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How Exporters Respond to Antidumping Investigations?

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Abstract

Using China Customs data that cover monthly transactions of all Chinese exporters, we investigate how Chinese exporters respond to U.S. antidumping investigations during the 2000-2006 period. Our difference-in-differences analysis uncovers a number of findings: (1) the substantial trade-dampening effect at the product level operates mostly at the extensive margin (i.e., a decrease in the number of exporters) rather than the intensive margin (i.e., a decrease in the export volume per exporter); (2) direct exporters are more likely to exit the U.S. market than trade intermediaries upon both the affirmative preliminary and final ITC determinations; (3) multi-product direct exporters are more likely to exit the U.S. market than single-product direct exporters upon the affirmative preliminary ITC determination, but the opposite holds upon the affirmative final ITC determination; and (4) little price adjustment to antidumping investigations are found at either the product level or firm-product level. We then provide a coherent explanation to the aforementioned findings based on recent developments in trade theories.

Keywords: Antidumping investigations; Difference-in-differences estimation; Extensive and intensive margins; Trade intermediaries; Single-versus multi-product exporters

JEL Codes: F13; D22; F14; L25

1 Introduction

Despite of the increasing trend for international trade due to rounds of reduction in tariffs and advancement in telecommunications and logistics, we have witnessed persistent and even increasing use of contingent trade protection policies (e.g., Prusa, 2001; Zanardi, 2006; Bown, 2011). In particular, governments around the world have resorted to antidumping measures, which are permissible under the World Trade Organization (WTO) rules and regulations, to protect their firms and industries. The widespread use of antidumping measures has intrigued economists to study its consequences. While the existing research generally focuses on the impact of antidumping measures on protected firms and industries,¹ it is also interesting to understand the corresponding impact on affected foreign exporters.² Moreover, in light of the burgeoning literature on firm heterogeneity and trade, it is important to investigate how different exporters may respond to antidumping measures.

This paper makes the following contributions to the literature.³ First, on top of presenting evidence for the trade-dampening effect of antidumping investigations at product level, we anatomize how the trade-dampening effect operates, specifically, whether it is through the decrease in the number of exporters (i.e., extensive margin) or in the trade volume per exporter (i.e., intensive margin). Second, we investigate how different exporters may respond to antidumping investigations, specifically, the possible difference between direct exporters and trade intermediaries, and that between single-product direct exporters and multi-products direct exporters. Third, in addition to examining the impact of antidumping investigations on trade volume, we study whether exporters adjust export prices of the concerned products. Fourth, aside from looking at the effect of antidumping investigations at the point of final imposition of duties, we also examine its effects at other important stages of the antidumping investigation process, such as initiation and preliminary decisions.

Specifically, our research utilizes the antidumping cases imposed by the United States (the U.S.) against Chinese exporters over the 2000-2006 period. The choice of this research setting is motivated by the fact that China has become the world's largest recipient of antidumping measures along with its rise

¹For recent studies, see, for example, Gallaway, Blonigen and Flynn (1999), Konings and Vandenbussche (2008), and Pierce (2011).

²There are a few papers looking at how antidumping duties affect foreign exporters' pricing behavior (Blonigen and Park, 2004), export-destination diversification (Bown and Crowley, 2006, 2007), and FDI strategies for serving foreign markets (Blonigen, 2002).

³For surveys of existing studies on antidumping, see, Blonigen and Prusa (2003) and Falvey and Nelson (2006).

from an insignificant player in the world trade system in 1978 to the world's largest exporter. Meanwhile, the U.S. is the world's second largest initiator of antidumping cases against China, because of its rising trade deficit with China and the apparently related losses of manufacturing jobs in the U.S. To carry out the empirical investigation, we draw data from two courses: China Customs data (2000-2006) and the World Bank global antidumping database. From the first data set, we obtain information of monthly export transactions at the Chinese HS-8 digit product category by all Chinese exporters to the U.S., including export volume, export value and exporter identity. From the second data set, we compile all the antidumping investigations carried out by the U.S. against Chinese exporters at the U.S. HS-10 digit product category over the 2000-2006 period, including information such as initiation date, preliminary determination dates, and final determination dates. The two data sets are then combined at the HS-6 digit product category, which is common to both China and the U.S.

Our identification strategy relies on the comparison of outcome variables (such as export volume and export price) of exporters in the affected product category (the treatment group) with those in the unaffected product category (the control group) before and after the various important stages of the antidumping investigation process, i.e., the difference-in-differences method. Specifically, we use two alternative control groups: first, for a HS-6 digit product that is subject to antidumping investigations, we use as the control group all other unaffected HS-6 digit products within the same HS-4 digit category. Second, we follow Blonigen and Park (2004) in constructing a matched control group based on the likelihood of products being subject to antidumping investigations.

Our main findings are summarized as follows. (1) We find substantial trade-dampening effects of antidumping investigations at HS-6 digit product level at both the date of affirmative preliminary ITC determination and the date of affirmative final ITC determination. Specifically, the affirmative preliminary ITC determination causes the growth of trade volume for the treatment group to lag behind that for the control group by around 32% during the period between the preliminary and final ITC determinations. The affirmative final ITC determination causes the growth of trade volume for the treatment group to further lag behind that for the control group by 65 ~ 66% after the final ITC determination and until the end of our sample period. (2) We show that the trade-dampening effect operates mostly at the extensive margin (i.e., a decrease in the number of exporters) rather than the intensive margin (i.e., a decrease in the export volume per exporter). Specifically, the affirmative preliminary ITC determination causes the growth of the number of exporters for the treatment group to lag behind

that for the control group by around 16% during the period between the preliminary and final ITC determinations. And the affirmative final ITC determination causes the growth of the number of exporters for the treatment group to further lag behind that for the control group by 17% ~ 18% after the final ITC determination and until the end of our sample period. (3) In response to antidumping investigations, direct exporters are found to be more likely to exit the U.S. market than trade intermediaries upon both the affirmative preliminary ITC determination and the affirmative final ITC determination. Meanwhile, we find that multi-product direct exporters are more likely to exit the U.S. market than single-product direct exporters upon the affirmative preliminary ITC determination, but the opposite holds upon the affirmative final ITC determination. (4) We find little Freight On Board (F.O.B.) export price adjustment to antidumping investigations at both the product and firm-product level.

To understand the aforementioned empirical findings, we draw insights from the recent developments in firm heterogeneity and trade. As the F.O.B. export prices are found to barely change, the final sales prices in the U.S. are expected to increase following the imposition of antidumping duties (unless the U.S. importers or retailers completely absorb these antidumping duties, which is an unlikely scenario). The increase in the final sales prices in the U.S. subsequently leads to a decline in the demand of the concerned products, which explains the observed substantial trade-dampening effects of antidumping investigations at the product level.

At the status quo, the shrinking market demand would lead to a decrease in firm revenue across the board, which then causes some exporters to incur losses in the and consequently exit the U.S. market. For example, in the framework of constant markups and fixed costs of exporting (e.g., Melitz, 2003), some less productive exporters may find their revenues not large enough to cover the fixed costs of exporting. In a framework of variable markups (e.g., Melitz and Ottaviano, 2008), the decrease in firm revenue leads to a fall in firm markups, as a result of which some less productive exporters may find their revenue not large enough to cover the variable costs. Under the new equilibrium, however, it is possible that the surviving (and the more productive) exporters could maintain their export volume by absorbing some of the market share left by the exiting exporters.

The observed difference in the exit likelihood between trade intermediaries and direct exporters can be explained by a model of exporting behavior in the presence of trade intermediaries (e.g., Ahn, Khandelwal, and Wei, 2011; Lu, Lu, and Tao, 2011). Specifically, the more productive manufacturers choose to export directly by themselves (these manufacturers are referred to as direct exporters), whereas the less productive manufacturers choose to

export through trade intermediaries (these manufacturers are referred to as indirect exporters). The decrease in firm revenue due to antidumping investigations causes some (less productive) direct exporters switch to export through trade intermediaries and makes some (less productive) indirect exporters exit the U.S. market. As a result, the effect on trade intermediaries is muted as they lose some old clients but also gain some new ones.

The observed differences in the exit likelihood between single-product direct exporters and multi-product direct exporters can be explained by the resource reallocation among different products within the multi-product producers (e.g., Mayer, Melitz and Ottaviano, 2011). Specifically, the negative shocks created by the affirmative preliminary ITC determination may cast greater impacts on multi-product direct exporters than their single-product counterparts, as many multi-product direct exporters can reallocate resources from the affected products to their other, unaffected (especially core) products. This leads to more decrease in revenues generated from the affected product category for multi-product direct exporters than their ex ante equally profitable single-product counterparts, consequently leading to more exit of the former than the latter. However, when the second wave of negative shocks caused by the affirmative final ITC determination hits, the remaining multi-product direct exporters are those with limited room for resource reallocation (e.g., the affected products are their core products). As a result, the negative shocks are expected to cast similar impacts on both single-product and multi-product direct exporters. However, as the productivity threshold of direct exporting for the remaining multi-product direct exporters is lower than that of single-product direct exporters (due to some scope economies enjoyed by the former), negative shocks of the similar magnitude cause a disproportionately more exit of the latter than the former from the U.S. market.

The rest of the paper is organized as follows. Section 2 describes the institutional background of antidumping investigations in the U.S. The estimation strategy is discussed in Section 3, and data is reported in Section 4. Empirical results and then a theoretical explanation are presented in Section 5. The paper concludes with Section 6.

2 Institutional Background of Antidumping Investigations in the U.S.

In this section, we briefly describe the institutional context of antidumping investigations in the U.S. and its relevance to our identification strategy (Staiger and Wolak, 1994).

In the U.S., there are two government bodies involved in the antidumping investigations, the Department of Commerce (DOC) and the International Trade Commission (ITC). The DOC determines whether an imported product under investigation is sold in the U.S. at less than its “fair value”, while the ITC determines whether the imported product has materially injured the relevant U.S. domestic industries. Each of these two bodies makes two determinations, i.e., the preliminary and final determinations.

Once an antidumping petition against an imported product is filed and considered in order, the ITC first makes a preliminary determination within 45 days. If the determination is negative, the investigation is terminated. Otherwise (i.e., affirmative preliminary ITC determination), the DOC conducts its investigation and makes a preliminary determination in the next 115 days. Regardless of the DOC’s preliminary determination (affirmative or negative), the investigation process continues. However, if the DOC’s preliminary determination is affirmative, the importers of the affected imported product have to post a cash deposit or bond to cover the dumping duties payable estimated by the DOC.

After the DOC’s preliminary determination but before the ITC’s final determination, the antidumping investigation can be terminated due to the withdrawal by the petitioners or suspended due to the agreements reached between the affected foreign exporters and the DOC. If an antidumping investigation is neither terminated nor suspended, the investigation moves on to the next stage, in which the DOC makes a final determination within 75 days of its preliminary decision. If the DOC’s final determination is negative, the investigation is terminated. Otherwise, the ITC has 45 (or 75) days to conduct a second round of investigation and make a final determination, depending on whether the DOC’s preliminary determination is affirmative (or negative). Once both the DOC and the ITC reach affirmative final determinations, the DOC must issue an antidumping order to levy antidumping duties within 7 days.

In summary, there are five important date points during an antidumping investigation, the initiation, the preliminary ITC determination, the preliminary DOC determination, the final DOC determination, and the final ITC determination.

3 Estimation Strategy

3.1 Estimation Specification

Our monthly export transaction data, in contrast to the yearly data used in most of the existing literature, allow us to investigate if there are differential exporters' responses to different stages of the antidumping investigation process. As noted in the Section 2, there are five stages in an antidumping investigation: initiation of the case, preliminary ITC determination, preliminary DOC determination, final DOC determination, and final ITC determination. Given that the DOC makes affirmative determinations in most of the antidumping petitions, we focus on the remaining three dates in the antidumping investigation, i.e., the initiation date, preliminary ITC determination, and final ITC determination. The affirmative final ITC determination leads to an imposition of dumping duties, which consequently increases the costs for the U.S. importers of the concerned export products. The affirmative preliminary ITC determination, in combination with (almost certain) affirmative preliminary DOC determination, would make it a requirement for the U.S. importers to pay a deposit as a bond for the expected dumping duties. Even the initiation of the antidumping investigation might have an effect on U.S. importers, as it brings uncertainty to their businesses. We therefore expect progressively negative responses of exporters to the three stages of the antidumping investigation (initiation, preliminary ITC determination, and final ITC determination).

