Multiproduct Firms and Antidumping Duties: Evidence from India

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Abstract

With the growing availability of high-quality higher-dimension data in international trade, many new stylized facts have also emerged. One such stylized fact is that multiproduct firms play a significant role in international trade. In this paper, we investigate the effect of US antidumping duties on the exports of Indian multiproduct firms. In particular, we study whether US antidumping duties lead the Indian exporter to alter their product-scope to third country markets (aka to trade partners other than the US). Using a unique transaction-level data from India, we find that firms affected by US antidumping duties increased the number of products exported to other destinations by about 0.7 products, on average. This translates to a substantial 40% increase in the product-scope of these firms because a typical Indian exporting firm exported an average of 1.8 products to a given destination in our sample. We also find that firms whose products spanned multiple sectors drove most of this increase. However, we do not find any difference in the product-scope response of firms producing differentiated vs. those producing homogenous products. We find our results to be robust across various specification and sample size changes.

Keywords: Antidumping Duties; India; Multiproduct firms; Product Scope.

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Introduction

There has been a dramatic increase in both theoretical as well as empirical literature highlighting the importance of firm heterogeneity in understanding trade flows (Bernard et al. (2003); Bernard et al. (2007); Melitz (2003)). Partly due to the availability of high-quality firm level data as well as due to the growing computational power, researchers have uncovered several new and interesting patterns in data. Some of these stylized facts are relatively similar across countries and across periods. For instance, there is now substantial evidence that exporting firms tend to be more productive and larger than the average firms in the industry, with multinational firms being the most productive (Bernard et al. (2007)). Similarly, there is increasing evidence that more productive firms tend to export more and to further destinations. Moreover, there is also mounting evidence that most of the firms, particularly those engaged in international trade, are multi-product firms (Bernard, Redding and Schott (2010); Iacovone and Javorcik (2010); Goldberg et al. (2010)).

While some of these findings are relatively uniform across studies, there are several questions where both the theoretical and the empirical evidence is mixed. One such question relates to the role of multiproduct firms in international trade and the response of these firms in the face of a trade shock. In particular, in the presence of an external shock do these firms adjust along the extensive margin (by changing the number of products) or along the intensive margins (by changing the trade volume of the affected products)? The theoretical literature gives several competing predictions about this question. For instance, Qiu and Zhou (2013) point out that whether trade liberalization reduces or increases the number of products depends on the nature of the firm as well as on the cost of the introduction of a new variety. In their model, they show that a very steep variety introduction fee is both necessary and sufficient to ensure that the most productive firms *increase* its product scope following trade liberalization.[1] This is in contrast with a large body of the literature that focuses on the cannibalization aspect of increased competition associated with trade liberalization. In these papers, the increased competition associated with trade liberalization would force firms to drop their least efficient products (Bernard et al. (2011); Eckel and Neary (2010); Feenstra and Ma (2008); Mayer et al. (2014)).[2]

Another branch of literature related to this paper studies the role of the *new* trade policy in international trade. Even as the traditional trade barriers such as tariffs have decreased around the world, several WTO sanctioned temporary trade barriers - antidumping duties, in particular - have emerged to take their place. In some respects, these new trade barriers can be thought of as another means of protection used by countries to replace the old barriers; though, the evidence here is mixed (Bown and Tovar (2011), Feinberg and Reynolds (2007), Moore and Zanardi (2011)). However, unlike tariffs, these barriers can often target specific countries or even specific firms within a country. This could lead to new and interesting results that are different from the usual trade barriers like tariffs. For instance, since temporary trade barriers can be country specific, it could

[1] The idea is that each firm will increase the product variety until the cost of introducing marginal variety is just sufficient to cover the variety introduction fee. Hence, with the rising variety fee the most productive firms will also be the ones with the largest product scope. Since globalization would tend to increase the profit of the marginal variety of the most productive firms, these firms would increase their product scope.

[2] In addition to the conflicting theoretical predictions, empirical evidence on the effect of trade liberalization on product scope is mixed. For instance, Baldwin and Gu (2009) study the impact of CAFTA and find that trade liberalization reduced the product scope but only for smaller Canadian firms. Similarly, Iacovone and Javorcik (2010) provide evidence of product scope reduction for Mexican firms following NAFTA. Berthou and Fontagné (2013), on the other hand, find evidence of an increase in the product scope for French firms following a reduction in trade costs spurred by the introduction of the Euro.

lead to reduced imports from the country against which the trade barrier has been imposed (trade destruction). While at the same time it could lead to increased imports from other non-targeted countries through import source diversion (Prusa, 1997; 2001; Chandra (2017)). Moreover, antidumping duties could cause firms to deflect trade to other countries (Bown and Crowley (2006, 2007); Chandra (2016)).[3] Similarly, even firms producing identical products in a given country might face different antidumping duty rates in the export market, depending on the size of their dumping margin, and/or whether they were considered to be cooperative in the antidumping investigations (Chandra and Long (2013)).[4]

A small but growing number of papers combine the above two branches of literature by studying the impact of antidumping duties on heterogeneous firms. For instance, Konings and Vandenbussche (2008) study the effect of European antidumping duties on its domestic industry and find heterogeneous productivity response. The more productive firms that are closer to the frontier experience a productivity decrease whereas, those with low initial productivity experience productivity gains. Pierce (2011) studies the impact of antidumping duty on firms in the US and finds that while the revenue productivity might show an increase, the actual physical productivity of average protected firm decreases. Note that, most of these papers focus on a developed economy such as the US and the EU and are often interested in the impact of antidumping duties on the firms within the country itself. There are only a few studies that focus on the effect on developing countries using firm-level data (Avsar (2013); Chandra and Long (2013); Lu, Tao and Zhang (2013)).

