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ABSTRACT

Studies of the welfare implications of trade policy often do not take account of the potential for tariff-jumping FDI to mitigate positive gains to domestic producers. We use event study methodology to examine the market effects for U.S. domestic firms that petitioned for antidumping (AD) relief, as well as the effect of announcements of FDI by their foreign rivals in the U.S. market on these U.S. petitioning firms. On average, affirmative U.S. AD decisions are associated with 3% abnormal gains to a petitioning firm when there is no tariff-jumping FDI, but no abnormal gains if there is tariff-jumping FDI. The evidence for this mitigating effect is strongest when announcements of the intended tariff-jumping FDI have already occurred before an AD decision takes place, which happened in a fair number of cases. We also find evidence that the announcements of plant expansions (and, to some extent, new plants) have significantly larger negative effects on U.S. domestic firms' profits than other types of FDI, including acquisitions and joint ventures.

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1. Introduction.

Tariff-jumping FDI allows a foreign firm to avoid a trade barrier by locating production within the destination market. Such activities can thereby substantially mitigate welfare consequences of the original trade protection policy.[1] Theoretically, the likelihood of tariff-jumping FDI for a given trade barrier and the magnitude of its effect on welfare of various agents depends on a number of factors, including differential production costs, relocation costs, other entry barriers, and demand conditions. As Smith (1987) shows for simple monopoly and Cournot duopoly markets, "tariffs may or may not induce foreign direct investment, they may or may not change market structure, and they may have pro- or anti-competitive effects."[2] (p. 96)

While trade economists find none of the above controversial, it is surprising how often tariff-jumping is ignored in the academic literature, particularly in the case of strategic trade policy.[3] An exception is a theoretical literature that examines the consequences of tariff-jumping FDI where governments understand the connection between trade policy and FDI and act strategically. Ellingsen and Warneryd (1999) find that the optimal tariff for a government concerned about domestic producers is one that is just low enough so that FDI does not occur. In addition, VERs may be preferred to tariffs since VERs provide quota rents to the foreign firms, making FDI less likely. In contrast, Brander and Spencer (1987) show conditions under which a country with unemployment may wish to induce FDI by setting differential taxes on imports and local production. Flam (1994) examines the ambiguity of trade policy determination with

[1] There are only rare exceptions where countries apply tariffs to foreign firms, regardless of whether they export to the country or have production in the country.

[2] Motta (1992) extends Smith's (1987) analysis, by allowing for potential entry by domestic producers and finding an even wider array of possible outcomes and welfare effects.

[3] For example, Levinsohn (1989) shows how the literature on the non-equivalence of tariffs and quotas in the presence of imperfect competition often hinges on the assumption that a quota leads to no foreign supply response, which is false if tariff-jumping FDI is possible. A second example is the sparse mention in the literature of the large FDI response by Japanese automakers when assessing the market and welfare effects of the U.S. automobile VER, though Berry et al. (1999) is an important exception to this.

potential FDI for a government such as the European Union (EU), where some members have domestic production and others do not. Finally, Haaland and Wooten (1998) examine optimal government trade policies with potential FDI in the context of a two-country reciprocal dumping model. These latter two papers present a wide variety of possible equilibrium outcomes depending on initial conditions and the nature of the strategic game.

Given this wide range of theoretical market outcomes and welfare consequences, the empirical evidence on tariff-jumping FDI and its welfare consequences in the context of trade policies is an important issue. Yet the profession has done little to estimate tariff-jumping responses or its welfare consequences. Indeed, only a few papers have systematically examined tariff-jumping FDI occurrences, and none have tried to estimate its welfare implications in any dimension. Recent papers that have empirically examined tariff-jumping FDI include Belderbos (1997), Blonigen and Feenstra (1997), Barrell and Pain (1999), which focus on Japanese firms' responses to antidumping (AD) trade protection in the U.S. and the EU. For various levels of data aggregation, these studies consistently find substantial tariff-jumping responses. In contrast, using a more comprehensive dataset of all firms subject to U.S. AD duties, Blonigen (2002) finds much smaller average tariff-jumping responses and concludes that tariff-jumping is only a realistic option for multinational firms from industrialized countries.

A number of papers have estimated the welfare consequences of trade policies, particularly AD protection, but do not address the effects of tariff-jumping FDI. Murray and Rousslang (1989), DeVault (1996) and Kelly and Morkre (1998) use computable partial equilibrium models to examine welfare consequences of dumping (and AD) for separate U.S. cases. Gallaway et al. (1999) estimate the collective welfare effects of all U.S. AD duties as of 1993 and find a substantial $2-$4 billion annual loss from these trade policies. None of these studies considers tariff-jumping FDI in their estimates.

Most closely related to our study, Hartigan et al. (1989), Mahdavi and Bhagwati (1994), and Hughes et al. (1997) use event study methodology to examine the consequences of AD investigation events and announced duties on domestic firms' profits.[4] Hartigan et al. (1989) examines non-steel U.S. AD petitions in the early 1980s and finds statistically significant effects on domestic firms' profits, but only when the U.S. International Trade Commission (USITC) ruled that there was a threat of "injury" to the domestic industry, not when they ruled that actual injury had occurred. Mahdavi and Bhagwati (1994) and Hughes et al. (1997) examine events surrounding the trade protection actions related to the U.S. semiconductor industry in the mid-1980s, which began with a series of AD investigations on various types of semiconductor chips. Mahdavi and Bhagwati find a negative stock market reaction to the AD investigation, but positive effects of the concluding Semiconductor Agreement of 1986 that supplanted any AD duties. Hughes et al. find positive effects of the Semiconductor Agreement for both the U.S. producers and the downstream consumers of semiconductors. They attribute positive impacts to downstream consumers coming from the benefits of having a strong, innovative domestic supplier. Neither of these studies considers tariff-jumping FDI responses which, in particular, occurred with substantial magnitude in the semiconductor industry.