To identify the possible effects of antidumping investigations, we employ the difference-in-differences (DID) estimation strategy at both the product level (defined at HS-6 digit) and the firm-product level. Specifically, we exploit two sources of variations, time variation (before and after a critical date point of the antidumping investigation process) and cross-sectional variation (affected products/firms or the treatment group, and unaffected products/firms or the control group). The identification relies on the comparison of the outcome variables of the treatment group with those of the control group both before and after the relevant stages of the antidumping investigation process.

The estimation specification at the product-level takes the following form

$$y_{pt} = \beta_1 Treatment_p \times Post_{pt}^1 + \beta_2 Treatment_p \times Post_{pt}^2 + \beta_3 Treatment_p \times Post_{pt}^3 + \lambda_p + \lambda_t + \varepsilon_{pt}, \quad (1)$$

where y_{pt} is the outcome variable (i.e., the logarithm of export volume, the logarithm of the number of exporters, and the logarithm of export price)

for product p in month t ; $Treatment_p$ is a dummy variable, taking value of 1 if product p belongs to the treatment group (i.e., being investigated for dumping) and 0 otherwise; λ_p is the product dummy, capturing all time-invariant product characteristics; λ_t is the month dummy, capturing common effects to all products in the same month; and ε_{pt} is an error term. The three time variables corresponding to the three date points of the antidumping investigation process are constructed as follows,

$$Post_{pt}^1 = \begin{cases} 1 & \text{if } t \in [t_{p0}, t_{p1}) \\ 0 & \text{otherwise} \end{cases}, \quad (2)$$

$$Post_{pt}^2 = \begin{cases} 1 & \text{if } t \in [t_{p1}, t_{p2}) \\ 0 & \text{otherwise} \end{cases}, \quad (3)$$

and

$$Post_{pt}^3 = \begin{cases} 1 & \text{if } t \geq t_{p2} \\ 0 & \text{otherwise} \end{cases}, \quad (4)$$

where t_{p0} is the date of the initiation (specifically, the month in which the case is initiated) for product p ; t_{p1} is the date of the preliminary ITC determination for product p ; and t_{p2} is the date of the final ITC determination for product p . The coefficients of interest in this study are: β_1 , β_2 and β_3 . To deal with the potential heteroskedasticity and serial correlation, we cluster the standard errors at the product-level (see Bertrand, Duflo, and Mullainathan, 2004).

The estimation specification for the firm-product level analysis is similar to equation (1), with the only change being the replacement of the outcome variable y_{pt} at the product level by those at the firm-product level.

3.2 Estimation Issues

Before proceeding to the next section on data, we discuss a few estimation issues in this sub-section.

First, we construct two alternative sets of control groups. The first set of control group encompasses all unaffected products/firms within the same HS-4 digit product category where the affected products/firms belong to (referred to as *Control Group 1*). The second set of control group is a matched group (referred to as *Control Group 2*), constructed using the method of Blonigen and Park (2004). Specifically, we first estimate the probability of a product being charged with antidumping duties (see Table A.1 of the Appendix for the logit regression results). The variables that are used to predict the probability of being investigated for dumping include the import value of the product, real GDP growth rate in the U.S., exchange rate index, a dummy variable

indicating whether the product was previously charged with antidumping duties, and HS 4-digit product dummy, similar to those used by Blonigen and Park (2004). The matched control group are those unaffected products that have predicted probabilities at least equal to 75th percentile of the predicted probability of the treatment group (see also Konings and Vandebussche, 2008; Pierce, 2011).

Second, the consistent estimation of $\{\beta_1, \beta_2, \beta_3\}$ hinges upon the assumption that the difference in the error term of the pre- and post-antidumping investigation period for the treatment group is the same as the corresponding one for the control group, i.e.,

$$E[\Delta\varepsilon_{pt}|Treatment_p = 1] = E[\Delta\varepsilon_{pt}|Treatment_p = 0]. \quad (5)$$

With a panel data of multiple periods and multiple groups, we conduct two validity checks following Angrist and Pischke (2009) and Imbens and Wooldridge (2009). Firstly, to explicitly check whether there is any difference in time trends between the treatment and control groups before the initiation of antidumping investigation, we add an additional regressor, $Treatment_p \times Pre_{pt}$, where

$$Pre_{pt} = \begin{cases} 1 & \text{if } t \in [t_{p0} - 12, t_{p0}) \\ 0 & \text{otherwise} \end{cases}, \quad (6)$$

and the corresponding regression equation becomes

$$\begin{aligned} y_{pt} = & \beta_0 Treatment_p \times Pre_{pt} + \beta_1 Treatment_p \times Post_{pt}^1 \\ & + \beta_2 Treatment_p \times Post_{pt}^2 + \beta_3 Treatment_p \times Post_{pt}^3 \\ & + \lambda_p + \lambda_t + \varepsilon_{pt}. \end{aligned} \quad (7)$$

Any statistical significance of β_0 would indicate differences in time trends between the treatment and control groups before the initiation of the antidumping investigation, thereby invalidating the DID estimation.

Secondly, to allow for the possibility that different HS-6 digit products may have different time trends, we further include product-specific linear time trends and estimate the following equation

$$\begin{aligned} y_{pt} = & \beta_1 Treatment_p \times Post_{pt}^1 + \beta_2 Treatment_p \times Post_{pt}^2 \\ & + \beta_3 Treatment_p \times Post_{pt}^3 + \lambda_p + \lambda_p \times t + \lambda_t + \varepsilon_{pt}. \end{aligned} \quad (8)$$

A valid DID estimation requires that $\{\beta_1, \beta_2, \beta_3\}$ remain robust to the inclusion of product-specific time trend ($\lambda_p \times t$).

4 Data

Our study draws on data from two sources. The first is China Customs Data for the 2000-2006 period. This data set cover monthly import or export transaction of every Chinese exporter or importer, including specifically product information (classified at the Chinese HS-8 digit level), trade volume, trade value, identity of Chinese exporters or importers, and export destination or importing countries. As our analysis focuses on the antidumping cases by the U.S. against Chinese exporters, we extract information about the monthly export transactions by Chinese exporters to the U.S.

The second data source is the Global Antidumping Database (GAD) from the World Bank, covering all antidumping cases from 1980 to 2010 in the world. The GAD has detailed information on each antidumping case, such as product information (classified at the U.S. HS-10 digit level), initiation date, preliminary determination dates, and final determination dates. For our analysis, we collect all U.S. antidumping cases against China during our sample period (i.e., 2000-2006). There are a total of 47 cases. Two cases (one in early 2000 and the other in late 2006) are dropped as there is not enough pre- or post-antidumping period for us to carry out DID estimation. Next, three cases are dropped because they overlapped with earlier antidumping cases in the same HS-6 product categories (see also Konings and Vandebussche, 2008). 28 cases out of the remaining 42 cases ended up with affirmative final ITC determination (referred to as *successful cases*); 5 out of the 6 cases that had affirmative preliminary ITC determination received negative final ITC determination (referred to as *unsuccessful cases*) and 1 was withdrawn before the final ITC determination (referred to as *withdrawn cases*); and, finally, 8 cases were either withdrawn before the preliminary ITC determination or given the negative preliminary ITC determination (referred to as *terminated cases*). As our analysis looks into the effects of antidumping at the three different stages of the antidumping investigation (i.e., initiation, preliminary ITC determination, and final ITC determination), we focus on a sample of 28 *successful cases* in the main analysis. For a robustness check, we include the *unsuccessful* and *withdrawn cases*, and find our results remain qualitatively the same.⁴ See Table A.2 of the Appendix for a list of all the U.S. antidumping cases against Chinese exporters over the period of

⁴We also experiment with other possible robustness checks involving the change in the sample of cases, such as combining the 28 successful cases with the only withdrawn case (as the withdrawn cases are generally cases that would end up with affirmative final ITC determination) and combining the 28 successful cases with the 5 unsuccessful cases (as they all have date points for preliminary and final ITC determinations), and find qualitatively similar results (available upon request).

2000-2006.

We match the two data sets (i.e., China customs data and the GAD) at the HS-6 digit level, the most disaggregated level at which the two data are comparable. The matched panel data from 2000 to 2006 contain 16,302 product-month level observations and 800,079 firm-product-month level observations. And among the 346 HS-6 digit product categories contained in the matched data, 81 product categories are successfully charged with antidumping duties.⁵

One of the focuses of this paper is to investigate the possible heterogeneous response to antidumping investigations in light of the recent literature on firm heterogeneity and trade. We first follow the method developed by Ahn, Khandelwal, and Wei (2011) for the same data to divide firms of our sample into trade intermediaries and direct exporters. Specifically, trade intermediaries are identified as those firms whose names contain Chinese characters with the English-equivalent meaning of importer, exporter, and/or trading. Furthermore, we divide the sample of direct exporters into two types, single-product firms and multi-product firms. Specifically, a firm is identified as a multi-product firm if it exports more than one HS-6 digit products before the initiation of antidumping investigations. For those products that were subject to antidumping investigations during our sample period, there were 9,356 exporters before the initiation of the antidumping investigations. 3,465 of them were trade intermediaries. Among the remaining 5,891 direct exporters, 627 firms were single-product direct exporters.

As the monthly data is quite noisy, we conduct a robustness check with the quarterly instead of monthly data. Meanwhile, to further alleviate the concerns of outlying observations, we experiment with excluding the top and bottom 1% of the data. Furthermore, as other countries across the world may conduct antidumping investigations of the same products as does the U.S. in the same period, this may confound our results. To alleviate this concern, we experiment with excluding those cases (i.e., all together 4 cases) that were also under antidumping investigations in some other countries.

5 Empirical Findings

In this section, we first provide our four, baseline empirical findings regarding how exporters respond to antidumping investigations in Section 5.1-5.4. Then we present a series of robustness checks on the validity of our DID estimation and other econometric concerns in Section 5.5. Finally, drawing

⁵Note that one antidumping case may involve several HS-6 digit product categories.

recent developments in trade theories, we provide a coherent explanation for our empirical findings in Section 5.6.

5.1 Product-level Quantity Response

We begin by examining the possible trade-dampening effect of antidumping investigations at product level. Before presenting regression results regarding equation (1), we plot time trends of export volume for the treatment and control groups over the pre- and post-antidumping investigation periods in Figures 1a-1d. The upper panel reports the results obtained using *Control Group 1* (i.e., all unaffected HS-6 digit products within the same HS-4 digit product category where the affected product belongs to), while the lower panel reports the results obtained using *Control Group 2* (i.e., the matched control group following Blonigen and Park, 2004). The left panel reports time trends of export volume separately for the treatment group and the respective control group, while the right panel reports the time trend of the difference in export volume between the treatment group and the respective control group. In each figure, there are three vertical dotted dash lines, from the left to the right, marking respectively the date points of the initiation of the antidumping investigation, the preliminary ITC determination, and the final ITC determination.

A few results emerge from these figures. First, there is clearly an upward trend in export volume of both the treatment and control groups before the initiation of the antidumping investigation, consistent with the general trend of increasing Chinese exports to the U.S. in the past decades. Second, more importantly, before the initiation of the antidumping investigation, the treatment and control groups do not exhibit any differential time trends, implying that there is no selection on the outcome variable and hence the validity of our DID estimation. Third, there is a clear dampening effect of antidumping investigations on export volume of the treatment group, consistent with the findings in the literature (e.g., Prusa, 2001; Egger and Nelson, 2011). Fourth, regarding the effects of the three different stages of the antidumping investigations, we observe significant effects of both the affirmative preliminary and affirmative final ITC determinations but not the initiation of the investigation (see also Staiger and Wolak, 1994).