In this paper, we add to this literature by examining the impact of antidumping duties on exports of multiproduct firms. In particular, we ask whether US antidumping duties have any effect on the number of products exported by Indian exporters in third country markets? To the best of our knowledge, no one has studied the impact of antidumping duties on the product scope of multi-product exporting firms, especially in a large developing country like India.[5] This is an important question because, as stated above, the theoretical predictions on the impact of trade cost adjustments on product scope are mixed. Thus, whether or not firms change their product mix in response to an adverse trade shock is largely an empirical question. Moreover, most of the limited existing evidence on the impact of changes in trade costs on firms' product-mix adjustments comes from episodes of trade liberalization, i.e., from instances where the trade costs decreased. However, it is not clear whether the response to an *increase* in the trade cost would necessarily be symmetric. Thus, it is important to also understand what happens when trade barriers go up. Finally, there is some evidence that

[3] Bown and Crowley (2007) identify four distinct effects of the imposition of a trade barrier that is not common across all trade partners. In particular, imposition of a trade barrier by Country A against country B, but not against country C, could (a) cause country B to increase its exports to country C (trade deflection); (b) cause country B to import less from country C, as country B exporters would sell part of the lost sales to country A domestically (trade depression); (c) increase country C's exports to A (trade diversion); or, (d) reduce the exports of B to A (trade destruction).

[4]Using firm level data from China between 2000-2006, Chandra and Long (2013) find that those firms that were specifically targeted in the US antidumping investigation faced up to 10% decrease in their productivity.

[5] In a recent paper, Vandenbussche and Vieghlan (2018) also study the impact of antidumping duties on multiproduct firms in India. However, they investigate the impact of antidumping duties on the firms' choice of inputs. They find that an increase in import protection on some inputs causes firms to switch to the unprotected inputs, which in turn also leads to product switching in the output market. Note that, this is different from the current paper in two respects. First, we are interested in studying the impact of antidumping duties on firms' final output as opposed to its input. Second, and more importantly, the antidumping duty is imposed by India's trade partner in this paper, whereas, they are interested in investigating the impact of India's own antidumping duty actions.

Indian firms might behave differently than other developed countries when it comes to product turnover. For instance, Goldberg et al. (2010a) find that while Indian firms are just like their US counterparts when looking at the cross-section, they are far less likely to drop product lines in the face of tariff liberalization. Thus, it is an interesting question to study the behavior of Indian exporters in the face of an adverse trade shock.

We choose to study the effect of US antidumping duty on Indian exports as the US is India's largest export destination, accounting for more than 15% of its total exports. For instance, in 2017, Indian merchandise exports to the US totaled more than $46 billion, followed by UAE ($30 billion) and Hong Kong ($15 billion) at second and third spots. At the same time, the US is also one of the largest users of antidumping investigations against India. According to the WTO (2019), of the 227 antidumping investigations initiated against India between 1995-2017, US alone accounted for 36 investigations – next only to the 28-member European Union with 38 investigations.

In this paper, we use a unique transaction-level customs data from India for a period between April, 2000 to March, 2003 to investigate the impact of US antidumping duties on India. While the data are at the shipment level, we aggregate it to the monthly level to carry out our analysis. To get our results as cleanly as possible, we investigate the impact of US antidumping duty on Indian firms' exports to third countries, i.e., exports to destinations other than the US. We find that Indian firms that were affected by the US antidumping duties were more likely to increase the number of products exported to other countries by as much as 0.7 products on average. This is a sizeable effect given that the median firms in our sample only exports a single product in a given period (average is 1.8). Thus, an increase of this magnitude almost doubles the product scope of the median firm and leads to an increase of almost 40% in the product scope of the average firm. This result remains robust across a variety of specifications, sample sizes, as well as estimation techniques. Additionally, we find that most of the increase in product scope is driven by multi-sectoral firms, i.e., firms that export products from more than one 2-digit/4-digit HS sectors. However, we do not find any significant differences across destinations based on income, nor do we find differences across firms that produce homogenous vs. differentiated goods. In addition to these main results, we also report other new findings that are interesting in their own right. For instance, we find that exports of the Indian firms that face US antidumping duty in a given period are lower by as much as 16%.

The format of the remainder of the paper is as follows. The next section, Section 2 describes our empirical methodology followed by a discussion of our dataset in Section 3. We discuss our main results in Section 4. Section 5 provides several extensions and robustness exercises. Finally, Section 6 concludes.

2. Empirical Methodology

The main question we seek to answer in this paper is, what is the impact, if any, of US antidumping duties on the product scope of Indian exporters. As stated above, this is largely an empirical issue as the theoretical guidance on this question is mixed.

In order to answer this question, we estimate the following equation:

$$NProducts_{fct} = \alpha_{fc} + \alpha_{ct} + \beta\tau_{USA,ft} + \gamma Z_{fct} + \varepsilon_{fct}, \quad (1)$$

where $NProducts_{fct}$ is the number of products exported by firm *f* to country *c* in time *t*. α_{fc} and α_{ct} are the firm*country and country*time fixed effects. $\tau_{USA,ft}$ is an indicator variable which shows whether firm *f* faces a US antidumping duty in period *t*. We define firm *f* as facing a US antidumping duty if it exports at least one product on which the US has an active antidumping duty on exports from India. Our main coefficient of interest is β which could be either positive or negative. Finally, Z_{fct} is a vector of control variables.