In this paper, we take the next step of addressing the impact of tariff-jumping FDI on welfare consequences of trade policies. Due to data considerations, our focus is on the welfare of domestic firms which apply for import relief under U.S. AD laws. Unique firm-specific data from U.S. AD cases allows us to focus on tariff-jumping FDI consequences for domestic firms' profits and compare that with the initial domestic profit effects from the imposition of the AD duty. For many U.S. AD cases, both the set of AD investigation events (from petition to

[4] Other examples of studies using event methodology to examine the impact of trade policies on domestic firm profitability include Hartigan et al. (1986) that examined U.S. escape clause petitions, Lenway et al. (1980) that

imposition of the duty) and the foreign firm's decision to locate production to the U.S. are publicly-announced events in prominent media outlets. Using these announcements in conjunction with stock market returns data, we employ an event study methodology that allows estimation of profit consequences for publicly-traded domestic firms involved in these AD cases.

The rest of the paper proceeds as follows. The next section describes the AD investigation process in the U.S. Section 3 details our empirical results from estimating stock market reactions to AD and related tariff-jumping announcements using event study methodology. Our second-stage analysis of the factors that affect the magnitude of these market reactions, including our hypothesis that tariff-jumping FDI mitigates the gains domestic petitioners experience from AD protection, is described in section 4, while section 5 highlights our main findings and concludes.

2. A Brief Overview of U.S. AD Investigations.

The U.S. AD laws are administered by the U.S. Department of Commerce (USDOC) and the USITC, each with distinct roles in the process. An investigation begins, when a petition is filed with both agencies by an "interested party" that represents the domestic industry connected with the product named in the investigation. Interested parties may be domestic firms, labor unions, a trade association, or the USDOC itself, but is typically one or more domestic firms in the industry.

When a petition is filed, the USDOC's role is to determine whether the subject product is being sold at "less than fair value" in the U.S. Specifically, they calculate whether firms exporting to the U.S. are selling the product in the U.S. at less than "normal" or "fair" value, which is generally defined as the foreign firm's own home market price for the same good. For each case, the USDOC calculates an *ad valorem* dumping margin equal to the percentage

examined various trade policies connected with the steel industry in the late 1970s and 1980s. Ries (1993) examines

difference between the U.S. transaction prices they observe and "fair value". The USITC concurrently determines whether the relevant U.S. domestic industry has been materially injured, or is threatened with material injury, by reason of the imports subject to its investigation.

The USDOC and USITC each make preliminary and final determinations for each case. If an affirmative *preliminary* determination is made by both the USDOC and the USITC, then the importer must post a cash deposit, a bond or other security for each entry equal to the preliminary margin determined by the USDOC. This requirement stays in effect until either the USDOC or the USITC makes a negative final determination. If an affirmative *final* determination is made by both the USITC and USDOC, then the USDOC issues an AD order to levy a duty equal to the estimated dumping margin on the subject product. When a subject foreign product enters the U.S., the importer must pay U.S. Customs a cash deposit equal to the margin times the value of the subject product.

In all cases, the USDOC finds a nonnegative dumping margin by virtue of the methodologies they use to calculate the dumping margins (see Murray, 1991). Thus, the main information received from the USDOC decision is the magnitude of the dumping duty should the case be ruled affirmative. The real hurdle for a final affirmative decision in the case, leading to imposition of AD duties, is the USITC final determination. The USITC ruled affirmative in their final decision in only about 40% of the cases from 1980-1993 (USITC, 1995, p. 3-1).

On a final note, AD cases can be terminated or suspended before a final decision is made by the USDOC and USITC. Terminations may occur for a variety of reasons, from insufficient grounds for an AD petition to a decision by the domestic petitioners to no longer pursue the case, possibly due to a private settlement with the foreign firms (see Prusa, 1992). Suspensions occur when the domestic and foreign parties agree to a suspension agreement to resolve their dispute, as

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the market effects for Japanese automakers and their suppliers from the 1981 U.S. VER on Japanese autos.

occurred with U.S. AD cases in semiconductors when the 1986 Semiconductor Agreement was signed between the U.S. and Japan.

3. First-Stage Analysis: Cumulative Abnormal Returns

Our empirical analysis is in two stages. In this section, we employ an event study methodology to estimate abnormal stock returns for publicly-traded firms from announcements of our focus events: AD investigations and tariff-jumping FDI. In the second stage analysis, which we present in section 4 below, we estimate determinants of these first-stage abnormal returns obtained from our event study methodology.

The hypotheses we explore in this section are that 1) AD duties will lead to gains in domestic firms' profits, and 2) tariff-jumping FDI by the foreign rival will mitigate these gains (i.e., lead to loss in domestic profits). There are a number of issues that may complicate the testing of these hypotheses. The first hypothesis is quite straightforward, particularly for AD cases which are initiated by domestic firms themselves, and which presumably would not petition for AD duties unless they expected positive profit gains from the action. Although government agencies make the ultimate determination of the case, AD actions allow little or no voice for consumer groups or other agents in the economy in the investigation. Thus, it is clear that the trade action is solely intended to benefit the domestic producers.

The second hypothesis, at least the magnitude of the tariff-jumping FDI effect, is perhaps less straightforward. Foreign firms' competitive advantages may have been largely connected with location advantages in their own country. Tariff-jumping may be preferred to exporting, but the foreign firm's ability to compete may be nearly as diminished once it tariff-jumps as if they were to continue exporting. For example, Dofasco and Co-Steel started a joint-venture steel mill in Kentucky in 1995 in response to the 1992-93 U.S. steel cases against imported steel from

Canada and other import sources. By 1998, the joint venture had never turned a profit and Co-Steel was trying to sell its $600 million share (Canadian Press Newswire, April 24, 1998). In a similar vein, U.S. Department of Commerce (1993) reports that U.S.-owned ball bearings plants were approximately three times more profitable from 1987-1991 than foreign-owned ball bearings plants in the U.S. (9.0% return on assets versus 2.3%), many of which had recently located in the U.S. due to AD duty cases. (p. 47) In fact, from a strategic game-theoretic viewpoint, one might suspect that domestic firms would not petition for relief if they believe harmful tariff-jumping FDI will occur: i.e., to the extent that we see tariff-jumping, it is in cases where the domestic industry calculated that the AD actions will not be substantially mitigated. This obviously assigns substantial information and rationality on the part of the domestic firms. In addition, government agencies, not domestic firms, determine the level of the import barrier in AD cases and may set it "too high", leading to tariff-jumping FDI that is harmful to the domestic firms.