Regression results corresponding to equation (1) are reported in Table 1, where *Control Group 1* and *Control Group 2* are used respectively in Column 1 and Column 2. It is found that both β_2 and β_3 are negative and statistically significant at 1% level, while β_1 is negative albeit statistically insignificant, which are consistent with the findings revealed in Figures 1a-1d. The marginal impact of the affirmative preliminary ITC determination

can be calculated as $\hat{\beta}_2 - \hat{\beta}_1 = -0.322$ (from Column 1) or -0.315 (from Column 2), both significant at 1% level. Meanwhile, the marginal impact of the affirmative final ITC determination can be calculated as $\hat{\beta}_3 - \hat{\beta}_2 = -0.651$ (from Column 1) or -0.665 (from Column 2), both significant at 1% level. In terms of economic magnitude, the affirmative preliminary ITC determination causes the growth of export volume for the treatment group to lag behind that for the control group by around 32% during the period between the preliminary and final ITC determinations. The affirmative final ITC determination causes the growth of export volume for the treatment group to further lag behind that for the control group by 65 ~ 67% after the final ITC determination and until the end of our sample period.⁶

5.2 Extensive versus Intensive Margins

Now that we have documented a substantial dampening effect of the antidumping investigations on export volume, we next anatomize this effect by investigating its underlying mechanism. Specifically, we look at the effect of antidumping investigations on both the number of exporters to the U.S. (extensive margin effect) and the export volume per exporter (intensive margin effect).

Figures 2a-2d plot time trends of the number of exporters for the treatment and control groups over the pre- and post-antidumping investigation periods. Clearly, there is a significant decrease in the number of exporters caused by the antidumping investigations. Specifically, after the initiation but before the preliminary ITC determination, there is barely any change in the number of exporters. However, after the affirmative preliminary ITC determination, the number of exporters decreases sharply, followed by another substantial decrease upon the affirmative final ITC determination.

Figures 3a-3d present time trends of export volume per exporter for the treatment and control groups over the pre- and post-antidumping investigation periods. Similar to the results on the extensive margin, there is a decrease in the export volume per exporter upon the affirmative preliminary ITC determination, followed by another decrease upon the affirmative final ITC determination.

Note that in the above analysis on the extensive margin effect we divide the total export volume by the total number of exporters. That is, for the pre-investigation period, we include those exporters that eventually exited from the US market due to the antidumping investigations, and for the

⁶Prusa (2001) show that, on average, antidumping duties cause the value of imports to fall by 30-50%, while the study of Egger and Nelson (2011) finds a modest impact using structural estimation of the gravity model.

post-investigation period we include those new entrants into the US export market. As a result the aforementioned intensive margin results (Figures 3a-3d) could be compounded by the exit and entry of exporters. To address this possible concern, we carry out another intensive margin effect analysis, i.e., for those surviving exporters. Figures 4a-4d present time trends of export volume of surviving exporters and their control groups over the pre- and post-antidumping investigation periods. Interestingly, in contrast to the aforementioned intensive margin results for all exporters, there is no clear differential time trend between export volume of surviving exporters and their control groups both before and after the antidumping investigation. In other words, we do not find evidence for the intensive-margin effect, and the patterns shown in Figures 3a-3d are mainly caused by the entry and exit of exporters.

Regression results regarding the effects of antidumping investigations on the number of exporters and export volume per exporter (i.e., for all exporters and for surviving exporters, separately) are reported in Table 2. Columns 1-2 report the effects on the number of exporters of the antidumping investigations for the two respective control groups. It is found that both β_2 and β_3 are negative and statistically significant at 1% level, while β_1 is negative albeit statistically insignificant. These results are consistent with the findings revealed in Figures 2a-2d, implying a strong extensive margin effect of the antidumping investigations. In terms of economic magnitude, the affirmative preliminary ITC determination causes the growth of the number of exporters for the treatment group to lag behind that for the control group by around 16% during the period between the preliminary and final ITC determinations (i.e., $\hat{\beta}_2 - \hat{\beta}_1 \simeq -0.16$ with statistical significance at 1% level). And the affirmative final ITC determination causes the growth of the number of exporters for the treatment group to further lag behind that for the control group by 17% ~ 18% after the final ITC determination and until the end of our sample period (i.e., $\hat{\beta}_3 - \hat{\beta}_2 = -0.174 \sim -0.182$ with statistical significance at 1% level).

Columns 3-4 of Table 2 present the results on the export volume per exporter for all exporters of the antidumping investigations for the two respective control groups. It is found that both β_2 and β_3 are negative and statistically significant at 1% level, consistent with the findings revealed in Figures 3a-3d. Columns 5-6 of Table 2 present the results on the export volume per exporter for the surviving exporters of the antidumping investigations for the two respective control groups. Clearly, none of β_1 , β_2 and β_3 has any statistical insignificance at 5% level. Taken together, much of the intensive-margin effect shown in Columns 3-4 of Table 2 are due to the the entry and exit of exporters, and overall there is no evidence for the intensive-

margin effect.

5.3 Heterogeneous Responses

In the previous section, we document a strong extensive margin effect of the antidumping investigations, that is, the number of exporters fall sharply after both the affirmative preliminary and affirmative final ITC determinations. It is curious to know what types of exporters are relatively more likely to exit the export market at these two important dates of the antidumping investigation process. To this end, we follow the recent literature on firm heterogeneity in first looking at the difference between trade intermediaries and direct exporters, and then at the difference between single-product and multi-product direct exporters.

Table 3 reports the regression results regarding the differential likelihood to exit the U.S. market between trade intermediaries and direct exporters, with Columns 1-3 focusing on the exit upon the affirmative preliminary ITC determination and Columns 4-6 focusing on the exit upon the affirmative final ITC determination. An exporter is classified as exiting the U.S. market upon affirmative preliminary (final) ITC determination if it does not export any of the affected HS-6 digit products after the affirmative preliminary (final) ITC determination (denoted as *Exit*). Meanwhile, we construct a dummy variable called *Trade Intermediary*, which takes value of 1 if the exporter is a trade intermediary and 0 otherwise. The regression specification is as follows:

$$Exit_{fp} = \gamma \cdot Trade\ Intermediary_{fp} + \lambda_p + \varepsilon_{fp}. \quad (9)$$

As shown in Columns 1 and 4 of Table 3, *Trade Intermediary* has negative and statistically significant estimated coefficients, suggesting that trade intermediaries are less likely to exit the U.S. market of the affected products than direct exporters upon both the affirmative preliminary ITC determination and the affirmative final ITC determination. These results are robust to the control for firm efficiency (proxied by either export volume of the affected products in Columns 2 and 5, or export price of the affected products in Columns 3 and 6). Meanwhile, it is interesting to observe that firms with larger quantity of export volume or lower prices are less likely to exit, consistent with the findings in the literature on firm heterogeneity (e.g., Melitz, 2003).

In Table 4, we examine the relative likelihood of exit from the U.S. market of the affected products between single-product and multi-product direct exporters upon both the affirmative preliminary ITC determination and the affirmative final ITC determination. We construct an alternative dummy

variable called *Single Product*, which takes value of 1 if the direct exporter is a single-product direct exporter and 0 otherwise, and then regress the outcome variable *Exit* on *Single Product* along with a list of HS-6 digit product dummy, i.e.,

$$Exit_{fp} = \theta \cdot Single\ Product_{fp} + \lambda_p + \varepsilon_{fp}. \quad (10)$$

Columns 1-3 of Table 4 report the results regarding the likelihood of exit upon the affirmative preliminary ITC determination. It is found that *Single Product* has a negative and statistically significant estimated coefficient, regardless of the control for firm efficiency. Interestingly, however, the estimated coefficients of *Single Product* become positive and statistically significant when we examine the likelihood of exit upon the affirmative final ITC determination (Columns 4-6 of Table 4). Together, our results suggest that single-product direct exporters are less likely to exit the U.S. market of the affected products than multi-product direct exporters upon the affirmative preliminary ITC determination, but the opposite holds upon the affirmative final ITC determination.

5.4 Price Response

We now proceed to the analysis of possible effects of antidumping investigation on export prices (i.e., F.O.B. prices charged by Chinese exporters), first at product level and then firm-product level.

Figures 5a-5d present time trends of export prices of affected HS-6 digit products and their control groups over the pre- and post-antidumping investigation periods. Interestingly, there is no clear differential time trend of export prices between the treatment and control groups both before and after the antidumping investigation. Figures 5b and 5d clearly show that the difference in export prices between the treatment and control group is quite flat throughout the whole period despite some fluctuations.

Figures 6a-6d present time trends of export prices of affected products of surviving firms and those of their control groups over the pre- and post-antidumping investigation periods. Still, we find no clear differential time trend of export prices between the treatment and control groups both before and after the antidumping investigation. Moreover, Figures 6b and 6d clearly demonstrate little difference in export prices of affected products of surviving firms and those of their control groups throughout the whole period despite some fluctuations.

Regression results regarding the effects of antidumping investigation on export prices are reported in Table 5, with Columns 1-2 for the product level

analysis and Columns 3-4 for the firm-product level analysis. It is found that, with only one exception (the impact of final ITC determination in product-level analysis involving Control Group 2, which is significant at 5% level), there is no significant effect of the antidumping investigation on export prices at both product and firm-product levels, consistent with the results revealed in Figures 5a-5d and 6a-6d.

5.5 Robustness Checks

In this Section, we conduct a series of robustness checks on the aforementioned DID estimation for all the relevant outcome variables examined in the Section 5.1-5.4 (i.e., logarithm of export volume at the HS-6 digit product level, the logarithm of the number of exporters, the logarithm of export volume per exporters for all exporters, the logarithm of export volume of surviving exporters, the logarithm of export price at the HS-6 digit product level, and the logarithm of export price of surviving exporters).

First, the validity of our DID estimation hinges upon the assumption that the treatment and control groups are comparable before the treatment happens. To explicitly check whether there is any difference in time trends between the treatment and control groups before the initiation of antidumping investigation, we conduct a robustness check according to equation (7). Estimation results are summarized in Table A.3 of the Appendix. Clearly, there is no evidence for any differential time trends between the treatment and control groups before the initiation of antidumping investigation, hence implying the validity of our DID estimations. Meanwhile, our main findings on the effects of antidumping investigation remain robust.

Second, one may be concerned that products in the treatment group and their counterparts in the control group may follow different time trends. To address this concern, we allow for product-specific time trend in our estimation, i.e., equation (8). Estimation results are reported in Table A.4 of the Appendix. Clearly, our main findings on the effects of antidumping investigation remain robust to the inclusion of product-specific time trend, implying the validity of our DID estimations.

Third, to alleviate the concern that our monthly data could be noisy as not all exporters have export to the U.S. in every month, we conduct a robustness check by using quarterly instead of monthly data (i.e., aggregation of monthly export transactions to the quarterly level). Regression results are reported in Table A.5 of the Appendix. It is found that, on top of the statistically significant impacts of antidumping investigations reported earlier, the final ITC determination has a negative and significant (at 5% level) impact on the export volume of surviving exporters (i.e., some limited

evidence for the intensive margin effect). In addition, the magnitudes of the effects for the sample of quarterly data are much bigger.

Fourth, to further address the concern that our results may be affected by some outlying observations, we focus on a sub-sample without the top and bottom 1% observations. Regression results reported in Table A.6 of the Appendix show the robustness of our earlier findings, and offer limited evidence for the intensive margin effect.