One of the first considerations in trying to estimate equation (1) is that of endogeneity of $\tau_{USA,ft}$. If the same factors that cause the US to impose an antidumping duty also cause the Indian firm to expand its product scope, omitting it would lead to a correlation between our explanatory variable of interest and the error term; which, in turn, could lead to inconsistent estimates. Fortunately, exploiting the panel nature of our dataset and using various fixed-effect potentially reduces some of these issues.

Firstly, whether or not the US would impose an antidumping duty depends on the product level exports from India to the US. Since most of the firms in our sample are multiproduct firms, conducting an analysis at the firm level reduces the correlation between increased exports from India and the likelihood of imposition of antidumping duty by the US.[6] This is an important point for our identification so we should clarify it further. Antidumping duties are typically imposed at the product level.[7] Moreover, whether or not US chooses to impose an antidumping duty on a given product depends in part on whether Indian exports of that product to the US has increased recently. For a multiproduct firm, even if exports of one of its product increases, the total exports of that firm to the US may go up or down depending on how firms adjust along other dimensions. In other words, using the firm level data reduces the potential reverse causality between an increase in exports and the increased probability of an antidumping duty. Thus, we can exploit the variation across firms in their exposure to the US antidumping duty to examine their response.

While using firm-level data reduces the degree of reverse causality running from exports to antidumping duty it doesn't eliminate it. Thus, to further reduce the risk of endogeneity we drop exports to the US from our analysis. Instead, our main question is, what effect do the US antidumping duties have on the number of products exported by Indian exporters to other countries, i.e., to countries other than the United States? Note that, the decision by the US to impose an antidumping duty depends on Indian exports to the US as well as on the political economy characteristics of those import-competing sectors in the US. But it is likely to be independent of India's exports to these third countries. Hence, we can use it to estimate the causal effect of US antidumping duties on Indian exports to the other countries.

In addition to our main policy variable, we include several fixed effects to control for other potential unmeasured variables that might also affect our dependent variable. In all of our benchmark regressions, we include firm-country fixed effects (α_{fc}). These fixed effects can control for several important gravity type variables that are time-invariant such as distance, language, colonial ties, etc. Since we focus only on Indian

[6] If our dependent variable were export of a given product from India to the US, regressing it on whether or not there is a US antidumping duty on that product, would lead to inconsistent estimates due to the presence of reverse causality.

[7] Once the antidumping duty is imposed on a given product, the size of the antidumping duty can itself vary across firms (Chandra, 2016; Chandra and Long, 2013). However, in this paper, we do not exploit across firm differences in the intensity of duties. Instead, we classify the firm as facing an antidumping duty as long it exported any product on which the US had imposed an antidumping duty. This will actually bias against us finding any effects.

exports to the other countries, these fixed effects also serve as country-pair fixed effects and control for all observable and unobservable time-invariant multilateral resistance terms (Baier and Bergstrand, 2007). Finally, these fixed effects (α_{fc}) go further than the bilateral country-pair fixed effects typically employed in the gravity literature as they also control for any firm-specific ties to the given country such as whether the firm had a preexisting extensive distribution network in the destination country or had a foreign collaboration with another firm in the destination country, etc.

In addition to these fixed effects we also include country-time fixed effects in our regressions. As stated above, we use monthly data on Indian firms for the period April, 2000 to March, 2003. Thus, using country*month-year fixed effects aims to control for any time-varying macroeconomic factors that might influence Indian firms' decision to export to a given destination as well as the likelihood of the imposition of antidumping duties by the United States. In particular, it controls for changes in the bilateral exchange rates that are common to all Indian firms for a given month. Besides, it can also control for the macroeconomic environment of India, the destination country, as well as that in the US, that are common across all firms.[8] The country-time fixed effects will also control for time-varying multilateral resistance terms a la Anderson and Van Wincoop (2003). Moreover, it can also control for other important events that happened during our time frame that might also affect Indian's firm's decisions to export and adjust their product scope - such as China's entry to the WTO in December, 2001.

Finally, one of the most essential concerns given the structure of our dataset is to ensure that errors are treated appropriately. In particular, the errors in our main regression might be non-nested and interdependent across multiple dimensions and ignoring this structure might lead to biased standard errors for the coefficient of interest thus invalidating any statistical inference. Hence, we allow for multi-way clustering following Cameron, Gelbach and Miller (2011). In particular, in all our benchmark regressions we cluster the standard errors by firm and by country.[9]

3. Data

Our main source of data is a unique transaction (shipment) level database from Indian customs acquired through a third-party vendor, TIPS software services. Several other papers have also used Indian trade data acquired through TIPS software (Goldberg et.al. (2010b); Mishra, Subramanian and Topalova (2008)). However, these papers use annual product level data as opposed to daily shipment level data used in this paper. To the best of my knowledge, the only other paper that uses the same data source is Anderson et al. (2018). However, they examine the pricing behavior of Indian exporters and find that unlike other countries, more productive Indian firms charge lower export prices than their less productive brethren.