3.1. Methodology and Data.

To test these hypotheses, we first employ an event study methodology that estimates abnormal stock returns for firms from public announcements of our focus events after controlling for general market movements. Thus, assuming the stock market is efficient, we estimate the market model:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \qquad \textbf{(1)}$$

where R_{it} is the return on security i on day t, R_{mt} is the market return on day t, and ε_{it} is the zero mean disturbance term. R_{mt} is the broad-based stock index for the market portfolio, the S & P 500 index.

Equation (1) is estimated for each firm using daily returns 300 days before the event through 45 days before the event. We then estimate abnormal returns ($AR_{i\tau}$) in our event window for firm *i*. Abnormal returns will be indexed in event time using τ. Using the market model parameter estimates from equation (1), we define $AR_{i\tau}$ for firm *i* as:

$$AR_{i\tau} = R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i R_{m\tau} \quad \textbf{(2)}$$

where τ measures time relative to the event date, τ= 0. Thus, assuming efficient markets, the abnormal return represents the market's valuation of the change in the firm's current and future expected profitability due to the announced event. An event window typically includes the event day and the day after the event to allow the information to be fully incorporated into the firms' return. In addition, the window includes days before the event to allow for possible leakage of the event's outcome to some investor's. The cost of extending the window is the possibility of other unrelated events confounding the estimated abnormal returns for the focus event (i.e. a firm's quarterly earnings announcement could confound the results). For our event window, we use a 3-day window, which includes the day before, the event day, and the day after, but also consider the sensitivity of the results by examining 1-day, 5-day, 7-day and 9-day windows.

In order to draw inferences for the focus events, the abnormal return observations must be aggregated. Using the estimated abnormal return for each day of the event window, we generate a cumulative abnormal return (CAR) for each firm *i* and event *j*:

$$CAR_{ij} = \sum_{\tau=l}^{L} AR_{ij\tau} \quad \textbf{(3)}$$

where *l* is the first day in the event window and *L* is the last day in the event window. Hartigan et al. (1986) notes that testing for statistical significance of CARs is potentially problematic due to the possibility of autocorrelation in the series of abnormal returns. Given that all the abnormal returns use the same intercept (α) and slope (β) parameters, serial correlation may occur.

Following Hartigan et al. (1986) and Ruback (1982), our variance estimate includes an adjustment for this first-order autocorrelation.[5]

We run this first-stage estimation procedure for two types of events. The first type is the AD investigation events which are comprised of five events (in the chronological order they follow in U.S. AD cases): 1) the initial petition by the domestic firms, 2) the preliminary decision by the USITC, 3) the preliminary decision by the USDOC, 4) the final decision by the USDOC, and 5) the final decision by the USITC. Figure 1 presents the timeline of AD case events for a standard case.

It is important to note that for our sample we expect that the five AD events should primarily yield positive (or, at least, non-negative) abnormal returns for petitioning firms. Firms would not petition without expectations of positive gains. In addition, all cases in our sample are cases in which the preliminary AD decisions are ruled affirmative, and many are cases for which the final AD decisions are also ruled affirmative. As described below, we include some cases where the final USITC was negative or the case was terminated/suspended when there was tariff-jumping announcements connected with these non-affirmative cases. We control for these non-affirmative decisions in our regressions.

The magnitude of the effect of these AD announcements on the market depends on how much additional information they reveal. The petition is the first event that begins the investigation and likely has a surprise element for the market. However, the gains are realized by the domestic firms only if the petition will be successful. Thus, uncertainty of the final outcome may mitigate the size of gains from a petition. The USITC preliminary injury decision is almost

[5] Typically, it is assumed that there is no overlap in the event window of the included securities, hence $AR_{i\tau}$ and CAR_{ij} will be independent across securities. This assumption will cause the covariance terms in the variance to go to zero. Therefore, the standard error for the CAR is obtained by summing the standard errors over the event window and dividing by the square root of the number of days in the event window (MacKinlay, 1997).[5] By allowing for serial correlation, the covariance terms will be greater than zero.

always affirmative, as it must occur within 45 days of the petition and only has time to incorporate information presented by the domestic industry in their petition. Thus, this event may not convey much new information to the market. The preliminary USDOC decision is almost always affirmative as well. However, this USDOC decision includes preliminary dumping margins which provides information to the market of the eventual size of AD duties should the final case decision be ruled affirmative. The USDOC final dumping margin determination comes out 75 days later in a standard case. While significant changes can occur in the dumping margin from preliminary to final stages, they tend to be highly correlated.[6] Thus, for many cases, the final USDOC may not convey very much new information. The final AD case event is the USITC final decision which, if affirmative, leads to imposition of AD duties. One would expect this event to have quite a bit of potential to elicit market reactions because it resolves any uncertainty about the final outcome of the case. On the other hand, as the last event of the case, many months after the petition in the case, the market may have reasonably certain information about how the case will be determined. In our results below, we report CARs for all of the five separate investigation events, as well as a CAR for the combination of the five events. The second type of events for which we estimate CARs, which is novel in the literature, is tariff-jumping FDI announcements.

Our sample data consists of all publicly traded U.S. firms that were petitioners in U.S. affirmative AD cases between 1980 and 1995. Of these 138 firm-case observations, 44 (32 percent) saw one or more foreign firms locate production in the United States in the product subject to the AD investigation. There were also a handful of U.S. AD cases that were not ruled affirmative, but nevertheless saw tariff-jumping FDI. We include these additional firm-case observations in our sample.