Fifth, note that in Sections 5.1-5.4, we only include successful antidumping cases (i.e., 28 cases with affirmative preliminary and affirmative final ITC determinations out of 42 antidumping cases), partly because we would like to investigate the differential impacts of the affirmative preliminary ITC determination and the affirmative final ITC determination. To check whether our main results are sensitive to the selection of the antidumping cases, we conduct a robustness check by including the 5 unsuccessful cases and 1 withdrawn case. Regression results are reported in Table A.7 of the Appendix. It is found that our main results regarding the effects of antidumping investigation remain the same as reported earlier.⁷

Sixth, it is possible that other countries may conduct the antidumping investigation of the same products as the U.S. during the same period, thereby confounding the effects of the U.S. antidumping investigation on Chinese exporters and complicating the interpretation of our results. To address this concern, we conduct a robustness check by excluding such overlapping antidumping cases (i.e., 4 cases). Regression results are reported in Table A.8 of the Appendix. Clearly, our main findings remain robust to this sub-sample.

5.6 Discussion

In the previous sections, we have uncovered how exporters respond to antidumping investigation. The main findings can be summarized as:

- substantial trade-dampening effects of antidumping investigations at HS-6 digit product level
- a sharp decrease in the number of exporters but little change in the export volume per exporter
- direct exporters more likely to exit the U.S. market than trade intermediaries

⁷It is noted that the impact of the affirmative preliminary ITC determination has relatively bigger impact than that obtained using the original sample of 28 successful cases, presumably because the negative impact of the affirmative final ITC determination for the five unsuccessful cases should be smaller than that for the 28 successful cases.

- multi-product direct exporters more likely to exit the U.S. market than single-product direct exporters upon the affirmative preliminary ITC determination, but the opposite holds upon the affirmative final ITC determination
- little adjustment in the F.O.B. export prices to antidumping investigations at both the HS-6 digit product level and firm-product level

In what follows, drawing on recent developments in trade literature, we offer a coherent explanation to the above empirical findings.

The finding of little change in F.O.B. export prices is understandable in the setup of U.S. antidumping investigation against Chinese exporters. On the one hand, it is not rational for Chinese exporters to lower the F.O.B. export prices, as that would exacerbate their position in the antidumping investigations. On the other hand, Chinese exporters may not have any bargaining power vis-à-vis their U.S. importers to increase their F.O.B. export prices, as they are generally fragmented and tend to concentrate in low-value-added manufacturing.

Given the little change in the F.O.B. export prices, it is expected that the final sales prices of the concerned export products in the U.S. market would generally increase, due to the imposition of antidumping duties and some pass-through by U.S. importers or retailers. The increase in the final sales prices in the U.S. market subsequently leads to a decline in the demand of the concerned products, which explains the observed substantial trade-dampening effects of antidumping investigations at the product level.

At the status quo, the shrinking market demand would lead to a decrease in firm revenue across the board. In a world with constant markups and product-specific fixed costs of exporting (i.e., Melitz, 2003), some less productive firms may find their revenues not large enough to cover the fixed costs and hence exit the U.S. market. In a world with variable markups (even without fixed costs of exporting, e.g., Melitz and Ottaviano, 2008), firms would encounter a decrease in their markups, as a result of which some less productive firms incur losses and hence exit the U.S. market. Under the new equilibrium, however, due to the exit of less productive exporters from the U.S. market, it is possible that the surviving (and the more productive) exporters could maintain their export volume by absorbing some of the market share left over by the exiting exporters.

The decrease in firm revenues may cast different pressures on different types of exporters in their likelihood of exit. For example, we observe that trade intermediaries are less likely to exit the U.S. market following antidumping investigations than direct exporters. This can be explained in a

model of exporting behavior in the presence of trade intermediaries. Specifically, Ahn, Khandelwal, and Wei (2011) and Lu, Lu, and Tao (2011) show that the more productive manufacturers choose to export directly by themselves (these manufacturers are referred to as direct exporters), whereas the less productive manufacturers choose to export through trade intermediaries (these manufacturers are referred to as indirect exporters). The decrease in firm revenues due to antidumping investigations causes some (less productive) indirect exporters to exit the U.S. market, and at the same time makes some (less productive) direct exporters switch to export through trade intermediaries. As a result, the number of trade intermediaries may change relatively smaller than that of direct exporters, as trade intermediaries lose some old clients but also gain some new ones.

We also observe that multi-product direct exporters more likely to exit the U.S. market than single-product direct exporters upon the affirmative preliminary ITC determination, but the opposite holds upon the affirmative final ITC determination. One possible explanation lies in the ease of resource reallocation among different products within the multi-product direct exporters relative to their single-product counterparts (e.g., Mayer, Melitz and Ottaviano, 2011). Specifically, due to the scope economies (e.g., some market-specific fixed costs of exporting regardless of the number of exported products), the productivity threshold of direct exporting for multi-product direct exporters is lower than that for single-product direct exporters. This is consistent with the fact that much more multi-product direct exporters are observed in the sample than single-product direct exporters.

The affirmative preliminary ITC determination generates negative shocks on both single-product and multi-product direct exporters, by reducing their revenues generated from the affected product category. However, such negative impact is stronger for multi-product direct exporters than their single-product counterparts, consequently leading to more exit of the former relative to the latter from the U.S. market of the affected products. This is because in response to the decrease in revenues generated from the affected product category, multi-product direct exporters would reallocate their resources away from the affected products to their existing, unaffected products (especially when the affected products are not their core products). As a result, these multi-product direct exporters earn less revenue from the affected products than their ex ante equally profitable single-product counterparts. Furthermore, in a world with constant markups but some product-specific fixed costs of exporting, such resource reallocation makes multi-product direct exporters less likely to break even in the and hence more likely to exit the U.S. market of the affected products. In a world with variable markups, the further reduction in revenues due to the resource reallocation further lowers markups

of multi-product direct exporters, causing losses in the and hence exit from the U.S. market of the affected products.

Upon the affirmative final ITC determination, there will be a second wave of negative shocks on both single-product and multi-product direct exporters. However, given that the remaining multi-product direct exporters are those having limited room for resource reallocation away from the affected products (e.g., the affected products are their core products), such negative shocks are expected to cast similar impacts on both single-product and multi-product direct exporters. As the productivity threshold of direct exporting for the remaining multi-product direct exporters is lower than that of single-product direct exporters, negative shocks of the similar magnitude cause a disproportionately more exit of the latter than the former from the U.S. market.

6 Conclusion

Antidumping measures have become a popular tool for governments to protect their domestic firms and industries. Much insight has been gained from a large and growing literature on how effective the antidumping measures are in trade protection. An equally important but overlooked issue is how antidumping measures affect the behavior of foreign exporters, the understanding of which should help us gain a complete picture of the effectiveness of the antidumping measures.

In this paper, we use China Customs data to investigate how Chinese exporters respond to U.S. antidumping investigations of their products during the 2000-2006 period. To identify the effects of antidumping investigation, we use the difference-in-differences estimation, i.e., the comparison of outcome variables of exporters in the affected product category with those in the unaffected product category before and after the various important stages of the antidumping investigation process. We find that much of the trade-dampening effect of antidumping investigations at product level operates through the extensive margin (i.e., a decrease in the number of exporters) rather than the intensive margin (i.e., a decrease in the export volume per exporter). We also find that the decrease in the number of exporters is contributed by direct exporters as opposed to trade intermediaries, and by first multi-product direct exporters (i.e., upon the affirmative preliminary ITC determination) and then their single-product counterparts (i.e., upon the affirmative final ITC determination). Moreover, we detect little price adjustments to antidumping investigations at both the product level and firm-product level. Finally, drawing recent developments in trade theories,

we offer a coherent explanation to our empirical findings on how exporters respond to antidumping investigations.

This paper contributes to the existing literature on antidumping by examining the effect of antidumping measures on the affected firms rather than the protected firms. Meanwhile, it provides further evidence regarding exporting behavior across different types of firms, i.e., trade intermediaries versus direct exporters, and single- versus multi-product exporters. It also complements the literature on trade liberalization by documenting the resource reallocation across firms and across products within firms in response to the negative shocks in the trade environment.

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Figure 1: Time trends of export volume, product level

Figure 1a (Control group 1)

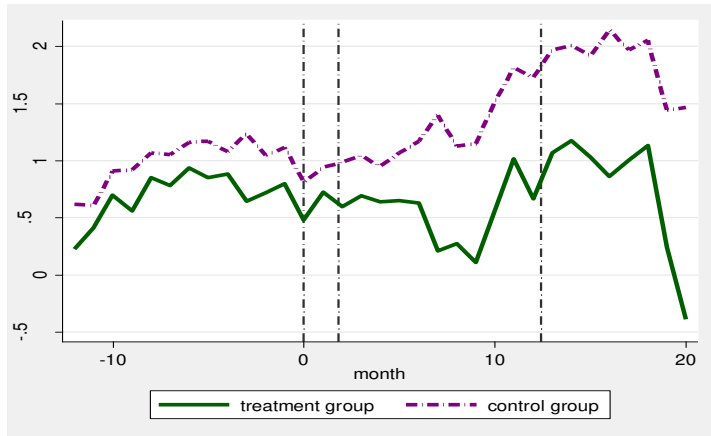


Figure 1b (Control group 1)

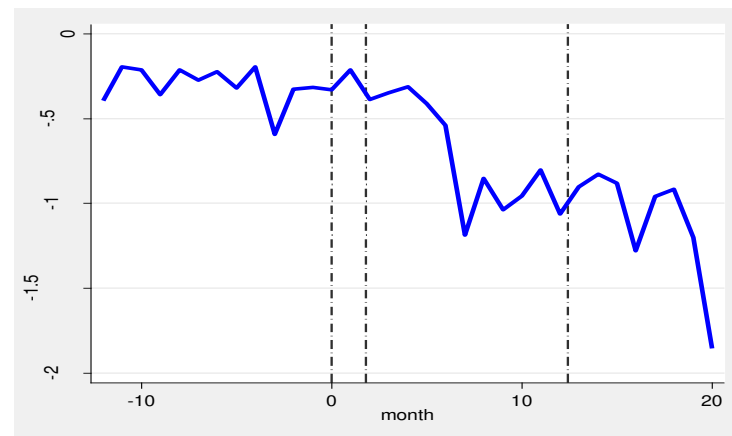


Figure 1c (Control group 2)