This daily trade data contains a record of every export transaction made from eleven Indian ports through both air and sea routes.[10] The dataset includes information on firm names, the date of transaction, HS 8-digit product codes, as well as product description, the name of Indian and foreign port, value of exports,

[8] Previous studies have shown that US macroeconomic environment might affect the likelihood of imposition of antidumping duty (Knetter and Prusa, 2003).
[9] We use the reghdfe module by Correia (2017) to implement the multiway clustering in STATA.
[10] Eleven Indian ports in the database are Calcutta (air, sea), Chennai (air, sea), Cochin (air, sea), Haldia (sea), Mangalore (sea), Mumbai (air, sea) and Visakhapatnam (sea).

quantity of exports, unit of measurement as well as the unit value. We have data for three fiscal years from April, 2000 to March, 2003.

While the database is extremely rich, there are some concerns with the quality of the data, and it took us a lot of effort to clean it up for a reasonable analysis. Since the data comes from the forms filled at the customs office, there are a number of missing entries and spelling errors. Some of these errors were relatively easy to fix though time-consuming such as spelling errors in country names, etc. However, the one that concerns us the most was regarding the identity of the firms. While the database also has a firm identifier, which is accurate for most parts, it is not completely error free. In some instances, the same firm may enter with two different firm identifiers. Relying on the firm names to create a panel is even more problematic due to variations in names/spelling errors/abbreviations, etc. Fortunately, we also have access to the addresses for many of these firms. Since there are no clear patterns in these errors, we couldn't write an algorithm to automatically produce correct matches.[11] Hence, we manually corrected these errors wherever there was no ambiguity based on the addresses and other information in the database itself. Furthermore, we decided to be very conservative in modifying the firm identifiers ourselves. So, in case of any ambiguity or where additional information such as the firm's address was not available, we decided to use the original classification. Of course, this would mean that we will treat a single firm with slightly different names in the database as two separate firms. Given that for most of our analysis we rely on within-firm variation this would reduce the variation we could potentially exploit and inflate our standard errors. Thus, it would lead to a bias against finding any significant results. We also check our results by restricting our sample to a subset of observations where the database entries were error free. Since the results are qualitatively similar, we omit them here for brevity, but these results are available from the authors on demand.

After cleaning this data further, we ended up with more than 4.5 million firm-country-product-day-transaction combinations with information on Indian firms' exports to roughly 180 countries. We restrict our analysis to India's top 38 exporters.[12] Moreover, barring some initial results, for most of our analysis we focus on countries other than the United States, so we drop exports to the United States from our sample. Also, for the sake of clarity, we define all twenty-seven members of the EU at the end of the year 2007 as one destination (EU) even though some of the countries were not part of the European Union during our sample period.[13] We also aggregate this information to the monthly level. Furthermore, as we explain below, for our main results we use firm-country-month-year as the unit of observations. Although, as explained below, we also report additional results that rely on firm-product or firm-month-year combinations, depending on the specification.

The next important variable, antidumping duties, come from the World Bank's Temporary Trade Barriers Database (Bown, 2011). Since our focus in this paper is to examine the response of Indian exporters to US antidumping duties imposed on India, we restrict ourselves to information on US antidumping duties. The US started eight new antidumping investigations against India during our sample period (April, 2000-March, 2003) involving a number of products, even though not all of them ended up with a final antidumping

[11] We tried using a user-written STATA program reclink2 by Wasi and Flaaen (2015) as well as writing our own matching program based on a similar fuzzy algorithm. However, none of them produced satisfactory results. We supplemented these algorithms by manually matching the firm names.
[12] A complete list of the countries in our sample is provided in the appendix in Table A1.
[13] Croatia was not officially a member when we started the project and hence is not included in the list of EU countries. However, this affects a minuscule number of observations in our sample and is unlikely to change any of our results.

duty. In addition, there were some other antidumping duties that had been imposed earlier but were either still active during our sample period, or where the investigation began earlier, but the final antidumping decision was made during our sample.[14] Note further, that the HS classification is only common across countries up to six-digit level of disaggregation. Hence, we used this to merge the antidumping duty information with the firm level information above. Thus, if the US imposed an antidumping duty on a given HS six-digit product, we treat all HS eight-digit products as being affected by the duty. We use HS-eight digit as our measure of product in all subsequent analysis, unless otherwise mentioned.

In addition to this data, we also collected information on product level import tariffs for these countries from TRAINS for the period 2001-2007. We have this information for twenty-seven countries. To classify firms as being the producer of differentiated products, we use the classification scheme by Rauch (1999). Note that, Rauch classification is available in SITC rev. 2, so we used the standard concordance table available from WITS to concord the SITC rev 2 product codes to the HS 6-digit *products*. Which we then merged with the eight-digits HS codes that we use. After merging all the above information and using the most liberal definition of firms (i.e., not correcting the firm names in case of ambiguity and treating them as separate firms) we still see that many of the firms in our sample are multiproduct firms. This is despite us using a conservative definition of a product as we count each eight-digit HS-digit product as a single product even though it could refer to several products within that category.[15] Table 1 provides a summary of our main variables used in the sample. The next table, Table 2 shows the evolution of the average number of products exported by Indian firms across various points in our sample. As we can see, there is a lot of variation in the number of products exported by firms across years as well as across destinations. The average number of products exported to a given destination is 1.8 products. The median firm in our sample only exports one eight-digit product to a given destination in each period. However, some firms may export as many as 106 products over our sample period across destinations.

