND EXPORTS DURING THE GLOBAL FINANCIAL CRISIS: EVIDENCE ON THE PEOPLE'S REPUBLIC OF CHINA

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## The Nexus between Antidumping Petitions and Exports during the Global Financial Crisis: Evidence on the People's Republic of China

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## Contents

|                                                                                                                   |    |
|-------------------------------------------------------------------------------------------------------------------|----|
| Abstract                                                                                                          | iv |
| 1. Introduction                                                                                                   | 1  |
| 2. Data and Methodology                                                                                           | 2  |
| 2.1. Antidumping Petitions Against the People's Republic of China                                                 | 2  |
| 2.2. Trade Costs                                                                                                  | 3  |
| 2.3. Empirical Strategy                                                                                           | 4  |
| 3. Results                                                                                                        | 5  |
| 3.1. Ordinary Least Squares Estimates                                                                             | 5  |
| 3.2. Reduced Form Estimates                                                                                       | 6  |
| 3.3. Two-Stage Least Squares Estimates                                                                            | 7  |
| 3.4. Additional Results                                                                                           | 7  |
| 3.5. Robustness Checks                                                                                            | 8  |
| 4. Conclusions                                                                                                    | 10 |
| References                                                                                                        | 11 |
| ADB Working Paper Series on Regional Economic Integration                                                         | 22 |
| Tables                                                                                                            |    |
| 1. Antidumping Investigations by the People's Republic of China (PRC)'s Major Trading Partners from 2006 to 2010  | 14 |
| 2. Antidumping Information against the People's Republic of China by Section at 2-digit HS Code from 2006 to 2010 | 15 |
| 3. Summary Statistics                                                                                             | 16 |
| 4. Ordinary Least Squares Regression: Antidumping Petitions on Exports                                            | 17 |
| 5. Reduced Form Regression: Antidumping Petitions on Instrumental Variables                                       | 18 |
| 6. Two-Stage Least Squares: Antidumping Petitions on Exports                                                      | 19 |
| 7. Two-Stage Least Squares (Additional Results): Antidumping Petitions on Exports                                 | 20 |
| 8. Two-Stage Least Squares (Robustness Checks): Antidumping Petitions on Export                                   | 21 |

## **Abstract**

This paper quantifies how the People's Republic of China's (PRC) export volume to its major trading partners during the global financial crisis affects the antidumping (AD) petitions filed by the trading partners against the PRC. Focusing on the AD petitions at the Harmonized System (HS) Code 8-digit level and the PRC's exports at the HS 2-digit level, we construct three instrument variables at the same HS level for export volume. These instruments—documents required, time taken, and container charges incurred for goods traded across borders—represent trade costs obtained from the World Bank's Doing Business Project. We find rising exports from the PRC lead to rising AD petitions against the country. Instrumental variable estimates indicate that a 1 percentage point rise in the PRC's export volume raises the number of AD petitions against the country by about 0.3 percentage point, and the probability of receiving AD petitions by 3.6 %. These estimates are about 10 times larger than those found in ordinary least square regressions. Their quantitative significance underlines why it is important to consider the issue of export endogeneity in the estimation. Moreover, it highlights the failure of the current trade statistics to account for the true value-added of traded goods, and how this has particularly disadvantaged the PRC, given its position as the factory of the world.

*Keywords:* International trade, antidumping, instrument variable, the People's Republic of China

*JEL Classification:* F13, F14, F59

## 1. Introduction

The People's Republic of China (PRC), the world's largest exporter, accounts for 11.3 % of the world's total exports in 2012.<sup>1</sup> The country's export capacity threatens established trade patterns (Bown and Crowley 2010), prompting protectionist measures from its major trade partners, particularly in the United States (US) and the European Union (EU) (Zhou and Cuyvers 2009). Empirical literature supports this observation of a positive link between export volume and antidumping (AD) petitions. Mah (1999), Leipziger and Shin (1991), and Irwin (2004) point out that the US domestic industry is more likely to initiate an antidumping case if there has been a surge in imports from a particular country. Prusa and Skeath (2002) suggest that being a big exporter matters for AD petitions. Zhou and Cuyvers (2009) note that larger exporting countries to the EU are more likely to face AD actions compared to smaller exporting countries. The study on AD petitions is particularly relevant as there is a large literature that shows how AD petitions can lead to trade destruction and trade diversion, such as, Staiger and Wolak (1994), Prusa (2001), Niels (2003), Durling and Prusa (2006), and Ganguli (2008).

Despite of the well-established positive association between export volume and AD petitions, the presence of reverse causality from AD petitions to export volume makes the task of clearly delineating the causal effect of interest a perennial empirical challenge. This paper's main aim is, therefore, to identify the true causal effect of export volume on AD petitions based on a set of trade cost variables—documents required, time taken, and container charges incurred when goods are traded across borders—that help to pin down exogenous variations in the export volume. The focus on the PRC and on the years surrounding the financial crisis is helpful in providing benchmark results on how exports affect AD petitions. The PRC is chosen for being the main target of AD petitions, which quite naturally follows from its position as the world's largest exporter. During the global financial crisis, particularly during the world economic slump, the filing of AD petitions is likely to be more prevalent. Governments often use such a strategy to insulate domestic firms from import competition (Hillberry and McCalman 2011, Georgiadis and Gräb 2013).

This paper contributes to the literature on determinants of AD petitions by further confirming that export volume is a quantitatively significant factor in explaining AD petitions. In addition, it uses a novel empirical strategy to identify the true causal effect of export volume on AD petitions. There is a substantive literature that examines the determinants of AD petitions. For example, Leidy (1997), Mah (2000), Knetter and Prusa (2003), Feinberg (2005), Jallab et al. (2006), and Zhou and Cuyvers (2009), find that macroeconomic factors of the complainant country, such as, real GDP growth, unemployment rate, and exchange rate fluctuations, are important determinants of AD petitions. Meanwhile, Finger (1993), Prusa (2001), Sanguinetti and Bianchi (2005), Vandebussche and Zanardi (2008), and Prusa and Sketh (2002) investigate retaliation as a strategic motive for AD use. They find that countries tend to file AD petitions against those which have previously investigated them or are currently taking AD actions against them.