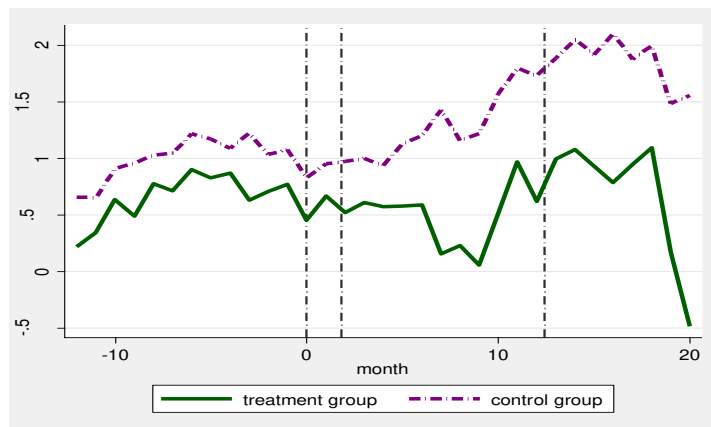
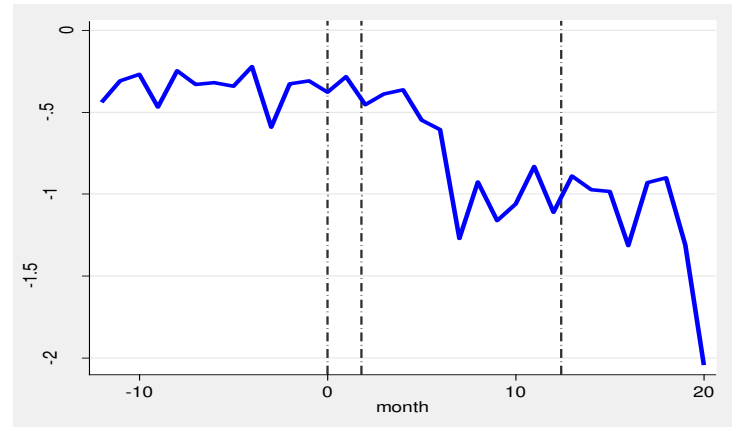
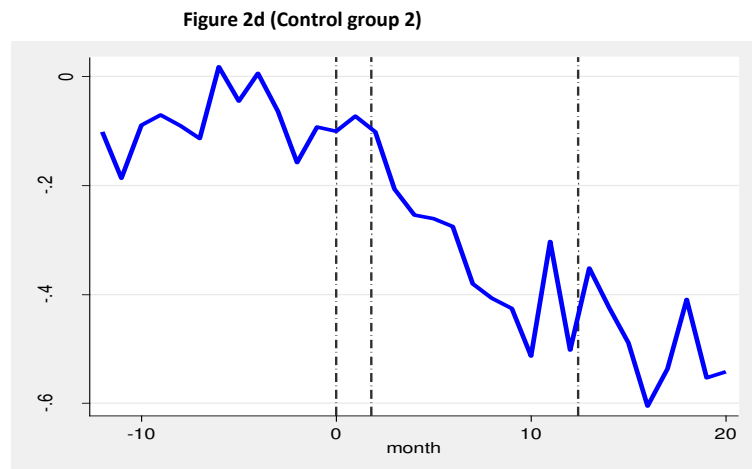
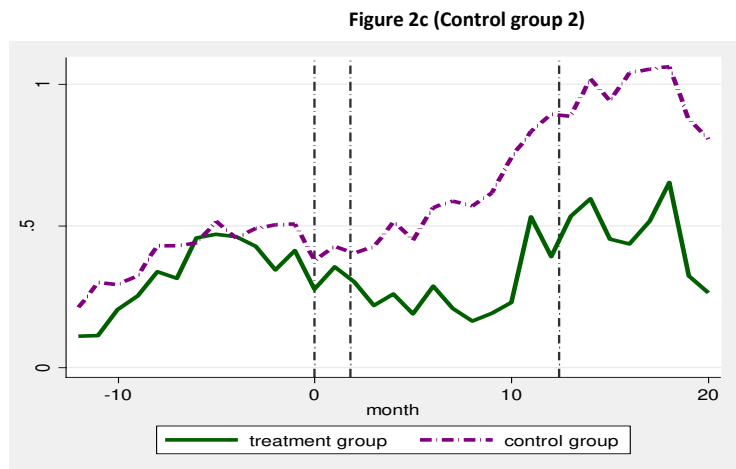
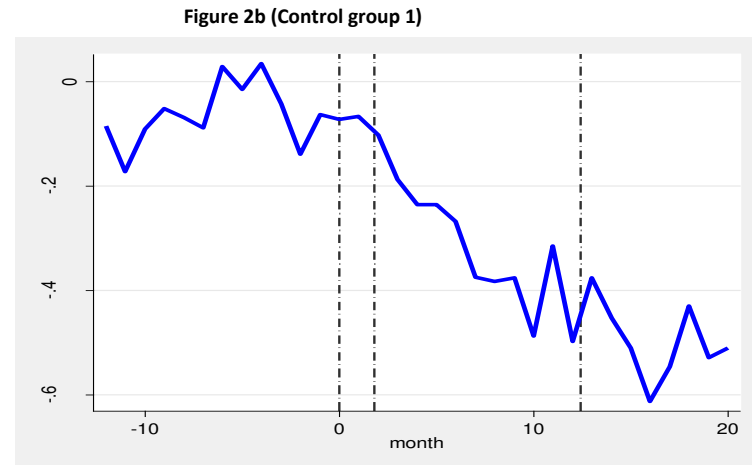
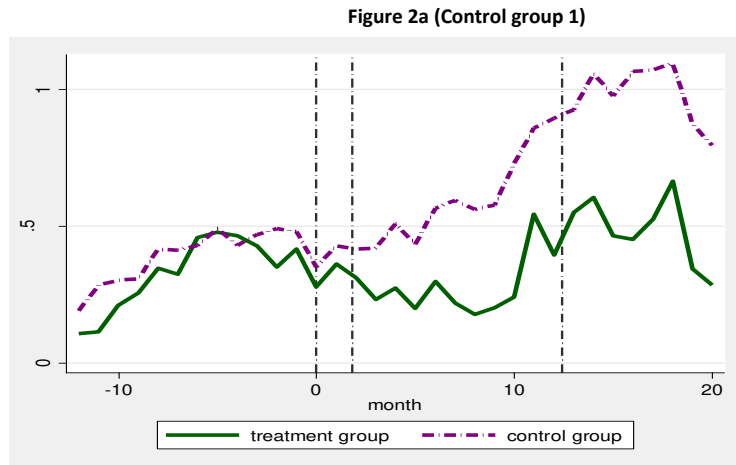


Figure 1d (Control group 2)



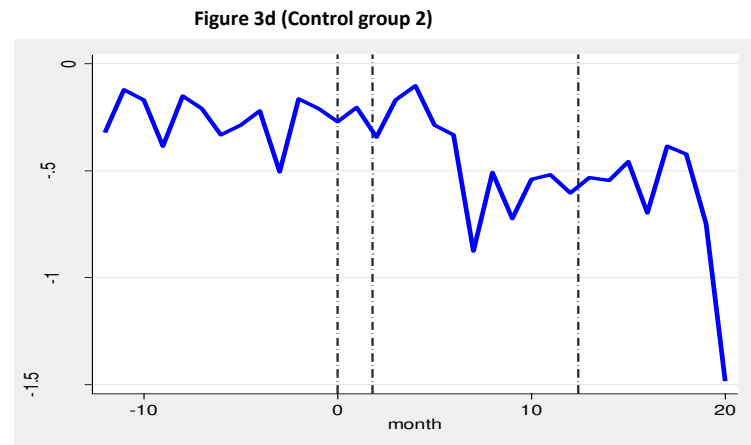
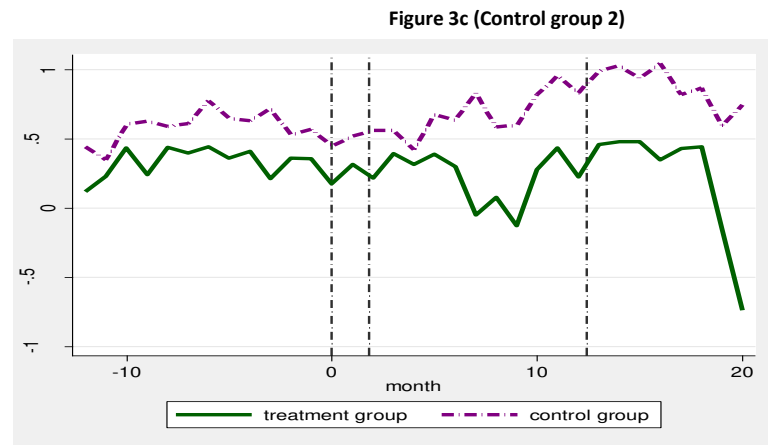
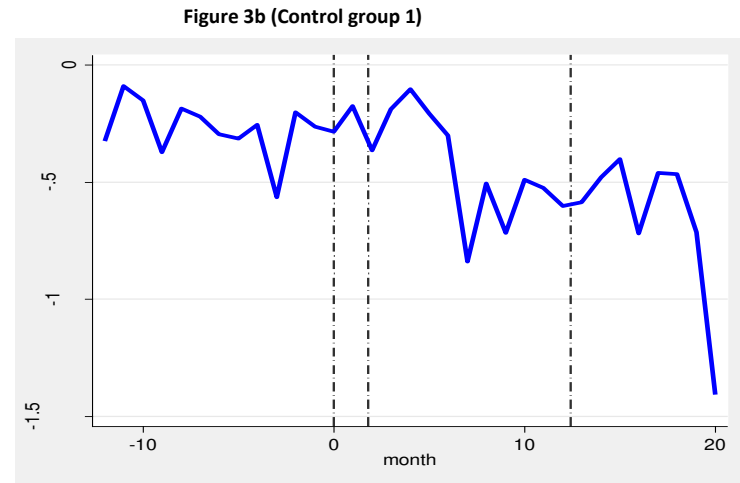
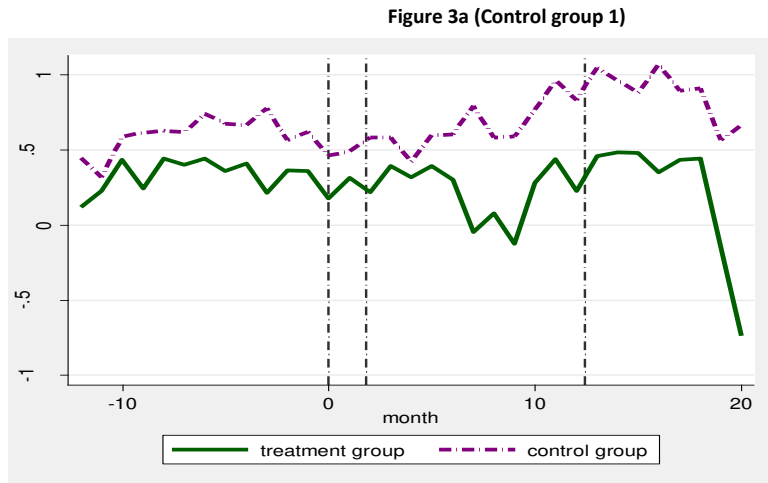
Note: The upper panel reports the results obtained using control group 1, whereas the lower panel reports the results obtained using control group 2. The left panel reports time trends of the treatment and control groups separately, whereas the right panel reports the time trend of the difference between the treatment and control groups. The three references lines mark respectively the date points of initiation of the antidumping investigation, the preliminary and final ITC determination.

Figure 2: Time trends of the number of exporters



Note: The upper panel reports the results obtained using control group 1, whereas the lower panel reports the results obtained using control group 2. The left panel reports time trends of the treatment and control groups separately, whereas the right panel reports the time trend of the difference between the treatment and control groups. The three reference lines mark respectively the date points of initiation of the antidumping investigation, the preliminary and final ITC determination.

Figure 3: Time trends of export volume per exporter, all exporters



Note: The upper panel reports the results obtained using control group 1, whereas the lower panel reports the results obtained using control group 2. The left panel reports time trends of the treatment and control groups separately, whereas the right panel reports the time trend of the difference between the treatment and control groups. . The three references lines mark respectively the date points of initiation of the antidumping investigation, the preliminary and final ITC determination.