[6] In our sample, the correlation between preliminary and final USDOC margins was 0.64 and significant at the 1%

Blonigen (2002) identifies all instances of FDI connected with U.S. AD investigations from 1980 through 1995 and these data also indicate the type of FDI that occurred (i.e., acquisition, new plant, joint venture, etc.).[7] Using this list, we compiled a database of public media announcements of these FDI incidents using Lexis-Nexis search engines. We also relied on Lexis-Nexis for public media announcements of the AD investigation events.[8] We next used *Federal Register* notices to identify the U.S. domestic firms that were petitioners in the relevant AD cases with FDI, as well as petitioners in all other affirmative AD cases, and then used standard search engines to identify if these petitioning firms were publicly traded on U.S. stock markets. Data on firms' stock returns, as well as the market return, come from the Center for Research on Stock Prices (CRSP). Table 1 lists the AD cases that involved tariff-jumping FDI and the associated publicly-traded petitioning firms. Table 1 also shows the variety of final outcomes in these cases, with 16 of the 30 affirmative, 5 terminated or suspended, 5 negative, and 4 mixed outcomes, where some of the investigated products received AD duties and others did not. Again, in addition to the observations listed in Table 1, our sample includes all publicly-traded firms involved in U.S. AD cases that went affirmative from 1980-1995, but saw no tariff-jumping activity. This leads to an additional 76 observations to the 62 listed in Table 1 and the list of such firms and associated cases is available from the authors upon request.

3.2. Empirical Results.

In stage-one regressions, we estimate 3-day CARs for all five types of AD investigation event decision dates: 1) petition, 2) preliminary USITC, 3) preliminary USDOC, 4) final USDOC,

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level.

[7] These data can be accessed at http://darkwing.uoregon.edu/~bruceb/adpage.html or http://www.nber.org/antidump/.

[8] While *Federal Register* notices report AD investigation events, they do so with a lag. The public announcements we found with Lexis-Nexis often predated the *Federal Register* notice dates by about 5-7 days.

and 5) final USITC decision.[9] The top half of Table 2, column 1 gives the average CARs of these five events and a cumulated total CAR for all five events. Following Borenstein and Zimmerman (1988), we construct a Z-statistic to analyze the statistical significance of these average CARs. Assuming independent events, a Z-statistic can be constructed that is the sum of the t-statistics connected with each event divided by the square of the number of events. This Z-statistic is distributed as a normal variable with a variance equal to the number of observations and has the following formula:

$$Z = \frac{\sum_{n=1}^{N} (CAR_n / \sqrt{VAR(CAR_n)})}{\sqrt{N}} \qquad \textbf{(4)}$$

where CAR_n is the cumulative abnormal return for event (n), VAR indicates "variance" and N is the number of events. This method of determining statistical significance has the advantage of controlling for observations with high standard errors, which get less weight in the Z-statistic. We report this Z-statistic in the second column of Table 2.[10]

The results in the top half of Table 2 show that the AD petition announcement is the one individual AD event that clearly leads to positive gains for firms, averaging about 1% of firm equity value. The average CAR cumulated over all five AD events is also positive and statistically significant, with an average gain of 1.66%. Thus, the AD events besides the petition also add to the gain to some extent, despite the fact that the average CARs for the preliminary and final decisions by the USDOC and USITC are close to zero in magnitude individually and not statistically significant. There is substantial heterogeneity in these AD events. For example, some cases end in negative AD decisions in our sample and, additionally, some affirmative

[9] The number of firm-case observations varies by AD investigation events because of varying instances of non-existent media announcements. Below, we briefly describe results from using alternative event window lengths.
[10] In our case of cumulated totals of CARs from the five AD events, we first construct z-statistics over the five AD events for each firm-case observation and then construct a z-statistic over all case observations.

decisions yield much smaller dumping margins than others. Our second stage regression analysis below will be able to examine this heterogeneity further.

Clearly, there is some support that domestic petitioning firms are receiving positive CARs from these AD investigations, with the mean CAR for all four of the five events positive and the cumulated total indicating around a 1.66% gain for these petitioning firms. While this 1.66% average cumulated abnormal return is statistically significant, it is not very large in magnitude. One reason for this may be that there are some cases in our sample that were not ruled affirmative. Another reason may be the mitigating effects of tariff-jumping FDI.

To control for both of these concerns, the next three rows of Table 2 report the average cumulated CARs for petitioning firms involved in only affirmative AD cases, and then the breakdown of this sample into observations where no tariff-jumping FDI occurred and where tariff-jumping FDI did occur. The average CAR goes up by limiting the sample to only affirmative AD cases (from 1.66% to 1.98%). However, we also find a substantial difference in average CARs between the set of firm-case observations where there was tariff-jumping versus where there was not. Those petitioning firms experiencing affirmative AD decisions and no tariff-jumping FDI by their foreign rivals average about a 3% gain, while those for which tariff-jumping FDI occurs experience essentially no gains. The Z-statistics for each of these groups indicates a statistically significant difference as well, with a Z-statistic of 12.14 for the group not experiencing tariff-jumping FDI and a Z-statistic of –0.19 for the group that does experience tariff-jumping FDI. These results confirm our hypothesis that tariff-jumping FDI can mitigate the positive abnormal gains that U.S. domestic firms experience from AD trade protection. In fact, it suggests that tariff-jumping FDI by foreign rivals completely eliminates such gains on average.

The above comparison of means does not control for other relevant factors that may systematically affect CARs across our focus groups. Thus, section 4 below employs second-stage

regression analysis of our estimated CARs to examine the effect of tariff-jumping FDI on firms' gains from AD investigations, controlling for other factors.