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<sup>1</sup> See International Trade Centre's Trade Map at <http://www.trademap.org/>

Focusing on the AD petitions against the PRC by its major trade partners at the Harmonized System (HS) Code 8-digit level and the PRC's exports at HS 2-digit level to its major trade partners, we construct within 2-digit level variation three trade costs as instruments for export volume. Using the two-stage least squares methodology, we find that rising exports from the PRC is followed by significant rise in AD petitions against the country. Instrumental variable estimates indicate that a 1 percentage point increase in the PRC's export volume raises the number of AD petition by about 0.3 percentage point, and the probability of facing AD petition by 3.6 %. These estimates are 10 times larger than those found in ordinary least square regression (OLS).

The remainder of the paper is structured as follows. Section 2 discusses the data and methodology used, specifically some stylized facts on AD petitions against the PRC during the global financial crisis, and the construction of the trade cost instruments. Section 3 presents the main results and those from various robustness checks. Section 4 concludes with policy considerations.

## **2. Data and Methodology**

Data used in this paper span from 2006 to 2010. The AD petition data come from Bown's (2012) Global Antidumping database. Our interest is on the AD petitions filed by the PRC's major trading partners, which comprise 29 trading partners that include 16 economies in the EU.<sup>2</sup> These 29 economies account for more than 50 % of the PRC's total export volume and 92 % of the total AD petitions filed against the PRC. (The export volume is the log of export value from the PRC to its trading partners at the HS two-digit level deflated by the US CPI. The value of exports is obtained from the United Nations Commodity Trade Statistics (UNComtrade). The 2005 US CPI is obtained from the U.S. Bureau of Labor Statistics).

### **2.1. Antidumping Petitions Against the People's Republic of China**

From 2006 to 2010, the PRC's major trading partners filed a total of 777 AD investigations, of which 310 or 39.9% of the total number of cases were against the PRC (Table 1). The AD petitions filed by developed and developing countries totaled 110 and 200, respectively.<sup>3</sup> The bulk of AD petitions came from India (59 cases), the US (47), and the EU (43). According to Bown and Tovar (2011), India's large number of ADB petitions against the PRC, despite the small PRC export to the country, is due to India's domestic political and economic pressures following tariff reforms.

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<sup>2</sup> See note to Table 1.

<sup>3</sup> This paper follows the definition of United Nations Conference on Trade and Development (UNCTAD) that classifies the US, EU, Canada and Australia, as developed countries; and Argentina, Brazil, Colombia, Indonesia, India, the Republic of Korea, Mexico, Peru, Turkey, and South Africa as developing countries.



Breaking down by product sections,<sup>4</sup> the AD investigations filed by the developed and developing countries vary mostly in terms of the larger variety of products targeted by the developing countries. The AD cases initiated by the developed countries are mostly concentrated at a particular sector, for example, steel products (Section 15) (Table 2). For developing countries, the scope of AD cases is more varied, ranging from chemical products (Section 6), textiles (Section 11), steel products (Section 15) to machinery and electrical products (Section 16). From 2006 to 2010, the UNComtrade data show that products in Sections 6, 11, and 16 also happened to be the main goods exported by the PRC, accounting for about 70 % of total exports volume. Machinery and electrical products (Section 16) alone comprised 45 % of total exports volume.

The AD petition data used in estimations are classified by chapter and country. Table 3 presents the AD petition data together with the other variables used in the estimations. Two dependent variables based on the AD information are used: *AD number*; and *AD dummy*. *AD number* is the number of AD petitions filed in a chapter by a country in a year against the PRC. The mean AD petition of 0.356, therefore, implies that on average, 0.356 petition is filed in a chapter by a country every year. *AD dummy* denotes whether or not an AD petition is filed in a chapter by a country each year. The dummy takes on a value of one if it is true, and zero otherwise. Its mean value of 0.067, therefore, says 6.7% of the chapters have AD petitions.

## 2.2. Trade Costs

Three measures of trade cost are collected for each country: documents required to import, time taken to import, and container cost to import. These are obtained from the *Doing Business Project* of the World Bank. Since 2006, the project has looked at the procedural requirements for exporting and importing a standardized cargo of goods by sea transport. *Documents* required to import refer to the number of documents required per shipment to import goods into a country. Documents required for clearance by government ministries, customs authorities, port and container terminal authorities, health and technical control agencies, and banks are taken into account. *Time* taken to import is the number of days calculated when a procedure to import is initiated until it is completed. It excludes ocean transport time, but includes the waiting time between procedures, such as during the unloading of a cargo. *Container* cost to import measures the total fees in US dollar levied on a 20-foot container. It covers all the fees associated with completing the procedures to import the goods, including costs for documents, administrative fees for customs clearance and technical control, customs broker fees, terminal handling charges, and inland transport. It does not include customs tariffs and duties or costs related to ocean transport.

Since the export volume is based on the 2-digit HS code and to account for the variations by chapter, country, and time, a modified trade cost is used and calculated as:

$$cost_{i,j,t} = \theta_{i,j,t-1} \log(measure_{j,t}) \quad (1)$$

<sup>4</sup> The 2-digit HS codes are classified based on 22 sections divided into 98 chapters. Notes to Table 2 provide the name of the product sections.

where  $\theta_{i,j,t-1}$  is the trade share that captures country  $j$ 's imports of chapter  $i$  goods to total imports from the PRC at period  $t - 1$ ;  $measure_{j,t}$  is *documents, time, or container* of country  $j$  at time  $t$ . The modified trade cost also takes into account the volume of certain goods being imported on trade cost—the larger the imports, the bigger its cost impact. The trade share is included as a lagged term because of its predetermined nature, but the results are not sensitive to using contemporaneous trade share.<sup>5</sup> The advantage of the cost instruments is that the trade cost index is constructed by interacting the lagged chapter-country-specific import shares with the country and time variant cost information when importing across the borders.

### 2.3. Empirical Strategy

We follow a two-step estimation strategy akin to the two-stage least squares methodology. The second stage Ordinary Least Squares (OLS) is the main estimated equation that relates  $AD_{i,j,t}$ , the AD petition in chapter  $i$  of country  $j$  against the PRC at year  $t$ :

$$AD_{i,j,t} = c_a + \beta exp_{i,j,t} + \delta' z_{i,j,t} + \mu_{ij} + \mu_i + \mu_j + \mu_t + v_{i,j,t} , \quad (2)$$

where  $exp_{i,j,t}$ , the log of export volume, is the main causal variable of interest;  $c_a$  is the constant term;  $z_{i,j,t}$  represents the chapter-specific characteristics such as belonging to the same section and other controls such as exchange rate levels and retaliatory AD petition numbers that we controlled as the robustness checks in section 3.5 ;  $\mu_{ij}$  represents the chapter-country specific characteristics that capture the time-invariant fixed-effects of cross-section panel data;  $\mu_i$  represents the chapter fixed-effects that capture all time invariant chapter-specific characteristics and permanent divergence;  $\mu_j$  represents the country fixed-effects that capture all time invariant country-specific characteristics and permanent differences;  $\mu_t$  represents the time-varying macroeconomic shocks that affect all chapters identically; and  $v_{i,j,t}$  is the idiosyncratic error term. Recall two indicators of AD petition as dependent variables are used: *AD number*; and *AD dummy*;  $\beta$ , therefore, measures the elasticity of AD petitions, and the average probability of AD petitions, with respect to export, respectively.