4. Results

4.1 Direct effect of US antidumping duties on Indian exports to the United States

Before moving on to discussing our main results, let us first ensure that we see the first order effects of US antidumping duties. If the US antidumping duty on Indian HS six-digit products does not have any first order effect on the exports of those *products* to the US, then this should certainly give us some pause.[16] We believe that this question is both novel and interesting in its own right. To the best of our knowledge, we are not aware of any paper that directly estimates the effect of US antidumping duties on Indian exports using disaggregated monthly data.

To test this first order effect, we run the following regression,

[14] A complete list of antidumping investigations and its outcome included in our sample is provided in the appendix in Table A2.
[15] Anderson et al. (2018) show that even within a single eight-digit code there could be multiple products as verified by their product names and unit prices etc.
[16] All estimates based on (2) use HS six-digit classification to classify products as HS classifications are common across countries only up to six-digits. Everywhere else in the paper where we are only interested in whether that firm has a US antidumping duty imposed, we use HS eight-digit nomenclature to classify a product.

$$Y_{USA,hft} = \alpha_{hf} + \alpha_{fy} + \alpha_{hy} + \alpha_t + \beta_1 \tau_{USAf,ht} + \beta_2 Z_{hft} + \varepsilon_{hft}, \quad (2)$$

where our main variable of interest is $\tau_{USAf,ht}$; which measures whether the HS six-digit product *h* exported by firm *f* to the US faces an antidumping duty in period *t*. We also include α_{hf} (product*firm) and α_{fy}, the firm*year, α_{hy} (product*year) and α_t (month*year) fixed effects. Finally, $Y_{USA,hft}$ are the various measures of firm-product exports to the US, as described below and Z_{hft} are a vector of controls. Finally, given the non-nested nature of the errors, we allow for multi-way clustering at the product and the firm level.

While many variables can potentially affect Indian firms exports to the US, to get reliable estimates for our main dependent variable of interest, we should try to control for those that might simultaneously affect firms' exports as well as the likelihood of imposition of antidumping duty. In the absence of firm-level information other than the trade data, we try to control for many of these variables by including a wide range of fixed effects. First, we include period (month-year) fixed effects, α_t, in all of our regressions to control for any macroeconomic variables that might affect a firm's exports. In addition, we include firm-product fixed effects in all of our regressions to control for any time-invariant variables that are specific to a given firm and product such as the distribution network, distance to the firm's production plants, etc. It also implies that our main identification comes from the intertemporal variation in firm-product pairs across our sample period.

An important variable that one must control for in this regression is a measure of firm productivity. Unfortunately, in the absence of firm-level information, we cannot directly control for it in our regression. Additionally, we do not have enough variation in the data to use a full set of firm-period fixed effects. However, since productivity is relatively persistent, we include a set of firm-year (α_{fy}) dummies as the next best alternative. The advantage of this is that it can also control for other supply side variables such as firm's budget or operational management, i.e., variables that are not time invariant but only varies by the year. Finally, we also include product-year (α_{hy}) fixed effects to control for any demand side variables that vary by the year but are common across all firms that export that product.[17]

These results are reported in Table 3a and Table 3b. The first four columns of Table 3a use the value of the firm's exports of a given product to the US as the dependent variable. According to our results, US antidumping duties are associated with a decrease in Indian firms' exports of the affected product to the US (both in terms of magnitude as well as statistical significance). According to the results in column (1), products on which the US had imposed an antidumping duty had 16% lower exports.[18] In the next column (2) instead of using product-year fixed effects, we use the industry fixed effects where the industry is defined as a HS 2-digit sector. Our results remain both qualitatively as well as quantitatively unchanged.

While we have included firm-year fixed effects to control somewhat for the firm size and productivity, it is not ideal, and it does not control for those firm level variables that vary more frequently. Larger firms are more likely to be faced with antidumping duty and tend to have larger exports. Thus, not controlling for firm size might lead to an underestimate of the true effect of antidumping duties. Hence, we next control for firm's size by including the total exports of the firm. Note that the total exports of the firm will include the firm's

[17] One such as demand side variable that affects all firms is import tariffs. Note that, while import tariffs are not strictly time-invariant, they did not change much during our sample. An alternative specification, where we include import tariffs directly into the regressions instead of α_{hy} fixed-effect does not change our results.

[18] (exp(-0.17)-1)

exports of the product by construction. Hence, we use lagged total exports instead to avoid any spurious correlation. This result is reported in column (3). As we can see, antidumping duties are still associated with lower exports but controlling for firm's size makes the magnitude of the effect much bigger. One lingering concern is that since exports tend to be highly persistent, using lagged total exports does not adequately address the spurious correlation between our dependent and the explanatory variable. In order to avoid this, we use a lagged measure of total exports of all *other* products exported by the firm.[19] Including these controls do not change our main result that imposition of antidumping duty by the US is associated with lower exports to the US by Indian firms.

One remaining concern is that antidumping duties are often imposed as a "response" to growth in imports from the target country. In that case, the effect of antidumping might be more pronounced in terms of the growth rates as opposed to the levels of variables. Thus, in the last two columns of Table 3a we repeat the same analysis as that in the first two columns of Table 3a but with the growth rates of exports as the dependent variable instead. We find significant effects of antidumping duties on Indian exports in the predicted direction across both specifications. Moreover, as expected, the magnitude of the coefficients is also larger for the growth rates compared to the levels.