The last rows of Table 2 show the summary statistics for the CARs from all tariff-jumping FDI announcements, as well as a breakdown by the type of FDI indicated in the announcement (i.e., new plant, plant expansion, acquisition, or joint venture). Our hypothesis is that tariff-jumping FDI announcements should lead to losses for the domestic petitioning firms. However, Table 3 shows that the mean CARs for all tariff-jumping announcements is 0.55%, though not statistically significant.

The breakdown of mean CARs by FDI type provides some additional information. The average CAR for plant expansion of existing foreign-owned plants is –1.20%, the average CAR for joint ventures is 1.78%, while average CARs for new plants and acquisitions is well below 1%. As mentioned earlier, tariff-jumping FDI may not be considered damaging to domestic firms if the foreign firm is unlikely to be as successful with domestic production as they were exporting to the U.S. This may be why plant expansion announcements may be the only form to show correct sign: These firms are already established in the U.S. The positive joint venture sign may be due to the possibility of knowledge spillovers to the industry from joint ventures with foreign firms. These average tariff-jumping CARs are generally not statistically significant (except for joint venture FDI at the 10% significance level), but also do not control for other factors, which we address in the next section with our second-stage estimation.

4. Second Stage: Explaining the CARs.

The above analysis provided simple comparisons of means. To more formally examine our hypotheses, this section presents a regression analysis of the various factors that may determine the CARs for these events. Thus, we run second-stage OLS regressions of the form:

$$CAR_{ij} = \phi + \lambda' X_{ij} + \mu_{ij}, \quad \textbf{(5)}$$

where ϕ is an intercept, X_{ij} is a matrix of explanatory variables, λ is a vector of estimated parameters, and μ_{ij} is an assumed normally-distributed error term. Because our dependent variable is generated from our first-stage event study regressions, we use a White correction to adjust our standard errors for heteroskedasticity.[11]

4.1. Explaining CARs from AD Announcements.

With respect to the second-stage regressions for the AD investigation announcements, our focus is the hypothesis that tariff-jumping FDI mitigates the gains domestic petitioners may experience from the AD case. Thus, we first include a dummy variable that takes the value of "1" when an investigated foreign firm announces its intention to FDI in the investigated product prior to an AD event and expect a negative coefficient. This captures known tariff-jumping FDI effects. However, there may also be a higher expectation in some AD cases that tariff-jumping FDI may be announced subsequent to an AD event. If the market can anticipate subsequent tariff-jumping FDI to some extent, then such FDI observed *ex post* may also mitigate positive abnormal gains from affirmative AD decisions. Thus, we include a dummy variable that takes the value of "1" for cases where tariff-jumping FDI is announced after the AD event and expect a negative coefficient as well.

We include other explanatory variables as controls. First, positive abnormal gains are expected to be higher for AD investigation events the greater the amount of trade volume involved in the cases, particularly relative to the size of the petitioning firm(s). Thus, we include the log of the dollar value of the subject import volume, expecting a positive coefficient, and the log of the dollar value of the petitioning firm's sales in the relevant year, expecting a negative

sign.[12] Additionally, a couple AD events yield unique quantifiable information that should affect the magnitude of the CARs for a firm. For the second-stage regression explaining CARS at the preliminary USDOC decision, we include the preliminary AD duty (in decimal) form, expecting a larger duty to be associated with higher CARs. At the final USDOC decision, an increase in the final dumping margin from the preliminary margin should also increase the CAR for this AD event, so we include the difference between the final and preliminary dumping margin (in decimal form) as an explanatory variable for second-stage regression of the CARs for the final USDOC decision. Finally, provided the AD case has made it to the final USITC decision, this decision is definitive for the case and becomes the AD case's final outcome. Therefore, we include a dummy variable for whether the decision is affirmative or not in the second-stage regression for the final USITC decision CARs and expect a positive coefficient.[13]

In any event study, there is always the possibility of other "confounding" announcements in the event window, which may bias the estimated CARs. With so many different events in this study it is difficult to systematically control for these possibilities. However, we hypothesize that the high profile 1985-86 semiconductor and 1992-93 steel cases are more likely to have such confounding events, as there were many media announcements connected with these cases throughout the time period of these AD cases. Thus, we include separate dummy variables for these two types of cases in our second-stage AD event regressions. Finally, we include year dummies and dummies for SIC industries 28, 33, 34, and 35, as unobserved macroeconomic conditions or industry characteristics may affect market investor's reactions in a systematic way.

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[11] We get qualitatively identical results when we control for heteroskedasticity as suggested by Saxonhouse (1976). Results using the Saxonhouse corrections are available from the authors upon request.

[12] Of course, a better measure of a firm's "exposure" would use information on the petitioning firm's market share in the investigated product, which is not available.

[13] Data for the subject import volume, case decision, and final AD duties can be accessed at http://www.nber.org/antidump/ or http://darkwing.uoregon.edu/~bruceb/adpage.html. Preliminary AD duties were collected from relevant *Federal Register* notices and data on petitioning firms' sales volume come from the Compustat database.

These particular industry dummies are included since they encompass the bulk of U.S. AD cases.[14] The top half of Table 3 reports descriptive statistics for our explanatory variables in the second stage regressions for the sample of CARs cumulated over all five AD events.

Table 4 presents our results from running separate regressions to explain CARs for the five AD events, as well as regression results for the cumulated total CAR. The F-test for the final three AD events, as well as for the cumulated total CAR is statistically significant with R^2s ranging from 0.16 to 0.32 for these cross-sectional regressions.

There are a number of results in Table 4 to highlight. First, consistent with comparison of means in Table 3, tariff-jumping FDI announcements are estimated to have a negative effect on a domestic firm's gains from AD events. FDI announcements that occur before the AD event (and thus represent almost certain tariff-jumping) are large and statistically significant, while the effect of tariff-jumping FDI that occurs after the event (a proxy for higher likelihood of tariff-jumping FDI at the time of the event) is smaller in magnitude and not statistically significant. Second, explanatory power of this second-stage regression analysis is perhaps highest for the preliminary USDOC decision, where the magnitude of the duty is first revealed, with the size of the duty leading to larger CARs for petitioning firms and FDI before the event mitigating these gains by 3.9%. The cumulated total regression analysis likewise has decent explanatory power and is largely consistent with the separate regressions. In particular, FDI before the event continues to be strongly negative, while log of the petitioning firm's sales is a statistically important control. The high R^2 in the final USITC regression seems to come primarily from the negative market reaction to the 1992-93 steel case, confirming press reports at the time that the ruling of negative on many of the products in that case was a blow to the U.S. steel industry and market expectations.