The key problem in estimating Equation 2 with OLS is that trade is likely to be endogenous to AD petitions, despite the controls included for chapter-specific, country, and year fixed-effects. The main source of endogeneity is due to simultaneity bias, wherein AD actions are also likely to affect export volume. This effect is likely to be negative, which means the OLS estimate of  $\beta$  is likely to be lower than the true effect. If we estimate a reverse causality equation and label the coefficient of the negative effect as  $\delta$  and the error term as  $e$ , then the OLS estimation of  $\beta$  can be written as:

$$\beta^{OLS} = \beta + \frac{\delta}{1-\beta\delta} \frac{var(v)}{var(trade)} + \frac{1}{1-\beta\delta} \frac{cov(v,e)}{var(trade)} \quad (3)$$

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<sup>5</sup> This is further discussed as a first robustness check in Section 3.5.

The second and last term of the right-hand-side capture the simultaneity bias and omitted variable bias, respectively. After the controls, if there is no omitted variable bias, since  $\delta$  is negative and  $\beta$  is positive, the OLS estimate of  $\beta$  will under-estimate the true effect of export volume on AD petitions.

One way to solve this reverse causality problem is to find appropriate instruments for export volume. To this end, we use each of the trade costs described above to pin down the exogenous variations in the export volume. Hence, in the first step of the estimation strategy, we estimate the following equation that relates the log of export volume to each of the modified trade cost variables; the estimated log of export volume is then used as key explanatory variable in the second stage of the regression (Equation 2):

$$exp_{i,j,t} = c_T + \alpha cost_{i,j,t} + \phi z_{i,j,t} + \mu_{ij} + \mu_i + \mu_t + \omega_{i,j,t}, \quad (4)$$

where  $c_T$  is the constant term;  $Cost_{i,j,t}$  is each cost variable in chapter  $i$ , country  $j$  at year  $t$ ;  $\omega_{i,j,t}$  is the idiosyncratic error term; and the rest are defined the same way as in Equation 2. We use three measurements of trade cost for robustness checks. In addition, to show that the cost variable affect AD through the export volume channel, we also estimate the following reduced form equation that directly relates AD petitions to each trade cost:

$$AD_{i,j,t} = c_b + \gamma cost_{i,j,t} + \psi z_{i,j,t} + \mu_{ij} + \mu_i + \mu_j + \mu_t + r_{i,j,t}. \quad (5)$$

### 3. Results

#### 3.1. Ordinary Least Squares Estimates

Table 4 presents the one-step OLS estimate of Equation 2. While the OLS estimate of export volume is inconsistent due to the endogeneity issue mentioned above, it nonetheless provides a useful starting point for investigating the direction of bias in relation to the true estimate of trade volume on AD petitions.

A few results can be gleaned. First, the most basic regression without any controls produces a positive estimate of trade with respect to AD petitions ( $\beta$ ) of 0.0945 (Column 1, Table 4). Besides the endogeneity issue, a potential problem with the estimate is that it may be spurious, reflecting the presence of a third variable—specifically the time trends in influencing the movements of the export volume and AD petitions. If this were true, a large  $R^2$  would be symptomatic. The computed  $R^2$ , nonetheless, is in fact very small (0.013) suggesting that the estimate is unlikely to be spurious.

Second, when the section-specific dummy is included as an additional control, the estimated  $\beta$  becomes 0.101 and the model's fit as indicated by the  $R^2$  improves. This and other controls are important to handle the omitted variables that affect AD petitions, but may be correlated with export volume.

Third, interestingly with the inclusion of all controls, the estimate of  $\beta$  decreases to 0.0212 while the model's fit significantly improves to 0.780 (Column IV). The inclusion of chapter-country specific dummy, which accounts for the cross-section fixed effects, together with the section specific dummy leads to a noticeable decline in  $\beta$  to 0.0111 (Column III) compared to the inclusion of the section specific dummy alone (Column II). The estimate only increases marginally afterward, when the chapter dummy and the country dummy, which accounts for the time invariant effects (Column IV), and the year dummy, which captures the broad macroeconomic factors that affect all chapters and countries (Column V), are included. Finally, when the dependent variable is expressed AD dummy, the  $\beta$  estimate is still positive (0.0045) and the  $R^2$  is 0.849.

Overall, Table 4 shows that the OLS estimates first decreases and then increases when the section, country-chapter, chapter, country, and year dummies are included in successive steps. This suggests that the OLS estimates are biased. One reason for this bias is the negative reverse causal relationship between AD petitions and export volume. A second possible reason could be the measurement error in the PRC's economic data, which is common among developing countries (Deaton 2005). If this measurement error were classical,<sup>6</sup> the OLS estimates would be biased towards zero and the estimated effect of trade volume on AD petitions would be attenuated. These factors confound the causal relationship when estimated using OLS regression. Hence, it is important to use instruments for exports in order to obtain consistent estimates of the causal effect of interest.

### 3.2. Reduced Form Estimates

Table 5 reports the OLS results of Equation 5, the reduced form equation of AD petitions on the different trade cost instrumental variables individually and then together in one estimation. (All the estimations include all the control variables).

Each individual trade cost (*DocumentsIV*, *TimeIV*, and *ContainerIV*) is a statistically significant predictor of AD petitions (Columns I to III, Table 5). However, when all trade cost variables are included in one estimation, *ContainerIV* is the only statistical significant predictor (Column IV). Specifically, a one standard deviation increase in the trade cost reduces the number of AD petitions from 12 percentage points (Column I) to 40 percentage points (Column III).<sup>7</sup> Comparing the results across Columns I-III, the impact of *ContainerIV* is the largest. The same is true when all the trade costs are included in one equation (Column IV). What is notable is that *ContainerIV* is the only statistical significant variable, and it still has an impact as large as 40 percentage points on AD petitions— similar to the case when only *ContainerIV* is included in the estimation (Column III).