Note that, there are two opposite effects of an antidumping duty that could potentially nullify each other. On the one hand, an antidumping duty by the US raises the cost of exporting to the US and hence might reduce the volume of Indian firms' exports to the US. On the other hand, an antidumping duty gives the firms an incentive to increase their f.o.b. price of exports to reduce their dumping margin (and hence to reduce the size of the duty).[20] Thus, focusing on the value of exports might give us an underestimate of the true dampening effect of antidumping duties. Hence, in the next table, Table 3b, we use the log of export volume as the dependent variable instead of the value of exports. The structure of the table is otherwise identical to that in Table 3a. The results in Table 3b seem to confirm our priors. Not only do antidumping duty seem to negatively affect the volume of exports the magnitude of the effect tends to be much larger. A US antidumping duty is associated with about 27% decrease in the exports of the affected products in terms of the volume. These are clearly sizeable impacts. Hence, only looking at the export value data might lead to an underestimate of the true effect of US antidumping duties.

4.2 Effect of US antidumping duties on the product scope of Indian exporters – to countries other than the United States

4.2.1 Benchmark results

While the previous results were novel in their own right, they are not the main focus of the paper, and we hasten to caution against putting a causal interpretation above. Instead, we now move to our main goal of understanding what happens to the product scope of Indian firms when they face a trade barrier in one of the export markets. Do they continue exporting the same range of goods as before while increasing the intensity of exports, i.e., adjust along the intensive margin? Or do they expand the range of product coverage by exporting more products and/or to more destinations (adjust along the extensive margins) in response to reduced market

[19] i.e., $TotalExports_{fht} = \sum_{k \neq h} Exports_{fkt}$

[20] See, for instance, Blonigen and Prusa (2008), Chandra and Long (2013).

access in one of its export markets? Note that, as discussed above, theoretically the number of products by these exporters might increase or decrease. For instance, a large enough reduction in the market access of a big market might cause the exporter to stop exporting that product to other markets as well in the presence of economies of scale. Thus, it is largely an empirical question which should be tested for different groups of exporters at different time periods.

We present our main benchmark results in Table 4a. The analysis is conducted at the firm-country level. The dependent variable is the number of products exported from India by a firm-country pair, i.e., it measures the number of HS 8-digit products that firm *f* exports to country *c* in a given month *t*. As seen in column (1), the coefficient on the US AD duties is positive, indicating an increase in the number of products for firms affected by US antidumping duty, and is both statistically as well as economically significant. The results suggest that the firms facing a US antidumping duty increase the number of products by 0.7 products to an average country. Since a typical firm in our sample exports an average of 1.8 products (median is 1) to a given country *c* in each month, this translates to an increase of 40% in the number of products.

Our estimates control for a large number of firm-country and country-period fixed effects. However, if there are still some omitted time-varying variables that affect both the probability of AD duties as well as the number of products exported by firms our estimates will be biased and inconsistent. One of the most important variables to control for is the size of the firm. Typically, large firms are more likely to be hit by an adverse antidumping duty and are also more likely to have a higher product scope. Thus, in column (2) of Table 4a, we include firms' total exports to country *c* in time *t* to control for the size of firms.[21] As expected, the size of exports is positively related to firms' product scope, indicating that bigger firms (firms with larger exports) are more likely to have a bigger product scope. In fact, according to the estimates in column (2) a 1% increase in firms' exports is associated with 0.3 more products on average. Despite controlling for the size of firm's exports, our main coefficient of interest remains largely unchanged. While the size of the coefficient of interest is now slightly smaller, it still indicates an increase of 0.6 products for firms faced with a US antidumping duty.

Another potential variable to control for is a measure of other trade barriers faced by firms in a given destination *c* at time *t*. To control for this trade barrier, we include a measure of weighted average tariff faced by the firm that is similar to Qiu and Zhou (2013).[22] We calculate this measure as,

$$AvgTar_{fct} = \sum_{h \epsilon H_{fct}} \left(\frac{exp_{hfct}}{\sum_{h \epsilon H_{fct}} exp_{hfct}} \right) Tar_{hct}. \quad (3)$$

[21] Another potential size measure would be to control for firms' total sales or firms' productivity. Unfortunately, our data comes from customs and does not have firm level information. However, as is widely known, larger and more productive firms are more likely to be exporters, have larger exports, as well as export to more destinations. Thus, it is likely that our results would not change even after the inclusion of those additional variables. Unfortunately, in the absence of a measure of productivity, we do not have a way to directly test this assertion.

[22] Note that, our measure of firm-specific tariff faced by the Indian firm in a given time period is slightly different from Qiu and Zhou (2013). While they were interested in a firm-specific trade cost measure, our variable varies by both firm and destination. In Table 8a and Table8b, we show that our results remain unchanged if we ignore the destination dimension and create a firm-specific tariff as in Qiu and Zhou (2013).

Here, *h* is an HS 8-digit product, and H_{fct} is the total scope of products exported by the Indian firm *f* to a country *c* in period *t*. Tar_{hct} is the *ad valorem* MFN import tariff imposed by country *c* on imports of product *h* in period *t*. Note that, our measure of the firm-specific tariffs has three potential sources of variation. Specifically, the average tariff for a given firm-country pair would change if the *ad valorem* tariff imposed on a product exported by firm *f* changes. However, it would also change if the firm *f* changes the composition of products it exports to country *c* as well as if the share of its exports of a given products changes.