[14] F-tests of the joint significance of the industry and year dummies were often, but not always statistically

4.2. Explaining CARs from Tariff-jumping FDI Announcements.

We next turn to second-stage regressions connected with the CARs from tariff-jumping FDI announcements. In particular, such a regression can indicate whether certain forms of FDI are more damaging to the domestic petitioning firms than others, controlling for other factors. To examine this issue, we include dummy variables indicating whether the announced FDI will be a new plant, joint venture or plant expansion, excluding a dummy variable for acquisition FDI to avoid perfect multicollinearity.

We also include dummy variables for whether the associated AD case was ruled affirmative or terminated/suspended, excluding a dummy variable for a negative decision. Consistent with our earlier hypotheses tested above, we expect that tariff-jumping FDI announcements lead to greater losses (negative coefficient) for the domestic firms that were successful in getting AD protection versus ones that did not receive such protection. Terminated and suspended cases often lead to public or private settlements by the domestic and foreign firms, such as voluntary export agreements (see, for example, Prusa, 1992, and Anderson, 1993). These outcomes may lead to positive CARs for domestic firms that may rival that of the proposed AD duties or, as shown by Rosendorff (1996), even higher profits for the domestic firms than with AD duties. Given these arguments, we would also expect a negative coefficient on the terminated/suspended dummy variable.

Another FDI-related explanatory variable that we include is a dummy variable for FDI before the investigation. On the one hand, such pre-investigation FDI may be expected to have less impact on the domestic firm post-investigation FDI because the AD duties (or termination/suspension agreement) is not in place for such FDI announcements. On the other hand, pre-investigation FDI may be by foreign firms that are much stronger rivals in the domestic

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significant for the regressions reported in Table 4.

market, since they choose to FDI before any threat from an AD investigation and/or AD duties. This would suggest a negative coefficient on our pre-investigation FDI dummy variable.

Finally, as with our second-stage regression analysis of the AD announcements, we include the log of the dollar value of the subject import volume, the log of the dollar value of the petitioning firm's sales in the relevant year, and dummy variables for the 1985-86 semiconductor cases and 1992-93 steel cases as controls. We do not include year and industry dummies in these regressions as F-tests reject their inclusion though we get qualitatively identical results to those reported here when they are included. The bottom half of Table 3 reports descriptive statistics for our explanatory variables in the second-stage regressions of the tariff-jumping FDI sample.

Table 5 presents our results for the tariff-jumping FDI announcements. The first column of results gives estimates when using the entire sample of observations. Many of the regressors have the correct sign, and the F-test rejects the null of jointly zero slopes at the 1% significance level. As hypothesized, tariff-jumping events lead to more negative CARs when the final outcome of the associated AD case was affirmative, though this effect is not statistically significant at standard significance levels. Terminated/suspended cases do not appear to have any statistically significant impact on the CARs from tariff-jumping.

Turning to our FDI variables, there is evidence that plant expansion FDI lead to more negative CARs than other types of FDI, with a 4.3% lower CAR, everything else equal. This makes sense because plant expansions add domestic capacity in the industry, unlike acquisitions, and are by foreign firms that have already established themselves in the domestic market, unlike new plants or joint ventures.

The last column of Table 5 displays results when we run our second-stage regressions for only our affirmative outcome observations. Since this sample is only affirmative cases, we must necessarily drop the first two regressors for identification. In general, this regression does not

have as good of a fit. However, the results are largely consistent with the full sample results in column 1. One difference is that plant expansion and new plant FDI are now both estimated to negatively impact domestic petitioners. Another notable difference is that FDI before the investigation is now found to significantly lead to lower returns for domestic petitioners, which is consistent with the hypothesis that it is generally foreign firms that can compete stronger domestically that announce before AD investigations.

On a final note, when we examine event windows of 1, 5, 7 and 9 days (rather than 3 days reported here), we get qualitatively identical results, though less precisely estimated. This is true for both our second-stage regressions for AD and for tariff-jumping announcements and is consistent with the notion that a larger window allows the possibility of greater noise from confounding events.

5. Conclusion

This paper began with the idea of examining changes in domestic firms profits from AD investigations and from the subsequent tariff-jumping FDI that may result from such actions. The initial hypotheses were that AD investigations, particularly those that are ruled affirmative and lead to AD duties, result in positive abnormal returns to domestic firms, while tariff-jumping FDI may partially or completely mitigate these effects. The sample we gathered showed substantial heterogeneity in the circumstances surrounding AD cases with associated FDI, including a variety of case outcomes, timing of FDI and type of FDI. This led to a variety of hypotheses tested concerning the variation in abnormal returns we observe from the AD investigation and tariff-jumping events.

We find evidence that FDI has a significant negative impact on abnormal gains from AD investigation events for U.S. domestic petitioning firms. On average, affirmative U.S. AD

decisions are associated with 3% abnormal gains to a petitioning firm when there is no tariff-jumping FDI, but no abnormal gains if there is tariff-jumping FDI. The evidence for this effect is strong when announcements of the intended tariff-jumping FDI have already occurred before the AD event takes place, which happened in a fair number of cases, while there is weaker evidence for this effect with anticipated subsequent FDI announcements.

In a related vein, we find evidence that the announcements of plant expansions (and, to some extent, new plants) have significantly larger negative effects on domestic firms' profits than other types of FDI, including acquisitions and joint ventures. This makes sense because plant expansions add domestic capacity in the industry, unlike acquisitions, and are by foreign firms that have already established themselves in the domestic market, unlike joint ventures.