<sup>6</sup> Classical measurement error means that the measurement error in the explanatory variable has mean zero, is uncorrelated with the true dependent and other independent variables, and is also uncorrelated with the true error term in the equation.

<sup>7</sup> To calculate the percentage point changes, the estimated coefficient of a trade cost is multiplied by its corresponding standard deviation from Table 3. For example, the 12 percentage points in Column I is  $0.343 \times 0.350 \times 100\%$ . The same calculation is done when all three trade costs are included in the estimation— calculate individual changes and then sum the results. We follow the same calculation in the first step of the two-stage least square estimations. See Lin and Sim (2013) for similar calculations.

When the dependent variable is the *AD dummy*, the preceding observations are still evident. Individually, each trade cost is a statistical predictor of AD activities, but when combined, only *ContainerIV* is statistically significant. And more important, either individually or together, the estimated coefficient of *ContainerIV* is the largest—a one standard deviation increase in *ContainerIV* raises the probability of AD petitions by 5.3 percentage points (Column VIII), close to the 5.1 percentage points increase in Column VII.

### 3.3. Two-Stage Least Squares Estimates

Table 6 presents the two-stage least squares results of Equation 2. Likewise, the different columns indicate the inclusion of each trade cost individually or together in one equation.

Several key results can be observed. First, export volume is a statistically significant predictor of AD petition regardless of which trade cost is used (the first row of results of Table 6). Second, the estimated coefficient of export volume is relatively tight around 0.20 to 0.28 across the different specifications, highlighting the robustness of the overall estimation. Third, all the trade costs are useful instruments for export volume as they are statistically significant at the 1 % level as shown in the first-stage of the regression results. This is further supported by the large F-statistics of over 300 in the first stage regression, which is well above the rule-of-thumb of 10 suggested by Staiger and Stock (1997). Fourth, that said, the choice of *ContainerIV* as the key instrument rather than together with the other trade costs is preferable; it produces a marginally higher coefficient of 0.004 compared to Column III, but at a lower cost having only one instrument rather than three. Fifth, the one-step OLS estimate as shown in Table 4 clearly underestimates the impact of export volume on AD petitions. In particular, the OLS estimate (Column V, Table 4) only captures 7.6 % of the impact of about 0.3 estimated by the two-stage least squares (Column IV, Table 6). This is a large underreporting of the potential impact of the PRC's export volume on AD petitions—it underscores the importance of accounting for the endogeneity of export in this line of empirical literature.

Similar results are obtained from the use of *AD dummy* as the dependent variable. The two-stage least squares estimates are very tight ranging from 0.030 to 0.036 underpinning the robustness of the result across different specification. Still, the estimates in Column III and Column IV are identical indicating the relative importance of *ContainerIV* as a key instrument for export volume. Likewise, the two-stage least squares estimates affirm that the OLS estimates are downward biased. Comparing the case of all trade costs are included as instruments, the OLS estimate of around 0.0045 (Column VI, Table 4) only captures 12.5 % of the effect of the PRC's trade on the probability of AD petitions based on the two-stage least squares estimate of 0.036 (Column IV, Table 6).

### 3.4. Additional Results

Table 7 presents additional results focusing on the type of countries that instigated the AD petitions against the PRC (developed, developing, and Asian), and on the Sections where the AD petitions are concentrated (cluster and others). As discussed in Section 2 of the paper, the intensity in which developed and developing countries use AD petitions varies. Hence, there is no reason to assume that the earlier results apply to both developed and developing countries.

In addition, we also look more closely on the case where the Asian countries<sup>8</sup> (India, Indonesia, the Republic of Korea, and Turkey) are the instigators, which may represent more direct competitors of the PRC. Separately, we compare the case where AD petitions are concentrated (in Sections 6, 11, 15, and 16) versus the remaining case (other Sections). The former represents more than 70 % of total AD petitions against the PRC.

Comparing with the baseline second-stage results of full sample of 0.278 (for *AD number*) and 0.036 (for *AD dummy*) in Column IV, Table 6, the export volume effect on *AD number* is higher for developed countries (0.348) than for developing countries (0.215). For *AD dummy*, the impact of export volume is greater for developing countries (0.039), compared with 0.035 for developed countries. This implies that although developed countries instigate more AD petitions than developing countries, the chances of developing countries doing so are greater. However, for the Asian countries, the export volume effect on AD petition is the greatest—the impact on *AD number* is 0.614, and for *AD dummy* is 0.108, which are larger than those for the overall developed and developing countries. This seems to suggest the presence of greater direct competition between the PRC and its Asian trading partners.

In the first-stage of the estimation results, the negative effect of trade costs on export is larger for developed countries, smaller for developing countries and even smaller for Asian developing countries. The total effect of a one standard deviation increase in trade cost is a decline in export by 317 % for developed countries, 125.6 % for developing countries, and 65.7 % for Asian developing countries. The baseline result from Column IV, Table 6, is 164.5 %. This suggests trade costs matter more in the developed countries than in the developing countries, even though the observed costs are less for the developed countries than the developing countries. Trade costs matter even less for the Asian developing countries. Since the trade costs of the developed countries are already low, the marginal effect of a one unit increase in the trade costs will be very large. In contrast, for the developing countries, since the trade costs are high, the marginal effect of a one unit increase in the costs will be lower.

The negative effect of trade costs on exports is smaller for cluster sections, and larger for other sections. The total effect of a one standard deviation increase in the trade costs is a decline in exports by 141.4 % for cluster sections and 257.1 % for other sections. This means that the increase in trade costs leads to a smaller fall in the export of cluster sections versus the export in other sections. The smaller fall in the export of cluster sections implies more cluster sections' goods will be exported, which in turn suggests that goods in the cluster sections are the ones that will face the most AD petitions. The latter as we know is consistent with the data—most AD petitions are concentrated at the cluster sections. Similar observations and interpretations apply to the results with *AD dummy*.

### 3.5. Robustness Checks

Table 8 presents the results of four robustness checks. First, instead of using the lagged trade share,  $\theta_{i,j,t-1}$ , in Equation 1, the contemporaneous trade share,  $\theta_{i,j,t}$  is used (Column I).

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<sup>8</sup> For data consistency, we follow UNCTAD's definition.

Second, instead of using the export volume sourced from exporting countries, the import volume from importing countries is used (Column II).<sup>9</sup> Feenstra et al. (2005) mention that data reported by importing countries tend to be more accurate because exporting countries tend to underreport the trade value. For the PRC, goods sent to Hong Kong, China for reexport say to the US is not recorded in the PRC data, but these are recorded by the US. In addition, Ferrantino et al. (2008) find strong evidence of underreporting of PRC exports to avoid the value-added tax.