Figure 4: Time trends of export volume, surviving exporters

Figure 4a (Control group 1)

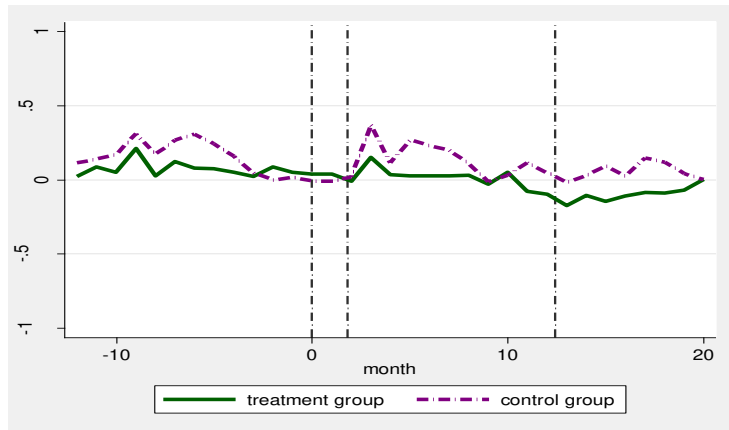


Figure 4b (Control group 1)

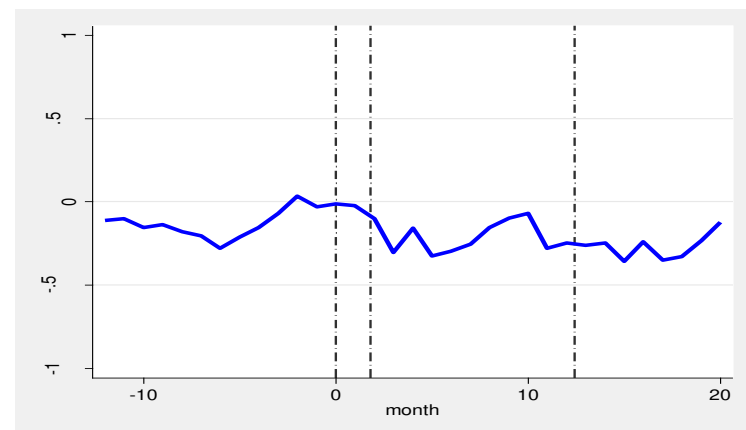


Figure 4c (Control group 2)

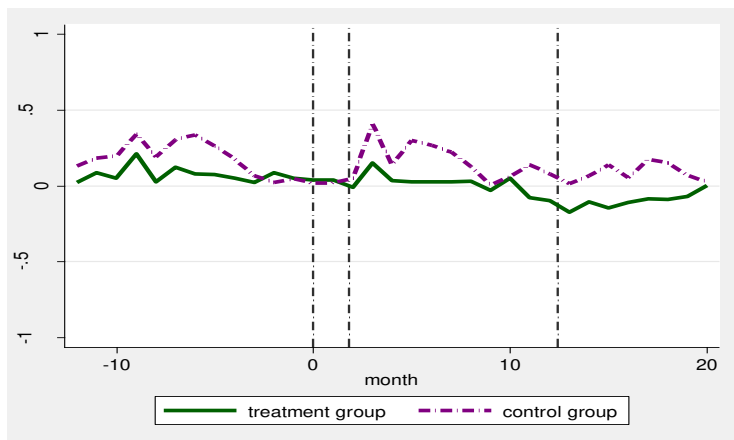
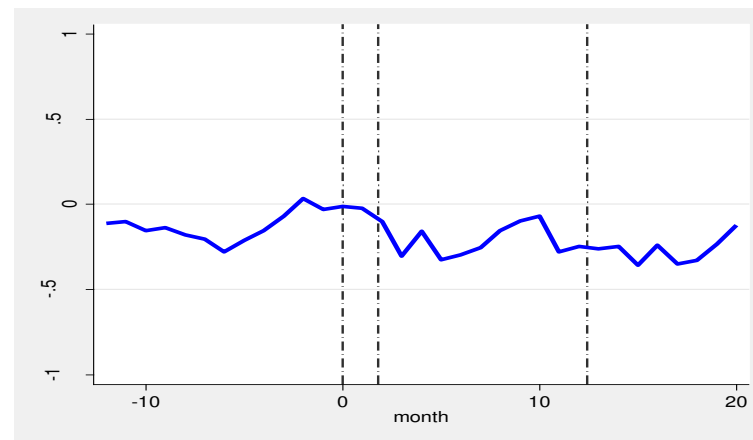


Figure 4d (Control group 2)



Note: The upper panel reports the results obtained using control group 1, whereas the lower panel reports the results obtained using control group 2. The left panel reports time trends of the treatment and control groups separately, whereas the right panel reports the time trend of the difference between the treatment and control groups. The three reference lines mark respectively the date points of initiation of the antidumping investigation, the preliminary and final ITC determination.

Figure 5: Time trends of export prices, product level

Figure 5a (Control group 1)

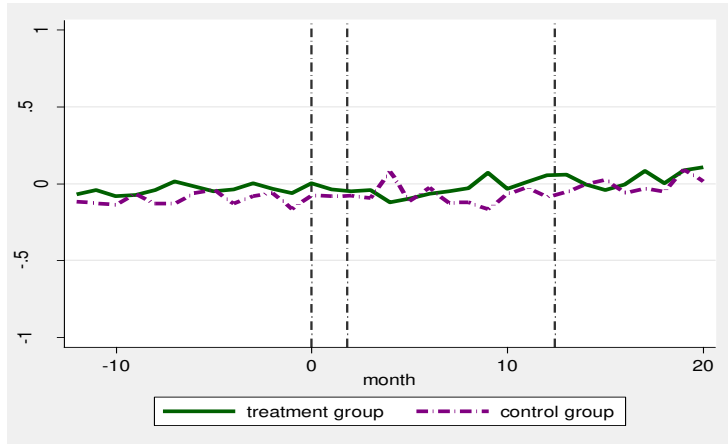


Figure 5b (Control group 1)

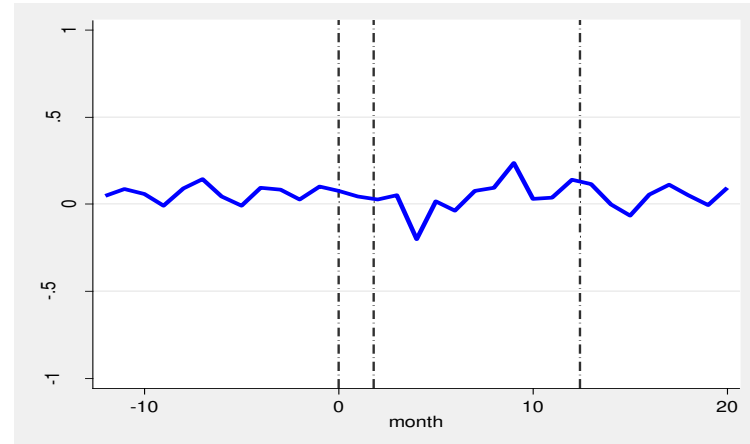


Figure 5c (Control group 2)

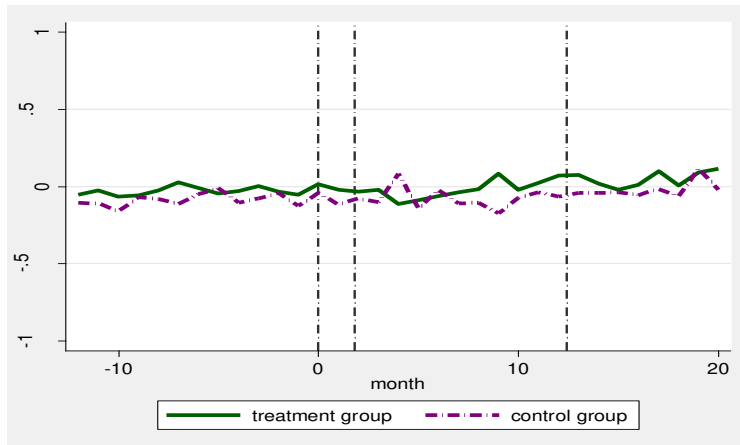
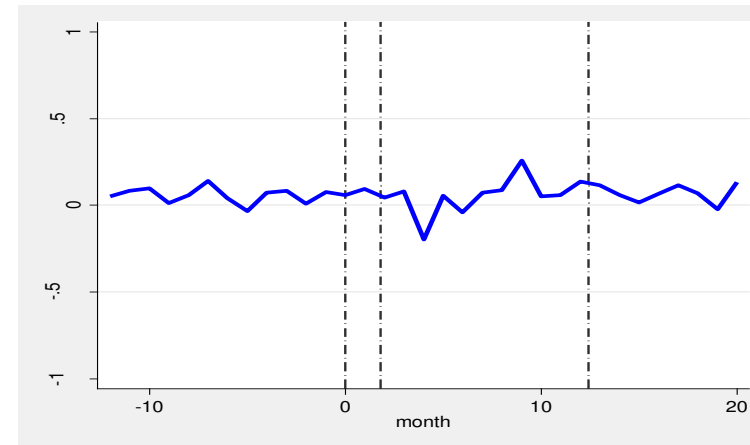


Figure 5d (Control group 2)



Note: The upper panel reports the results obtained using control group 1, whereas the lower panel reports the results obtained using control group 2. The left panel reports time trends of the treatment and control groups separately, whereas the right panel reports the time trend of the difference between the treatment and control groups. The three references lines mark respectively the date points of initiation of the antidumping investigation, the preliminary and final ITC determination.

Figure 6: Time trends of export prices, surviving exporters

Figure 6a (Control group 1)

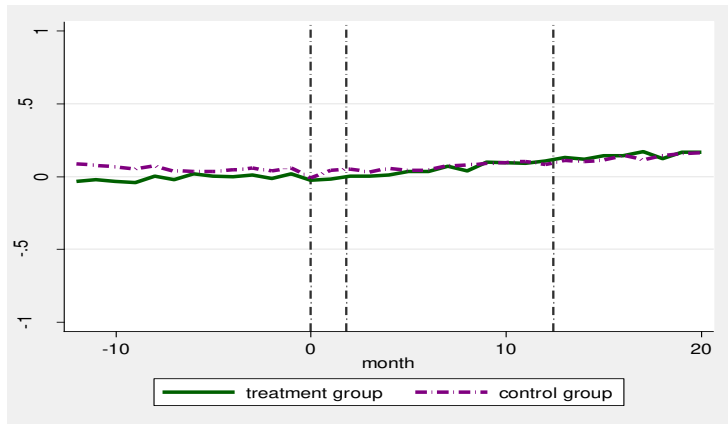


Figure 6b (Control group 1)

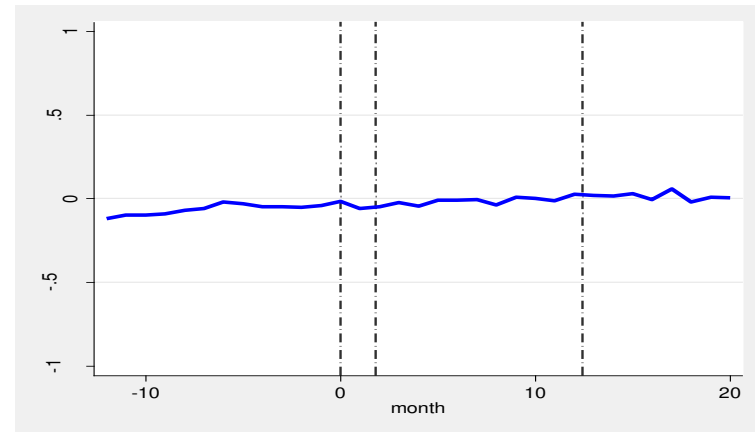


Figure 6c (Control group 2)

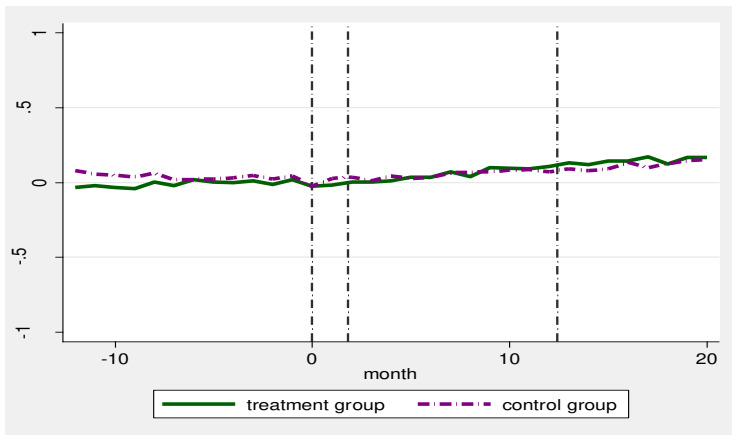
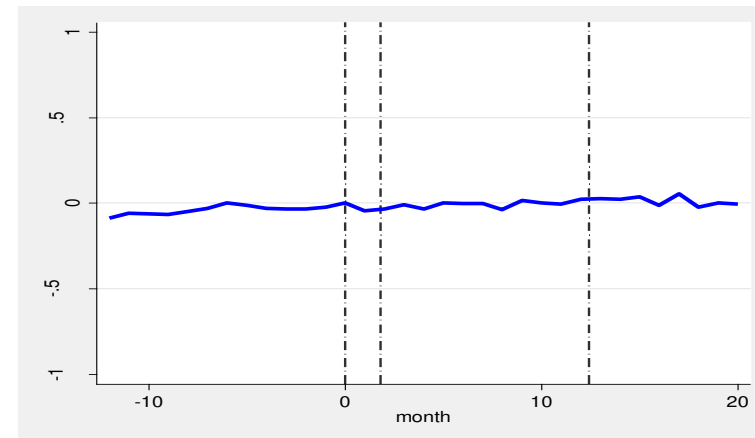


Figure 6d (Control group 2)



Note: The upper panel reports the results obtained using control group 1, whereas the lower panel reports the results obtained using control group 2. The left panel reports time trends of the treatment and control groups separately, whereas the right panel reports the time trend of the difference between the treatment and control groups. . The three references lines mark respectively the date points of initiation of the antidumping investigation, the preliminary and final ITC determination.