Our analysis also highlights that market reactions are significantly more marked for some AD events than others. Our ability to explain market reactions (in terms of R^2) is highest for the preliminary USDOC decision where the proposed AD duty is first announced, and the final USITC decision where the final case outcome is resolved.[15] Finally, the negative decision on some of the products involved in the 1992-93 steel cases, one of the largest set of AD cases ever investigated in the U.S. led to significantly negative abnormal returns to the U.S. steel petitioners.

[15] The preliminary USDOC decision is often not the focus of event studies of AD decisions, though Hughes et al. (1997) also find that the preliminary USDOC announcement for the U.S. AD case against Japan in 64k drams had very large effects on the market.

Figure 1: Standard Timeline for U.S. AD Investigations.

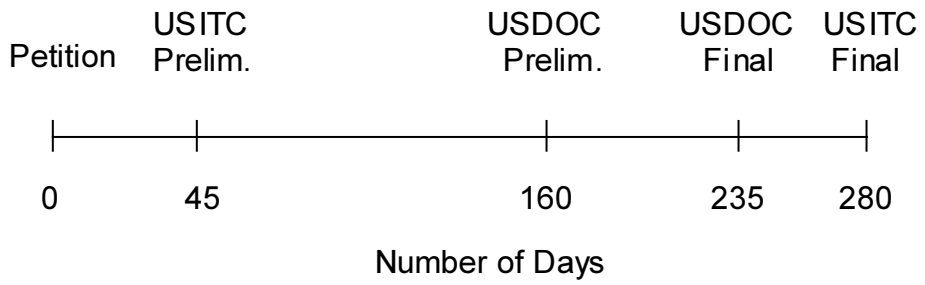

Table 1: U.S. AD Cases with Tariff-jumping FDI and U.S. Domestic Petitioners that were Publicly-traded Firms at Time of the AD Case.

USITC Case Number	Year of Petition	Publicly Traded Petitioners	Product	Case Decision[f]
731012	1980	SCM Corp.	Portable Electronic Typewriters	A
731053-731084	1982	Bethlehem Steel Corp. US Steel Corp.	Carbon Steel Products	N,T
731089	1982	ARMCO Steel Co. Bethlehem Steel Corp.	Concrete Wire Strand	T
731095	1982	ARMCO Steel Co. Allegheny Ludlum Carpenter Technology Colt Industries Cyclops Corp. Eastern Stainless Steel Republic Steel Corp.	Stainless Steel Sheet and Strip	A
731102	1982	Motorola Inc.	Radio Pagers	A
731134	1983	Corning Glass Works Owens Illinois Corp. Wells-Gardner Electric	Color TV Receivers	A
731207	1984	Motorola Inc.	Cellular Mobile Telephones	A
731270	1985	Micron Technology	64k DRAMs	A
731288	1985	Advanced Micro Devices Intel Corp. National Semiconductor	EPROMs	T
731300[a]	1985	Advanced Micro Devices Intel Corp. National Semiconductor	256k and above DRAMs	T
731343	1986	Timken Corp.	Tapered Roller Bearings	A
731350-731353	1986	Wyman-Gordon	Forged Steel Crankshafts	A,N,T
731354	1986	ARMCO Steel Co. Allegheny Ludlum Carpenter Technology	Stainless Steel Pipe	A
731368	1986	Zenith Electronics	Color Picture Tubes	A
731370	1987	Caterpillar[b]	Forklifts	A
731388	1988	Polaris Industries	All-terrain Vehicles	N
731389	1988	Eastman Kodak[c]	3.5 Inch Floppy Disks	A
731391-731399	1988	Ingersoll Rand Corp.[d]	Ball Bearings	A
731426	1988	AT&T Corp. Comdial Corp.	Small Business Telephones	A
731429	1989	Allied Products[e]	Mechanical Transfer Press	A
731451	1989	Ideal Basic Industries Texas Industries	Portland Cement	A

731490	1990	Boise Cascade Bowater Inc. Champion International Consolidated Papers International Paper	Coated Groundwood Paper	N
731522	1991	Chrysler Motor Corp. Ford Motor Corp. General Motors Corp.	Minivans	N
731556	1992	Micron Technology	DRAMs	A
731557	1992	Bethlehem Steel Corp.	Steel Rails	N
731571	1992	Black & Decker Corp.	Professional Electric Handtools	A,N
731573- 731620	1992	ARMCO Steel Co. Bethlehem Steel Corp. Geneva Steel Corp. LaClede Steel Corp. LTV Corp. Lukens Steel Corp. US Steel Corp.	Steel Products	A,N
731622	1992	DuPont Hercules Inc. Morton International	Dry Film PhotoResist	N
731647	1993	Keystone Consolidated	Carbon Steel Wire Rod	T
731661	1993	Eastman Kodak	Photo Paper and Chemicals	T

[a] Petition actually initiated by U.S. government through the Department of Commerce, but largely connected with case 731-288, so we assign the same firms as "petitioners" in this case.
[b] Petition filed by the labor unions connected with Caterpillar Inc.
[c] Petition by Verbatim Corp., a subsidiary of Eastman Kodak.
[d] Petition by Torrington Corp., a subsidiary of Ingersoll Rand Corp.
[e] Petition by Verson Corp., a subsidiary of Allied Products.
[f] "A" represents "Affirmative", "N" represents "Negative", "T" represents "Terminated" or "Suspended" often in terms of a negotiated voluntary export restraint agreement. In some cases, with multiple countries or products named, there may be more than one decision listed.

Table 2: Summary of First-Stage Regressions for AD Investigations and Tariff-jumping Events.