Third and fourth robustness checks comprise the inclusion of two explanatory variables which may be important in determining AD petitions: exchange rate levels (Column III),<sup>10</sup> and retaliatory AD petitions (Column IV). Mah (2000), Irwin (2004), Jallab et al. (2006), and Zhou and Cuyvers (2009) find that exchange rate levels are an important determinant of AD actions. On the other hand, the AD petitions instigated by the PRC may also lead to retaliatory actions against the country. Prusa (2001), Sanguinetti and Bianchi (2005) and Vandebussche and Zanardi (2008), for example, find that many countries appear to file AD actions against countries that have previously investigated them or currently taking AD against them.<sup>11</sup>

Overall, the results from the different robustness checks are supportive of the baseline results in Column IV, Table 6.<sup>12</sup> From Column I, Table 8, the baseline results are robust to using the contemporaneous trade share in the construction of chapter-specific trade costs. Note the estimated coefficients of exports with respect to *AD number* and *AD dummy* of 0.281 and 0.0034, respectively, are very close to 0.278 and 0.036, respectively, of the baseline results. In addition, in the first-stage of the regression, a one standard deviation increase in the trade costs leads to an increase of the export volume by 193 percentage points. Again this is close to the 164.5 percentage points increase recorded in the baseline results.

From Column II, Table 8, if the export volume is recorded from the importing countries' perspective, the impact on AD activities are slightly greater: 0.345 for *AD number*, and 0.044 for *AD dummy*. These estimates are slightly greater than the benchmark results reported in Table 6 (Column IV, also using the three instruments), and hence are consistent with the a priori that the export numbers recorded by importing countries tend to be greater, which implies larger estimated coefficients.

Likewise from Columns III (exchange rate) and IV (petitions by the PRC), the second-stage and first-stage results are very close to the baseline numbers. From Column III, the estimated

<sup>9</sup> The import volume is obtained by deflating a country's import value from the PRC by the 2005 US CPI. The import value is sourced from the UN Comtrade.

<sup>10</sup> Annual average exchange rates are obtained from the UNCTAD online database: <http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx>. The local currency to the US dollar rate is used given that the bulk of international trade is carried in US dollar. Bank for International Settlements (2013) identifies that over 80% of daily foreign exchange turnover involves the US dollar.

<sup>11</sup> We use a dummy to measure whether a country has previously instigated AD petitions. If a country that has previously instigated or currently taking AD petition against the PRC, the dummy will take on a value of one, otherwise, zero.

<sup>12</sup> This refers to the second-stage results where DocumentsIV, TimeIV, and ContainerIV, are all included as instruments.

coefficient of trade to *AD number* is 0.278, and to *AD dummy* is 0.035; while from Column IV, there are 0.289, and 0.036, respectively. (Baseline results are 0.278 and 0.036, respectively.) Again, a one standard deviation in the trade costs increase export volume by 163.2 percentage points in Column III, and 169.9 percentage points in Column IV, which is close to the 164.5 percentage points in the baseline result.

#### 4. Conclusions

This paper quantifies the impact of the PRC's exports on the AD petitions filed against the country from 2006 to 2010, which coincide with the period of the global financial crisis, when AD petitions are more rampant. The PRC is an obvious focus, besides being the largest exporter in the world, it is also the country that receives the most AD petitions accounting for about 40% of the total number AD petitions filed by its major trade partners.

Based on the World Bank's *Doing Business* project, this study uses documents required, time taken, and container cost incurred when goods are traded across borders as instruments for export volume. It finds export volume to have a positive and statistically significant impact on AD petitions. Specifically, a unit rise in the PRC's export volume leads to an approximately 0.3 percentage point increase in the number of AD petitions against the PRC, and a 3.6 % chance of receiving an AD petition. These results are robust to differences in the construction of the instrument variables, and the definition of export volume, as well as the inclusion of additional explanatory variables. More important, these results are 10 times larger than the OLS estimates that ignore the endogeneity issue.

These results point to several policy implications. First, the magnitude by which a country (in this case, the PRC) faces AD petitions is actually much higher than the conventional OLS measure. This implies a big exporting country is likely to face a larger number of AD petitions than commonly thought. Second, since it is the exporting country that faces AD petitions, it is the exporting country that will be particularly disadvantaged by the inadequacy of the current trade statistics that fail to properly account for the prevalence of production fragmentations in international trade. In such an environment, it is the exporting country of final goods that is landed with the AD petitions even when various components of the final products—often higher value-added ones—are made in many other countries. The role of the exporting country is mainly that of lower value-added activity of assembling the components into final products for exports. The PRC stands out because half of its manufacturing exports are produced by processing plants that assemble imported parts and components into final goods for export (Feenstra and Hanson 2005). In addition, within export processing plants, especially those labeled as relatively sophisticated electronic devices, domestic value-added as a share of total exports is only about 30 % or less (Koopman et al., 2012). Third, the weakness of the current trade statistics, that fail to properly account for a country true value-added, presents an important policy role for international organizations. In this regard, given the absence of direct commercial and national interests, but a common world interest, international organizations should regularly convey in various regional and international the economic fallacy of using AD petitions against another country.



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**Table 1. Antidumping Investigations by the People's Republic of China (PRC)'s Major Trading Partners from 2006 to 2010**

| Major Trading Partners of the PRC | Total | Investigations on the PRC | Share of the PRC |
|-----------------------------------|-------|---------------------------|------------------|
| Australia                         | 34    | 10                        | 29.4             |
| Canada                            | 19    | 10                        | 52.6             |
| European Union                    | 93    | 43                        | 46.2             |
| United States                     | 78    | 47                        | 60.3             |
| Argentina                         | 80    | 33                        | 41.3             |
| Brazil                            | 96    | 31                        | 32.3             |
| Colombia                          | 28    | 21                        | 75.0             |
| Indonesia                         | 31    | 6                         | 19.4             |
| India                             | 202   | 59                        | 29.2             |
| Korea, Republic of                | 30    | 7                         | 23.3             |
| Mexico                            | 14    | 10                        | 71.4             |
| Peru                              | 12    | 4                         | 33.3             |
| Turkey                            | 45    | 21                        | 46.7             |
| South Africa                      | 15    | 8                         | 53.3             |
| Total                             | 777   | 310                       | 39.9             |

Notes: The countries are the 29 major trading partners of the People's Republic of China, including 16 countries in the EU, which are Austria, Belgium, Denmark, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, The Netherlands, Poland, Portugal, Sweden, Spain, and the United Kingdom.