Interestingly, the coefficient of this variable enters with a wrong sign. However, it is neither statistically nor economically significant. It could perhaps be due to the attenuation bias as constructing such a measure of average tariffs is bound to have measurement errors. Nevertheless, the inclusion of this variable does not alter our main message that the imposition of an antidumping duty seems to increase the number of products by Indian exporters to alternate destinations by about 0.54 products on average. Perhaps it is important to highlight that, of the 38 countries included in our sample we only have product level tariffs data for 25 countries. Thus, including tariffs decreases our sample size by more than 150,000 observations. However, it is nice to see that the coefficient estimates are stable across changes in sample size.

The next two columns in Table 4a include other control variables that might be correlated with the number of products. For instance, even after controlling for the total value of exports, firms that export to/from more destinations within a country might have a more diversified portfolio of products. Thus, we include the number of Indian ports used by the firm as well as the number of foreign ports through which the exports are routed as additional controls. However, none of these variables affect our main results in any meaningful way.

Finally, it could be that whether or not the US will impose an antidumping duty would depend not on the levels but the growth of exports. Hence, we explore this possibility in results presented in the next two columns. Instead of including a log of exports to control for the size of the firm we include the growth of firms exports as a potential control in column (6). Moreover, it could be that it is the growth of exports last period that motivates US antidumping duty, so we also include the lagged growth rate in column (7). None of these changes affect our main qualitative results. In fact, the magnitude of our main coefficient of interest slightly increases. According to column (6), US imposition of an antidumping would cause the average number of products exported by Indian exporters to increase by 0.8 (a 44% increase). One word of caution is in order here. Since we include monthly growth rates, we can only include those export-country pairs that export in consecutive months. As these are likely to be larger firms or more established relationships, these results apply to only those firms. In fact, the number of country-firm pairs included in these columns decreases from about 98,000 in column (2) to about 36,000 and 20,000 in columns (6) and (7) respectively. Thus, these estimates again establish the robustness of our main results.

4.2.2 Antidumping Investigations Sample

Note that, our estimating equation (1) can be interpreted as a generalized difference-in-difference estimation with time-varying treatments (Wooldridge, 2002; Bertrand, Duflo and Mullainathan, 2004).[23] Since

[23] To clarify, let us write equation (1) using the usual difference-in-difference estimation structure:

$$NProducts_{fct} = \alpha_{fc} + \alpha_{ct} + \beta_1 Treatment_f + \beta_2 \tau_{USA,ft} + \beta_3 \tau_{USA,ft} * Treatment_f + \gamma Z_{fct} + \varepsilon_{fct}, \quad (1a)$$

our benchmark results use the universe of all exporting firms in India, according to this difference-in-difference interpretation our control group consists of all other Indian firms that did not export a single product on which the US had imposed an antidumping duty. One potential concern with our results above is that the firms affected by antidumping duties might be different in some respects that is not captured by our control variables. It is important to compare the firms before and after they were affected by antidumping duties with a suitable control group that was similar in other respects but was not affected by the antidumping duty. One could arrive at this potential control group using matching methods. However, this would still not be completely satisfactory because matching on the observables would still preclude other unobservable ways in which firms affected by antidumping duty might be different than those who did not. Fortunately, antidumping process itself provides a potentially suitable control group (Konings and Vandenbussche, 2008).

In the United States, the antidumping process involves two stages – preliminary and a final round. When a petitioner files for antidumping protection, USITC first conducts a preliminary investigation to see whether there is any evidence of injury to the petitioning industry. Given an affirmative decision by the USITC in preliminary round, US Department of Commerce (DOC) calculates whether alleged dumping exists and, if yes, calculates the dumping margin. Following affirmative decisions by the DOC in the preliminary and the final rounds, USITC conducts a final injury investigation. A final antidumping duty is imposed if all decisions are affirmative.[24] Interestingly, in practice, DOC finds an affirmative dumping decision in a large majority of cases, thus whether or not an antidumping duty is imposed is largely a function of ITC's negative ruling. Given that the US petitioners are likely to petition against imports of products/foreign firms with similar characteristics, the firms that were involved with US antidumping investigations but where an antidumping duty was not ultimately imposed, are an ideal candidate to be used as a control group. Several recent studies use the same treatment and control group setup to study the impact of antidumping duties (Chandra and Long (2013); Konings and Vandenbussche (2008); Pierce (2011)).

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where $NProducts_{fct}$ is the number of products exported by firm *f* to country *c* in time *t*, and α_{fc} and α_{ct} are the firm*country and country*time fixed effects, as above. Similarly, $\tau_{USA,ft}$ is an indicator variable which shows whether firm *f* faces a US antidumping duty in period *t*, and $Z_{fct}$is a vector of control variables. The main difference between equation (1) and equation (4) is the inclusion of $Treatment_f$, which is defined as an indicator that takes the value one for all firms that had an antidumping duty imposed against them by the US during our sample period. Whereas, $Treatment_f$ is zero for those products where US started an antidumping *investigation* but where no antidumping duty was eventually imposed. The coefficient on the interaction term, β_3 then gives us the difference-in-difference estimate of the US antidumping duty.

The advantage of the panel data structure is that since $Treatment_f$ is time-invariant, it drops out of the estimating equation. Similarly, the interaction between $\tau_{USA,ft} * Treatment_f$ is also functionally equivalent to $\tau_{USA,ft}$. Thus, our estimating equation reduces to

$$NProducts_{fct} = \alpha_{fc} + \alpha_{ct} + \beta_3 \tau_{USA,ft} + \gamma Z_{fct} + \varepsilon_{fct}, \quad (1b)$$

which is identical to equation (1). Here β_3 can be interpreted as the differential impact of the treatment on the treated under the usual common trend assumption (Wooldridge, 2002; Bertrand, Duflo and Mullainathan, 2004).