Table 1: The effect of antidumping investigation on export volume, product level

Dependent Variable	(1)	(2)
	Log (export volume)	
Control group	1	2
Initiation (β_1)	-0.108 (0.164)	-0.135 (0.163)
Preliminary ITC determination (β_2)	-0.430** (0.112)	-0.450** (0.112)
Final ITC determination (β_3)	-1.081** (0.193)	-1.115** (0.195)
Month fixed effects	yes	yes
Product fixed effects	yes	yes
Number of observations	16,294	14,993
R-squared	0.759	0.744

Note: Standard errors, clustered at the product level, are reported in the bracket. ** represents statistical significance at the 1% level.

Table 2: The effect of antidumping investigation, extensive versus intensive margins

Specification	(1)	(2)	(3)	(4)	(5)	(6)
	<u>Extensive margin</u>		<u>Intensive margin</u>			
Dependent Variable	Log (number of exporters)		Log (export volume per exporter)			
Sample	<u>Whole sample</u>		<u>Whole sample</u>		<u>Surviving firms</u>	
Control Group	1	2	1	2	1	2
Initiation (β_1)	-0.067 (0.042)	-0.076 (0.042)	-0.041 (0.146)	-0.060 (0.145)	0.026 (0.050)	0.025 (0.050)
Preliminary ITC determination (β_2)	-0.228** (0.056)	-0.235** (0.057)	-0.198* (0.090)	-0.212* (0.090)	-0.034 (0.035)	-0.036 (0.035)
Final ITC determination (β_3)	-0.402** (0.090)	-0.417** (0.091)	-0.671** (0.149)	-0.693** (0.149)	-0.097 (0.052)	-0.101 (0.051)
Month fixed effects	yes	yes	yes	yes	yes	yes
Product fixed effects	yes	yes	yes	yes	yes	yes
Number of observations	16,302	14,997	16,302	14,997	547,007	538,113
R-squared	0.932	0.936	0.659	0.665	0.227	0.226

Note: Standard errors, clustered at the product level, are reported in the bracket. * and ** represent statistical significance at the 5% and 1% level, respectively.

Table 3: The effect of antidumping investigation on the likelihood of exit, trade intermediaries versus direct exporters

Dependent Variable Cutoff point	(1)	(2)	(3)	(4)	(5)	(6)
	Exit					
	<u>Preliminary ITC determination</u>			<u>Final ITC determination</u>		
Trade intermediaries	-0.091** (0.011)	-0.116** (0.011)	-0.091** (0.011)	-0.085** (0.011)	-0.099** (0.011)	-0.083** (0.011)
Log (export volume)		-0.069** (0.002)			-0.029** (0.002)	
Log (export price)			0.048** (0.007)			-0.032** (0.007)
Month fixed effects	yes	yes	yes	yes	yes	yes
Product fixed effects	yes	yes	yes	yes	yes	yes
Number of observations	212,046	211,867	211,867	202,389	202,322	202,322
Pseudo R2	0.300	0.308	0.300	0.224	0.226	0.224

Note: Standard errors, clustered at the product level, are reported in the bracket. ** represents statistical significance at the 1% level.

Table 4: The effect of antidumping investigation on the likelihood of exit, single-product direct exporters versus multiple-product direct exporters

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Exit					
	<u>Preliminary ITC determination</u>			<u>Final ITC determination</u>		
Cutoff point						
Single-product firm	-0.820** (0.033)	-0.763** (0.033)	-0.815** (0.033)	0.649** (0.018)	0.693** (0.019)	0.646** (0.018)
Log (export volume)		-0.077** (0.003)			-0.049** (0.003)	
Log (export price)			0.085** (0.008)			-0.026** (0.009)
Month fixed effects	yes	yes	yes	yes	yes	yes
Product fixed effects	yes	yes	yes	yes	yes	yes
Number of observations	131,979	131,871	131,871	124,391	124,298	124,298
Pseudo R2	0.315	0.325	0.317	0.280	0.285	0.280

Note: Standard errors, clustered at the product level, are reported in the bracket. ** represents statistical significance at the 1% level.

Table 5: The effect of antidumping investigation on export prices

Specification	(1)	(2)	(3)	(4)
	<u>Product Level</u>		<u>Surviving Exporters</u>	
	Log (export price)			
Control Group	1	2	1	2
Initiation (β_1)	0.006 (0.034)	0.021 (0.033)	-0.017 (0.019)	-0.017 (0.019)
Preliminary ITC determination (β_2)	-0.011 (0.035)	0.001 (0.036)	0.011 (0.015)	0.012 (0.015)
Final ITC determination (β_3)	0.105 (0.055)	0.119* (0.057)	0.047 (0.034)	0.049 (0.034)
Month fixed effects	yes	yes	yes	yes
Product fixed effects	yes	yes	yes	yes
Number of observations	16,294	14,993	547,007	538,113
R-squared	0.839	0.847	0.612	0.613

Note: Standard errors, clustered at the product level, are reported in the bracket. * represents statistical significance at the 5% level.

Table A.1: Logit regression on the likelihood of being investigated for dumping

Dependent Variable	(1) Probability of being investigated for dumping
Import value	0.473** (0.036)
Real GDP growth rate	0.031 (0.047)
Exchange rate index(1989=100)	1.598** (0.602)
Previously investigated	0.749** (0.205)
Industry fixed effect	yes
Number of observations	2,243
Pseudo R2	0.230

Note: Standard errors, clustered at the product level, are reported in the bracket. ** represents statistical significance at the 1% level.

Table A.2: US antidumping cases against China over 2000-2006

CASE_ID	PRODUCT	Initiation date	Preliminary ITC		Final ITC	
			Date	Decision	Date	Decision
USA-AD-868	Steel Wire Rope	03/2000	04/2000	A	04/2001	N
USA-AD-874	Steel Concrete Rebar	07/2000	08/2000	A	07/2001	A
USA-AD-885	Desktop Note Counters and Scanners	07/2000	09/2000	N	.	.
USA-AD-891	Foundry Coke	09/2000	11/2000	A	09/2001	A
USA-AD-893	Honey	10/2000	11/2000	A	11/2001	A
USA-AD-895	Pure Magnesium	10/2000	12/2000	A	11/2001	A
USA-AD-899	Hot-Rolled Carbon Steel Products	11/2000	01/2001	A	11/2001	A
USA-AD-921	Folding Gift Boxes	03/2001	04/2001	A	12/2001	A
USA-AD-922	Automotive Replacement Glass Windshields	03/2001	04/2001	A	04/2002	A
USA-AD-932	Folding Metal Tables and Chairs	05/2001	06/2001	A	06/2002	A
USA-AD-935	Structural Steel Beams	06/2001	07/2001	A	06/2002	N
USA-AD-943	Circular-Welded Non-Alloy Steel Pipe	06/2001	07/2001	A	07/2002	N
USA-AD-951	Blast Furnace Coke	07/2001	08/2001	N	.	.
USA-AD-968	Cold-Rolled Steel Products	10/2001	10/2001	A	11/2002	N
USA-AD-986	Ferrovandium	11/2001	01/2002	A	01/2003	A
USA-AD-989	Ball Bearings	02/2002	05/2002	A	04/2003	N
USA-AD-990	Non-Malleable Cast Iron Pipe Fittings	02/2002	04/2002	A	04/2003	A
USA-AD-994	Oil Country Tubular Goods	04/2002	05/2002	N	.	.
USA-AD-1010	Lawn and Garden Steel Fence Posts	05/2002	06/2002	A	06/2003	A
USA-AD-1013	Saccharin	07/2002	08/2002	A	06/2003	A
USA-AD-1014	Polyvinyl Alcohol	09/2002	10/2002	A	10/2003	A
USA-AD-1020	Barium Carbonate	10/2002	11/2002	A	10/2003	A
USA-AD-1021	Malleable Iron Pipe Fittings	11/2002	12/2002	A	12/2003	A
USA-AD-1022	Refined Brown Aluminum Oxide	11/2002	01/2003	A	11/2003	A
USA-AD-1030	44'-Diamino-22'-Stilbenedisulfonic Acid and Stilbenic Fluorescent Whitening Agents	04/2003	.	W	.	.
USA-AD-1034	Color Television Receivers	05/2003	06/2003	A	06/2004	A
USA-AD-1036	44'-Diamino-22'-Stilbenedisulfonic Acid Chemistry	05/2003	07/2003	N	.	.
USA-AD-1043	Polyethylene Retail Carrier Bags	06/2003	08/2003	A	08/2004	A
USA-AD-1046	Tetrahydrofurfuryl Alcohol	06/2003	08/2003	A	08/2004	A
USA-AD-1047	Ironing Tables and Certain Parts Thereof	07/2003	08/2003	A	08/2004	A
USA-AD-1049	Electrolytic Manganese Dioxide	08/2003	.	T	.	.
USA-AD-1058	Wooden Bedroom Furniture	11/2003	01/2004	A	12/2004	A
USA-AD-1059	Hand Trucks	11/2003	01/2004	A	12/2004	A
USA-AD-1060	Carbazole Violet Pigment 23	11/2003	01/2004	A	12/2004	A
USA-AD-1064	Certain Frozen and Canned Warmwater Shrimp and Prawns	01/2004	03/2004	A	01/2005	P
USA-AD-1070a	Crepe Paper Products	02/2004	04/2004	A	01/2005	A
USA-AD-1070b	Certain Tissue Paper Products	02/2004	04/2004	A	03/2005	A
USA-AD-1071	Magnesium	03/2004	05/2004	A	04/2005	A
USA-AD-1073	Certain Circular Welded Carbon Quality Line Pipe	03/2004	05/2004	A	.	T
USA-AD-1082	Chlorinated Isocyanurates	05/2004	07/2004	A	06/2005	A
USA-AD-1091	Artists' Canvas	04/2005	05/2005	A	05/2006	A
USA-AD-1092	Diamond Sawblades and Parts Thereof	05/2005	07/2005	A	07/006	N
USA-AD-1095	Certain Lined Paper Products	09/2005	10/2005	A	09/2006	A
USA-AD-1099	Carbon and Certain Alloy Steel Wire Rod	11/2005	01/2006	N	.	.
USA-AD-1102	Activated Carbon	02/2006	.	W	.	.
USA-AD-1103	Certain Activated Carbon	03/2006	05/2006	A	04/2007	A
USA-AD-1104	Certain Polyester Staple Fiber	06/2006	08/2006	A	05/2007	A
USA-AD-1107	Coated Free Sheet Paper	11/2006	12/2006	A	12/2007	N

Note: A: affirmative; B: negative; W: withdrawal; T: terminated

Table A.3: Robustness check, differential time trends before the antidumping investigation

Specification Dependent Variable Sample Control Group	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	<u>Product Level</u>		<u>Extensive margin</u>		<u>Intensive margin</u>				<u>Product Level</u>		<u>Surviving exporters</u>	
	Log (export volume)		Log (number of exporters)		Log (export volume per exporter)				Log(export rice)		Log(export price)	
	<u>Whole sample</u>		<u>Whole sample</u>		<u>Whole sample</u>		<u>Surviving firms</u>		<u>Whole sample</u>		<u>Surviving firms</u>	
	1	2	1	2	1	2	1	2	1	2	1	2
Previous 12 months (β_0)	-0.005 (0.135)	-0.023 (0.134)	-0.008 (0.047)	-0.015 (0.047)	0.011 (0.104)	-0.002 (0.103)	0.041 (0.039)	0.039 (0.039)	0.008 (0.035)	0.022 (0.036)	0.002 (0.018)	0.004 (0.018)
Initiation (β_1)	-0.111 (0.193)	-0.146 (0.192)	-0.071 (0.055)	-0.084 (0.055)	-0.036 (0.167)	-0.061 (0.165)	0.050 (0.055)	0.047 (0.055)	0.010 (0.045)	0.031 (0.046)	-0.016 (0.024)	-0.014 (0.025)
Preliminary ITC determination (β_2)	-0.432** (0.148)	-0.461** (0.147)	-0.232** (0.064)	-0.243** (0.064)	-0.193 (0.120)	-0.212 (0.119)	-0.009 (0.047)	-0.013 (0.047)	-0.008 (0.045)	0.012 (0.047)	0.013 (0.021)	0.015 (0.022)
Final ITC determination (β_3)	-1.083** (0.217)	-1.126** (0.218)	-0.406** (0.096)	-0.424** (0.097)	-0.665** (0.169)	-0.694** (0.169)	-0.070 (0.061)	-0.076 (0.061)	0.108 (0.065)	0.130 (0.068)	0.048 (0.037)	0.051 (0.038)
Month dummy	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Product dummy	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	16,294	14,993	16,302	14,993	16,302	14,997	547,007	538,113	16,294	14,993	547,007	538,113
R-squared	0.759	0.762	0.932	0.936	0.659	0.665	0.227	0.226	0.839	0.847	0.612	0.613

Note: Standard errors, clustered at the product level, are reported in the bracket. ** represents statistical significance at the 1% level.