Source: Bown (2012).

**Table 2. Antidumping Information against the People's Republic of China by Section at 2-digit HS Code from 2006 to 2010**

| Major Trading Partners of the PRC | Section |    |    |   |    |    |    |    |    |    |    |    |    | Total |
|-----------------------------------|---------|----|----|---|----|----|----|----|----|----|----|----|----|-------|
|                                   | 4       | 6  | 7  | 9 | 10 | 11 | 12 | 13 | 15 | 16 | 17 | 18 | 20 |       |
| Australia                         | 1       | 1  | 0  | 1 | 1  | 0  | 0  | 2  | 3  | 0  | 1  | 0  | 0  | 10    |
| Canada                            | 0       | 0  | 0  | 0 | 0  | 0  | 1  | 0  | 7  | 1  | 0  | 0  | 1  | 10    |
| EU                                | 1       | 9  | 2  | 1 | 1  | 1  | 0  | 3  | 13 | 7  | 3  | 1  | 1  | 43    |
| United States                     | 0       | 11 | 2  | 1 | 3  | 4  | 0  | 1  | 16 | 6  | 0  | 0  | 3  | 47    |
| Argentina                         | 0       | 2  | 1  | 1 | 1  | 3  | 1  | 2  | 8  | 8  | 2  | 2  | 2  | 33    |
| Brazil                            | 0       | 2  | 4  | 0 | 0  | 5  | 1  | 2  | 4  | 4  | 1  | 3  | 5  | 31    |
| Colombia                          | 0       | 0  | 0  | 0 | 0  | 11 | 0  | 0  | 7  | 3  | 0  | 0  | 0  | 21    |
| Indonesia                         | 0       | 1  | 0  | 0 | 0  | 0  | 0  | 0  | 4  | 1  | 0  | 0  | 0  | 6     |
| India                             | 0       | 25 | 5  | 1 | 0  | 3  | 0  | 3  | 6  | 12 | 4  | 0  | 0  | 59    |
| Korea, Rep. of                    | 0       | 2  | 2  | 0 | 1  | 1  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 7     |
| Mexico                            | 0       | 0  | 0  | 0 | 0  | 1  | 0  | 0  | 6  | 1  | 0  | 0  | 2  | 10    |
| Peru                              | 0       | 0  | 0  | 0 | 0  | 2  | 2  | 0  | 0  | 0  | 0  | 0  | 0  | 4     |
| Turkey                            | 0       | 1  | 2  | 2 | 0  | 8  | 0  | 3  | 4  | 1  | 0  | 0  | 0  | 21    |
| South Africa                      | 0       | 2  | 1  | 0 | 0  | 1  | 0  | 1  | 3  | 0  | 0  | 0  | 0  | 8     |
| Total                             | 2       | 56 | 19 | 7 | 7  | 40 | 5  | 18 | 81 | 44 | 11 | 6  | 14 | 310   |

Notes: Only information on 13 sections is included. There is no antidumping information on the other nine sections. Section 1 refers to live animals, animal products; 2, vegetable products; 3, animal or vegetable fats and oils and their cleavage products, etc.; 4, prepared foodstuffs, beverages, spirits and vinegar, tobacco, etc.; 5, mineral products; 6, products of the chemical or industries allied; 7, plastics and articles thereof rubber and articles thereof; 8, raw hides and skins, leather, fur skins and articles thereof, etc.; 9, wood and articles of wood, wood charcoal, cork and articles of cork, etc.; 10, pulp of wood or of other fibrous cellulosic material, paperboard, etc.; 11, textiles and textile articles; 12, footwear, headgear, umbrellas, sun umbrellas, walking-sticks, seat-sticks, etc.; 13, articles of stone, plaster, cement, asbestos, mica or similar materials, etc.; 14, natural or cultured pearls, precious or semi-precious stones, precious metals, etc.; 15, base metals and articles of base metal; 16, machinery and mechanical appliances, electrical equipment, etc.; 17, vehicles, aircraft, vessels and associated transport equipment; 18, optical, photographic, cinematographic, measuring, checking, etc.; 19, arms and ammunition; parts and accessories thereof; 20, miscellaneous manufactured articles; 21, works of art, collectors pieces and antiques; 22, commodities and transactions not classified according to kind.

Source: Bown (2012).

Table 3. Summary Statistics

| Variable           | Obs.   | Mean   | Std. Dev. | Min      | Max    |
|--------------------|--------|--------|-----------|----------|--------|
| <i>AD number</i>   | 11,400 | 0.356  | 2.518     | 0        | 14     |
| <i>AD dummy</i>    | 11,400 | 0.067  | 0.249     | 0        | 1      |
| Trade share        | 10,998 | 0.013  | 0.043     | 2.81e-10 | 0.969  |
| <i>Exports</i>     | 10,998 | 16.397 | 3.059     | 0        | 25.034 |
| <i>Documents</i>   | 11,316 | 1.673  | 0.346     | 0.693    | 2.565  |
| <i>Time</i>        | 11,316 | 2.540  | 0.576     | 1.609    | 3.871  |
| <i>Container</i>   | 11,316 | 6.992  | 0.294     | 6.402    | 7.626  |
| <i>DocumentsIV</i> | 10,950 | 1.656  | 0.350     | 0.0425   | 2.565  |
| <i>TimeIV</i>      | 10,950 | 2.515  | 0.577     | 0.055    | 3.871  |
| <i>ContainerIV</i> | 10,950 | 6.902  | 0.412     | 0.222    | 7.626  |

AD=antidumping, Obs. = observation, Std. Dev. = standard deviation, Min = minimum, Max = maximum.

Notes: *AD number* refers to the number of AD petitions filed in a chapter by a country in each year from 2006 to 2010. *AD dummy* refers to the case where a country files an AD petition in a chapter in a year. and takes on a value of one, otherwise, zero. Trade share is the ratio of a country import of chapter *i* goods from the PRC over its total imports from the PRC. *Exports* are in real or volume terms derived as the log of nominal exports deflated by the US CPI. *Documents* refer to the log of the number of documents required per shipment to import goods into a country. *Time* refers to the log of the number of days calculated for a procedure (trade contract) that is initiated until it is completed. *Container* refers to the log of the fees levied on a 20-foot container in US dollar. *DocumentsIV*, *TimeIV*, and *ContainerIV*, are derived from the multiplication of each trade share with *Documents*, *Time*, and *Container*, respectively.