Event	Mean CARs	Z-statistic	Number of CARs
AD Events			
Petition	0.0105	2.17*	130
Preliminary USITC Decision	0.0024	0.40	127
Preliminary USDOC Decision	0.0023	-0.19	126
Final USDOC Decision	0.0060	0.97	115
Final USITC Decision	-0.0001	0.83	119
Cumulated Total	0.0166	7.61**	132
AD Events - Affirmative Cases Only			
Cumulated Total	0.0198	9.95**	99
Cumulated Total – With Tariff-jumping FDI	0.0019	-0.19	31
Cumulated Total – Without Tariff-jumping FDI	0.0296	12.14**	68
Tariff-jumping Events			
All Tariff-jumping FDI Announcements	0.0055	1.39	160
New Plant FDI	0.0033	0.60	77
Acquisition FDI	0.0078	0.74	25
Plant Expansion FDI	-0.0120	-0.71	20
Joint Venture FDI	0.0178	1.92*	38

Table 3: Descriptive Statistics for Second-Stage Regressions.

Variable	Mean	Standard Deviation	Minimum	Maximum
AD Cumulated Total Events (138 observations)				
Log of Subject Import Volume (in $ millions)	2.34	0.26	1.00	2.70
Log of Petitioning Firm's Sales (in $ millions)	1.94	0.23	1.16	2.46
Preliminary Duty (in decimals)	0.42	0.58	0.00	4.44
Final Duty – Preliminary Duty (in decimals)	-0.09	0.48	-3.60	1.63
FDI Before	0.11	0.31	0.00	1.00
FDI After	0.21	0.41	0.00	1.00
Semiconductor Case	0.06	0.24	0.00	1.00
1992-93 Steel Case	0.05	0.22	0.00	1.00
Affirmative Decision	0.79	0.39	0.00	1.00
Tariff-jumping Events (160 observations)				
Log of Subject Import Volume (in $ millions)	2.56	0.14	2.07	2.70
Log of Petitioning Firm's Sales (in $ millions)	2.01	0.19	1.21	2.48
FDI Before Investigation	0.34	0.47	0.00	1.00
New Plant FDI	0.48	0.50	0.00	1.00
Joint Venture FDI	0.24	0.43	0.00	1.00
Plant Expansion FDI	0.13	0.33	0.00	1.00
1992-93 Steel Case	0.37	0.48	0.00	1.00
Semiconductor Case	0.24	0.43	0.00	1.00
Affirmative Decision	0.51	0.50	0.00	1.00
Terminated/Suspended	0.23	0.42	0.00	1.00

Table 4: Second-Stage Regressions for AD Investigation Events – White-corrected Standard Errors.

Regressors	Expect-ed Sign	Dependent Variable: CARs with 3-day Event Window					
		Petition	Preliminary USITC	Preliminary USDOC	Final USDOC	Final USITC	Cumulated Total
Log of Subject Import Volume	+	0.002 (0.026)	- 0.017 (0.018)	0.026 (0.021)	0.017 (0.024)	- 0.024 (0.023)	- 0.023 (0.029)
Log of Petition Firm's Sales	-	- 0.002 (0.034)	0.012 (0.027)	- 0.045 (0.028)	- 0.082** (0.028)	- 0.026 (0.029)	- 0.088** (0.037)
Preliminary Duty	+			0.022** (0.010)			- 0.001 (0.027)
Final Duty – Preliminary Duty	+				- 0.000 (0.008)		- 0.007 (0.026)
FDI Before Event	_	- 0.051* (0.027)	- 0.024 (0.017)	- 0.039** (0.017)	0.005 (0.017)	- 0.015 (0.025)	- 0.080* (0.041)
FDI After Event	_	- 0.023 (0.016)	- 0.009 (0.012)	- 0.021 (0.015)	0.013 (0.016)	- 0.012 (0.018)	- 0.034 (0.038)
Semiconductor Case	?	0.028 (0.037)	0.013 (0.025)	0.025 (0.023)	- 0.073 (0.056)	- 0.021 (0.049)	0.002 (0.055)
1992-93 Steel Case	?	0.024 (0.032)	0.024 (0.047)	0.103 (0.081)	- 0.010 (0.031)	- 0.109** (0.049)	- 0.040 (0.073)
Affirmative Decision	+					- 0.017 (0.030)	- 0.003 (0.051)
R^2		0.18	0.16	0.32	0.30	0.37	0.31
F-statistic		0.86	1.41	1.63**	277.57**	3.00**	1.70**
Number of Observations		124	122	120	107	114	138

NOTES: Robust (White-corrected) standard errors in parentheses. Year and industry dummies included, where industry dummies are for SIC 28, 33, 34 and 35, the sectors with the majority of AD activity.
* denotes statistical significance at the 10% level and ** denotes statistical significance at the 5% level.
For the "Cumulated Total" regression, the variable "FDI Before Event" is replaced with a dummy variable for FDI taking place before final USITC decision and, similarly, "FDI After Event" is defined as FDI after final USITC decision.

Table 5: Second-Stage Regressions for Tariff-Jumping Events.

Regressors	Expected Sign	Dependent Variable: CARs with 3-day Event Window All Observations	 Affirmative Decisions Only
Log of Subject Import Volume	-	0.026 (0.042)	0.054 (0.068)
Log of Petition Firm's Sales	+	- 0.033 (0.028)	- 0.005 (0.038)
FDI Before Investigation	?	- 0.010 (0.012)	- 0.024* (0.013)
New Plant FDI	_	- 0.001 (0.014)	- 0.054** (0.022)
Joint Venture FDI	_	0.020 (0.017)	- 0.024 (0.031)
Plant Expansion FDI	_	- 0.043** (0.018)	- 0.076** (0.034)
1992-93 Steel Case	?	- 0.025 (0.018)	- 0.028 (0.023)
Semiconductor Case	?	0.016 (0.018)	0.022 (0.027)
Affirmative Decision	-	- 0.019 (0.012)	
Terminated/Suspended	-	0.014 (0.027)	
R^2		0.08	0.10
F-statistic		2.05**	0.99
Number of Observations		160	81

NOTES: Robust standard errors in parentheses. * denotes statistical significance at the 10% level, and ** denotes statistical significance at the 5% level.

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