Table A.4: Robustness check, inclusion of product-specific time trends

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	<u>Product Level</u>		<u>Extensive margin</u>		<u>Intensive margin</u>				<u>Product Level</u>		<u>Surviving exporters</u>	
Dependent Variable	Log (export volume)		Log (number of exporters)		Log (export volume per exporter)				Log(export price)		Log(export price)	
Sample	<u>Whole sample</u>		<u>Whole sample</u>		<u>Whole sample</u>		<u>Surviving firms</u>		<u>Whole sample</u>		<u>Surviving firms</u>	
Control Group	1	2	1	2	1	2	1	2	1	2	1	2
Initiation (β_1)	-0.129 (0.149)	-0.134 (0.148)	-0.071 (0.042)	-0.075 (0.042)	-0.063 (0.126)	-0.064 (0.126)	0.002 (0.052)	0.003 (0.052)	0.015 (0.030)	0.022 (0.030)	-0.034* (0.017)	-0.034* (0.017)
Preliminary ITC determination (β_2)	-0.363** (0.131)	-0.357** (0.131)	-0.215** (0.067)	-0.216** (0.066)	-0.148 (0.100)	-0.142 (0.100)	-0.067 (0.049)	-0.067 (0.049)	-0.011 (0.038)	-0.008 (0.039)	-0.011 (0.015)	-0.010 (0.015)
Final ITC determination (β_3)	-0.903** (0.221)	-0.888** (0.220)	-0.357** (0.110)	-0.354** (0.109)	-0.547** (0.158)	-0.535** (0.158)	-0.124 (0.070)	-0.125 (0.070)	0.058 (0.067)	0.059 (0.067)	0.002 (0.024)	0.003 (0.024)
Month dummy	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Product dummy	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Product time trend	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	16,294	14,993	16,302	14,997	16,302	14,997	547,007	538,113	16,294	14,993	547,007	538,113
R-squared	0.796	0.762	0.944	0.947	0.706	0.710	0.229	0.228	0.856	0.862	0.613	0.615

Note: Standard errors, clustered at the product level, are reported in the bracket. * and ** represent statistical significance at the 5% level and 1% level, respectively.

Table A.5: Robustness check, quarterly data

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	<u>Product Level</u>		<u>Extensive margin</u>		<u>Intensive margin</u>				<u>Product Level</u>		<u>Surviving exporters</u>	
Dependent Variable	Log (export volume)		Log (number of exporters)		Log (export volume per exporter)				Log(export price)		Log(export price)	
Sample	<u>Whole sample</u>		<u>Whole sample</u>		<u>Whole sample</u>		<u>Surviving firms</u>		<u>Whole sample</u>		<u>Surviving firms</u>	
Control Group	1	2	1	2	1	2	1	2	1	2	1	2
Initiation (β_1)	0.113 (0.273)	0.086 (0.272)	-0.056 (0.043)	-0.064 (0.043)	0.221 (0.266)	0.204 (0.264)	0.065 (0.055)	0.064 (0.056)	-0.035 (0.073)	-0.022 (0.073)	-0.020 (0.021)	-0.019 (0.021)
Preliminary ITC determination (β_2)	-0.735** (0.155)	-0.751** (0.156)	-0.177** (0.054)	-0.184** (0.054)	-0.490** (0.135)	-0.499** (0.135)	-0.047 (0.045)	-0.049 (0.045)	0.026 (0.035)	0.036 (0.036)	0.007 (0.012)	0.008 (0.013)
Final ITC determination (β_3)	-1.409** (0.229)	-1.442** (0.232)	-0.279** (0.076)	-0.295** (0.076)	-1.018** (0.191)	-1.035** (0.193)	-0.128* (0.056)	-0.132* (0.057)	0.068 (0.044)	0.081 (0.046)	0.020 (0.031)	0.021 (0.031)
Month dummy	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Product dummy	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	6,314	5,736	6,314	5,376	6,314	5,736	312,311	306,445	6,310	5,736	311,702	305,858
R-squared	0.781	0.785	0.957	0.959	0.672	0.677	0.202	0.202	0.854	0.862	0.591	0.593

Note: Standard errors, clustered at the product level, are reported in the bracket. * and ** represent statistical significance at the 5% level and 1% level, respectively.

Table A.6: Robustness check, exclusion of outliers

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	<u>Product Level</u>		<u>Extensive margin</u>		<u>Intensive margin</u>				<u>Product Level</u>		<u>Surviving exporters</u>	
	Log (export volume)		Log (number of exporters)		Log (export volume per exporter)				Log(export price)		Log(export price)	
	<u>Whole sample</u>		<u>Whole sample</u>		<u>Whole sample</u>		<u>Surviving firms</u>		<u>Whole sample</u>		<u>Surviving firms</u>	
Control Group	1	2	1	2	1	2	1	2	1	2	1	2
Initiation (β_1)	-0.071 (0.169)	-0.093 (0.168)	-0.060 (0.043)	-0.070 (0.043)	-0.012 (0.151)	-0.024 (0.150)	0.020 (0.043)	0.020 (0.043)	0.011 (0.033)	0.026 (0.033)	-0.014 (0.018)	-0.014 (0.019)
Preliminary ITC determination (β_2)	-0.438** (0.112)	-0.459** (0.112)	-0.230** (0.057)	-0.237** (0.057)	-0.205* (0.089)	-0.218* (0.088)	-0.035 (0.031)	-0.036 (0.031)	-0.005 (0.034)	0.008 (0.035)	0.014 (0.013)	0.015 (0.013)
Final ITC determination (β_3)	-1.074** (0.192)	-1.111** (0.193)	-0.397** (0.091)	-0.412** (0.091)	-0.671** (0.146)	-0.693** (0.147)	-0.101* (0.047)	-0.104* (0.047)	0.106 (0.054)	0.123* (0.057)	0.043 (0.031)	0.044 (0.032)
Month dummy	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Product dummy	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	15,827	14,595	15,834	14,599	15,834	14,599	531,400	522,784	15,827	14,595	531,400	522,784
R-squared	0.774	0.776	0.934	0.938	0.676	0.681	0.257	0.256	0.842	0.85	0.623	0.625

Note: Standard errors, clustered at the product level, are reported in the bracket. * and ** represent statistical significance at the 5% level and 1% level, respectively.

Table A.7: Robustness check, inclusion of unsuccessful and withdrawn cases

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	<u>Product Level</u>		<u>Extensive margin</u>		<u>Intensive margin</u>				<u>Product Level</u>		<u>Surviving exporters</u>	
	Log (export volume)		Log (number of exporters)		Log (export volume per exporter)				Log(export price)		Log(export price)	
	<u>Whole sample</u>		<u>Whole sample</u>		<u>Whole sample</u>		<u>Surviving firms</u>		<u>Whole sample</u>		<u>Surviving firms</u>	
Control Group	1	2	1	2	1	2	1	2	1	2	1	2
Initiation (β_1)	-0.155 (0.115)	-0.179 (0.114)	-0.037 (0.026)	-0.045 (0.026)	-0.082 (0.100)	-0.097 (0.100)	0.010 (0.044)	0.011 (0.044)	-0.021 (0.044)	-0.022 (0.047)	-0.021 (0.015)	-0.022 (0.015)
Preliminary ITC determination (β_2)	-0.373** (0.098)	-0.411** (0.100)	-0.132** (0.036)	-0.142** (0.037)	-0.205** (0.077)	-0.218** (0.077)	0.022 (0.032)	0.022 (0.032)	0.002 (0.035)	0.003 (0.034)	-0.005 (0.017)	-0.006 (0.017)
Final ITC determination (β_3)	-0.755** (0.151)	-0.798** (0.151)	-0.213** (0.058)	-0.238** (0.058)	-0.447** (0.116)	-0.473** (0.117)	0.007 (0.056)	0.004 (0.057)	0.049 (0.046)	0.060 (0.048)	0.004 (0.034)	0.004 (0.034)
Month dummy	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Product dummy	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	22,821	20,373	22,823	20,373	22,823	20,373	909,293	884,678	22,813	20,369	906,737	882,169
R-squared	0.781	0.769	0.950	0.953	0.660	0.670	0.205	0.205	0.843	0.846	0.531	0.532

Note: Standard errors, clustered at the product level, are reported in the bracket. ** represents statistical significance at the 1% level.

Table A.8: Robustness check, exclusion of antidumping cases investigated by other countries

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(7)	(8)	(9)	(10)
	<u>Product Level</u>		<u>Extensive margin</u>		<u>Intensive margin</u>				<u>Product Level</u>		<u>Surviving exporters</u>	
Dependent Variable	Log (export volume)		Log (number of exporters)		Log (export volume per exporter)				Log(export price)		Log(export price)	
Sample	<u>Whole sample</u>		<u>Whole sample</u>		<u>Whole sample</u>		<u>Surviving firms</u>		<u>Whole sample</u>		<u>Surviving firms</u>	
Control Group	1	2	1	2	1	2	1	2	1	2	1	2
Initiation (β_1)	-0.227 (0.151)	-0.263 (0.150)	-0.048 (0.047)	-0.059 (0.047)	-0.180 (0.126)	-0.204 (0.125)	0.025 (0.050)	0.024 (0.050)	0.034 (0.035)	0.046 (0.035)	-0.017 (0.019)	-0.016 (0.020)
Preliminary ITC determination (β_2)	-0.308** (0.106)	-0.325** (0.107)	-0.203*** (0.059)	-0.209** (0.059)	-0.103 (0.086)	-0.114 (0.086)	-0.031 (0.035)	-0.033 (0.035)	-0.001 (0.035)	0.007 (0.036)	0.011 (0.015)	0.012 (0.015)
Final ITC determination (β_3)	-0.826** (0.177)	-0.863** (0.179)	-0.363*** (0.095)	-0.376** (0.095)	-0.457** (0.136)	-0.482** (0.138)	-0.092 (0.052)	-0.096 (0.052)	0.079 (0.056)	0.093 (0.059)	0.046 (0.034)	0.047 (0.035)
Month dummy	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Product dummy	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	14,425	13,277	14,431	13,280	14,431	13,280	543,567	534,818	14,425	13,277	543,567	534,818
R-squared	0.781	0.785	0.933	0.937	0.675	0.680	0.223	0.223	0.848	0.856	0.611	0.613

Note: Standard errors, clustered at the product level, are reported in the bracket. ** represents statistical significance at the 1% level.