Source: Authors' calculations.

**Table 4. Ordinary Least Squares Regression: Antidumping Petitions on Exports**

|                 | <i>AD Number</i>      |                      |                    | <i>AD Dummy</i>      |                      |                         |
|-----------------|-----------------------|----------------------|--------------------|----------------------|----------------------|-------------------------|
|                 | I                     | II                   | III                | IV                   | V                    | VI                      |
| <i>Exports</i>  | 0.0945***<br>(0.0112) | 0.101***<br>(0.0142) | 0.0111<br>(0.0121) | 0.0260**<br>(0.0130) | 0.0212**<br>(0.0102) | 0.00450***<br>(0.00119) |
| Section         | No                    | Yes                  | Yes                | Yes                  | Yes                  | Yes                     |
| Chapter×Country | No                    | No                   | Yes                | Yes                  | Yes                  | Yes                     |
| Chapter         | No                    | No                   | No                 | Yes                  | Yes                  | Yes                     |
| Country         | No                    | No                   | No                 | Yes                  | Yes                  | Yes                     |
| Year            | No                    | No                   | No                 | No                   | Yes                  | Yes                     |
| n               | 10,998                | 10,998               | 10,998             | 10,998               | 10,998               | 10,998                  |
| R <sup>2</sup>  | 0.013                 | 0.041                | 0.772              | 0.779                | 0.780                | 0.849                   |

AD=Antidumping.

Notes: *AD Number*, *AD Dummy*, and *Exports* are defined as per the note to Table 3. Robust standard errors are reported in the parentheses. Statistical significance at the 10%, 5%, and 1% levels are indicated by \*, \*\*, and \*\*\* respectively.

Source: Authors' calculations.

**Table 5. Reduced Form Regression: Antidumping Petitions on Instrumental Variables**

|                    | <i>AD Number</i>     |                      |                      |                       |                      | <i>AD Dummy</i>      |                      |                       |
|--------------------|----------------------|----------------------|----------------------|-----------------------|----------------------|----------------------|----------------------|-----------------------|
|                    | I                    | II                   | III                  | IV                    | V                    | VI                   | VII                  | VIII                  |
| <i>DocumentsIV</i> | -0.343***<br>(0.109) |                      |                      | -0.165<br>(0.121)     | -0.039**<br>(-0.018) |                      |                      | -0.0065<br>(0.019)    |
| <i>TimeIV</i>      |                      | -0.534***<br>(0.171) |                      | 0.120<br>(0.204)      |                      | -0.083***<br>(0.021) |                      | 0.0001<br>(0.023)     |
| <i>ContainerIV</i> |                      |                      | -0.960***<br>(0.224) | -0.997***<br>(-0.242) |                      |                      | -0.124***<br>(0.028) | -0.123***<br>(-0.030) |
| Section            | Yes                  | Yes                  | Yes                  | Yes                   | Yes                  | Yes                  | Yes                  | Yes                   |
| Chapter×Country    | Yes                  | Yes                  | Yes                  | Yes                   | Yes                  | Yes                  | Yes                  | Yes                   |
| Chapter            | Yes                  | Yes                  | Yes                  | Yes                   | Yes                  | Yes                  | Yes                  | Yes                   |
| Country            | Yes                  | Yes                  | Yes                  | Yes                   | Yes                  | Yes                  | Yes                  | Yes                   |
| Year               | Yes                  | Yes                  | Yes                  | Yes                   | Yes                  | Yes                  | Yes                  | Yes                   |
| N                  | 10,950               | 10,950               | 10,950               | 10,950                | 10,950               | 10,950               | 10,950               | 10,950                |
| R <sup>2</sup>     | 0.780                | 0.780                | 0.780                | 0.780                 | 0.846                | 0.846                | 0.846                | 0.820                 |

AD=Antidumping.

Notes: *AD number*, *AD dummy*, *DocumentsIV*, *TimeIV*, and *ContainerIV*, are defined as per the note to Table 3. Robust standard errors are reported in the parentheses. Statistical significance at the 10%, 5%, and 1% levels are indicated by \*, \*\* and \*\*\* respectively.

Source: Authors' calculations.



Table 6. Two-Stage Least Squares: Antidumping Petitions on Exports

|                                      | I                    | II                   | III                  | IV                   |
|--------------------------------------|----------------------|----------------------|----------------------|----------------------|
| <b>Second Stage</b>                  |                      |                      |                      |                      |
| Dependent Variable: <i>AD Number</i> |                      |                      |                      |                      |
| <i>Exports</i>                       | 0.270***<br>(0.086)  | 0.204***<br>(0.064)  | 0.282***<br>(0.048)  | 0.278***<br>(0.047)  |
| R <sup>2</sup>                       | 0.780                | 0.776                | 0.779                | 0.780                |
| Dependent Variable: <i>AD Dummy</i>  |                      |                      |                      |                      |
| <i>Exports</i>                       | 0.030**<br>(0.014)   | 0.032***<br>(0.008)  | 0.036***<br>(0.006)  | 0.036***<br>(0.006)  |
| R <sup>2</sup>                       | 0.843                | 0.846                | 0.844                | 0.845                |
| <b>First Stage</b>                   |                      |                      |                      |                      |
| Dependent Variable: <i>Exports</i>   |                      |                      |                      |                      |
| <i>DocumentsIV</i>                   | -1.269***<br>(0.144) |                      |                      | -0.266*<br>(0.148)   |
| <i>TimeIV</i>                        |                      | -2.613***<br>(0.154) |                      | -0.374*<br>(0.207)   |
| <i>ContainerIV</i>                   |                      |                      | -3.409***<br>(0.367) | -3.242***<br>(0.388) |
| Section                              | Yes                  | Yes                  | Yes                  | Yes                  |
| Chapter×Country                      | Yes                  | Yes                  | Yes                  | Yes                  |
| Chapter                              | Yes                  | Yes                  | Yes                  | Yes                  |
| Country                              | Yes                  | Yes                  | Yes                  | Yes                  |
| Year                                 | Yes                  | Yes                  | Yes                  | Yes                  |
| N                                    | 10,950               | 10,950               | 10,950               | 10,950               |
| IV- F-statistics                     | 420                  | 457                  | 312                  | 300                  |
| R <sup>2</sup>                       | 0.908                | 0.910                | 0.916                | 0.916                |

AD=Antidumping.

Notes: *AD Number*, *AD Dummy*, *Exports*, *DocumentsIV*, *TimeIV*, and *ContainerIV*, are defined as per the note to Table 3. IV-F-statistics is the first-stage weak instrument F-statistics. Robust standard errors are reported in the parenthesis. Statistical significance at the 10%, 5%, and 1% levels are indicated by \*, \*\* and \*\*\* respectively.

Source: Authors' calculations.

**Table 7. Two-Stage Least Squares (Additional Results): Antidumping Petitions on Exports**

|                                      | Developed            | Developing           | Asian                | Cluster              | Others               |
|--------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| <b>Second Stage</b>                  |                      |                      |                      |                      |                      |
| Dependent Variable: <i>AD Number</i> |                      |                      |                      |                      |                      |
| <i>Exports</i>                       | 0.348***<br>(0.070)  | 0.215***<br>(0.054)  | 0.614**<br>(0.304)   | 0.376***<br>(0.072)  | 0.076***<br>(0.023)  |
| R <sup>2</sup>                       | 0.780                | 0.776                | 0.817                | 0.779                | 0.780                |
| Dependent Variable: <i>AD Dummy</i>  |                      |                      |                      |                      |                      |
| <i>Exports</i>                       | 0.035***<br>(0.008)  | 0.039***<br>(0.008)  | 0.108***<br>(0.039)  | 0.042***<br>(0.009)  | 0.024***<br>(0.005)  |
| R <sup>2</sup>                       | 0.941                | 0.725                | 0.805                | 0.894                | 0.763                |
| <b>First Stage</b>                   |                      |                      |                      |                      |                      |
| Dependent Variable: <i>Exports</i>   |                      |                      |                      |                      |                      |
| <i>DocumentsIV</i>                   | 1.014***<br>(0.305)  | 0.595**<br>(0.260)   | 0.298*<br>(0.170)    | -0.066<br>(0.221)    | -0.685***<br>(0.184) |
| <i>TimeIV</i>                        | -4.382***<br>(0.728) | 0.329<br>(0.223)     | -0.129<br>(0.234)    | -0.498*<br>(0.285)   | 0.027<br>(0.240)     |
| <i>ContainerIV</i>                   | -2.419***<br>(0.527) | -4.014***<br>(0.465) | -1.667***<br>(0.231) | -2.678***<br>(0.373) | -5.697***<br>(0.294) |
| Section                              | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| Chapter×Country                      | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| Chapter                              | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| Country                              | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| Year                                 | Yes                  | Yes                  | Yes                  | Yes                  | Yes                  |
| N                                    | 6,599                | 4,351                | 1,437                | 5,367                | 5,583                |
| IV- F-statistics                     | 286                  | 145                  | 203                  | 150                  | 227                  |
| R <sup>2</sup>                       | 0.953                | 0.926                | 0.804                | 0.932                | 0.915                |

AD=Antidumping.

Notes *AD Number*, *AD Dummy*, *Exports*, *DocumentsIV*, *TimeIV*, and *ContainerIV*, are defined as per the note to Table 3. IV-F-statistics is the first-stage weak instrument F-statistics. Robust standard errors are reported in the parenthesis. Statistical significance at the 10%, 5%, and 1% levels are indicated by \*, \*\*, and \*\*\* respectively.

Source: Authors' calculations.

**Table 8. Two-Stage Least Squares (Robustness Checks): Antidumping Petitions on Export**

|                                      | I                    | II                   | III                  | IV                   |
|--------------------------------------|----------------------|----------------------|----------------------|----------------------|
| <b>Second Stage</b>                  |                      |                      |                      |                      |
| Dependent Variable: <i>AD Number</i> |                      |                      |                      |                      |
| <i>Exports</i>                       | 0.281***<br>(0.048)  | 0.345***<br>(0.055)  | 0.278***<br>(0.047)  | 0.289***<br>(0.049)  |
| R <sup>2</sup>                       | 0.779                | 0.784                | 0.780                | 0.780                |
| Dependent Variable: <i>AD Dummy</i>  |                      |                      |                      |                      |
| <i>Exports</i>                       | 0.034***<br>(0.006)  | 0.044***<br>(0.007)  | 0.036***<br>(0.006)  | 0.035***<br>(0.006)  |
| R <sup>2</sup>                       | 0.838                | 0.850                | 0.845                | 0.846                |
| <b>First Stage</b>                   |                      |                      |                      |                      |
| Dependent Variable: <i>Exports</i>   |                      |                      |                      |                      |
| <i>DocumentsIV</i>                   | -0.382***<br>(0.147) | -0.090<br>(0.129)    | -0.291**<br>(0.150)  | -0.252*<br>(0.147)   |
| <i>TimeIV</i>                        | -1.077***<br>(0.171) | -0.529***<br>(0.207) | -0.321<br>(0.215)    | -0.485**<br>(0.213)  |
| <i>ContainerIV</i>                   | -2.851***<br>(0.327) | -2.500***<br>(0.426) | -3.264***<br>(0.394) | -3.224***<br>(0.389) |
| Section                              | Yes                  | Yes                  | Yes                  | Yes                  |
| Chapter×Country                      | Yes                  | Yes                  | Yes                  | Yes                  |
| Chapter                              | Yes                  | Yes                  | Yes                  | Yes                  |
| Country                              | Yes                  | Yes                  | Yes                  | Yes                  |
| Year                                 | Yes                  | Yes                  | Yes                  | Yes                  |
| n                                    | 10,950               | 10,492               | 10,950               | 10,950               |
| IV- F-statistics                     | 317                  | 345                  | 294                  | 294                  |
| R <sup>2</sup>                       | 0.912                | 0.934                | 0.916                | 0.916                |

AD=Antidumping.

Note: *AD Number*, *AD Dummy*, *Exports*, *DocumentsIV*, *TimeIV*, and *ContainerIV*, are defined as per the note to Table 3. IV-F-statistics is the first-stage weak instrument F-statistics. Robust standard errors are reported in the parenthesis. Statistical significance at the 10%, 5%, and 1% levels are indicated by \*, \*\* and \*\*\* respectively.

Source: Authors' calculations.

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## **The Nexus between Antidumping Petitions and Exports during the Global Financial Crisis**

Evidence on the People's Republic of China

This paper quantifies how the People's Republic of China's (PRC) export volume to its major trading partners during the global financial crisis affects the antidumping (AD) petitions filed by the trading partners against the PRC. The study finds that rising exports from the PRC lead to rising AD petitions against the country. These estimates are about 10 times larger than those found in ordinary least square regressions.

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