[24] Note that in addition to a negative decision, the petitioner also has the right to withdraw the petition at any point, which would also terminate the investigation.

During our sample period (April, 2000-March, 2003), United States petitioners initiated eight antidumping investigations. Out of these four antidumping investigations resulted in a negative injury decision by the ITC (three in the preliminary round and one in the final round) and hence these will form our control group. These investigations were on *Oleoresin Paprika*, *Cold-Rolled Steel Products*, *Oil Country Tubular goods*, and *Allura Red Coloring*. Whereas, the other four antidumping investigations that resulted in a positive antidumping duty are part of our treatment group.[25] Hence, we use equation (1) to carry out our difference-in-difference estimation, but instead of including all Indian firms, our sample consists of only those firms that were involved in a US antidumping investigation during our sample period regardless of the eventual outcome. From here on we will call this our antidumping investigations sample. These results are reported in Table 4b. For ease of comparison, we have kept the columns similar to that in Table 4a. Restricting the sample to only firms in the treatment and the control groups dramatically reduces our sample size. However, despite the change in the size of the sample, not only our main qualitative results but also the magnitude of the effects remains unchanged. We continue to find that firms affected by a US antidumping duty would increase the number of products it exports to a typical destination by about 0.7. These results are largely unchanged if we control for additional variables such as the value of firms' exports, the average tariff barrier it faces, or the number of ports it ships its products from.

5. Extensions and Robustness

5.1 Differentiated products

Given the robustness of our earlier results, in this section, we carry out several extensions to further investigate the source of our main findings. In the process, we further establish the robustness of our results. The next question we turn to is whether our results differ across different types of firms? One obvious candidate to check is by separating the firms according to the degree of difficulty in establishing new product lines. However, theoretically it is not clear to identify whether firms operating in the differentiated products sector will be more or less likely to increase product lines. For instance, Eckel et al. (2015) emphasize cost versus quality based competence for multiproduct firms. Building on Eckel and Neary (2010) they show that the firms have opposite incentives for selling a low quality but cheap product, and a high quality but higher markup product. In a differentiated products sector where it is easy to distinguish one firm's products from others', firms have an incentive to invest in the quality of their product instead of increasing the number of products. While the focus of their paper is on endogenous product quality but their framework implies that the firms producing in the differentiated products sector have less of an incentive to increase product scope.

On the other hand, several papers focus on the *cannibalization* aspect of products (Feenstra and Ma (2008); Arkolakis and Muendler (2010)).[26] Given that US antidumping duty may cause Indian exporters to switch to other countries this would mean they face increased competition abroad. If the goods are homogenous, the firms are more likely to compete on the costs and, hence, drop product lines in the presence

[25] For a complete list of the US antidumping investigations included in our sample period as well as their outcome, please see appendix Table A2.

[26] See also, Dhingra (2013), who emphasizes competing effects of trade liberalization through increased economies of scale and through higher competition from other firms. According to her framework, a firm facing tougher competition might be induced to lower product lines to reduce within-brand cannibalization. However, lowering product lines also exposes the firms to reduced brand visibility, and hence, to tougher between-brand competitions.

of economies of scale. On the other hand, in more differentiated markets firms do not need to reduce its product scope and can invest in improving the product quality instead. Thus, according to them, relative to a more homogenous sector, firms producing differentiated products will have a higher product scope. Hence, whether differentiated product firms have a higher or lower product scope once again becomes an empirical issue.

To test whether there are any differences in the effect of antidumping duties across firms, we modify our main estimating equation - equation (1) - to add an interaction term indicating whether the firm exports differentiated or homogenous products. In particular, we now estimate,

$$NProducts_{fct} = \alpha_{fc} + \alpha_{ct} + \beta_1 \tau_{USA,ft} + \beta_2 \tau_{USA,ft} * Diff_{fct} + \gamma Z_{fct} + \varepsilon_{fct}, \quad (4)$$

where $Diff_{fct}$ is an indicator variable that takes the value one if firm *f* exports a differentiated product to country *c* in time *t*. The coefficient on the interaction term, β_2, will then capture any additional effects of US antidumping duties on these firms. The next step is figuring out how to measure $Diff_{fct}$. We decided to use a very liberal definition of whether the firms are operating in the differentiated products sector. We used Rauch (1999) classification and call the firm-country pair as being in a differentiated sector as long as it exported at least one HS six-digit products that belonged to the differentiated sector to a given destination at least once during our sample period.[27] Of course, this classification fails to distinguish between firms where all of the products belong to the differentiated sector vs. only few. Similarly, it also does not distinguish between firms that exported in differentiated sectors across all periods or only in few.[28]

We report our results in Table 5. The first three columns of the table report estimates based on the full sample, whereas, the next three report results from the smaller antidumping investigations sample. According to estimates in column (1), the coefficient on our main effect is still positive and significant. However, the interpretation is now slightly different. The coefficient now measures the effect of US antidumping duties on firms that never exported any differentiated product to that destination. We find that US antidumping duties led to an increase in the number of exported by these firms to an average destination by 0.4 products. The coefficient on the interaction term is also positive suggesting that firms exporting differentiated products were likely to increase their product scope by an additional 0.3 products. However, this result is not statistically significant. Hence, we do not emphasize this result much. Nevertheless, the estimate for the level term remains positive and significant as we control for firm size and average trade barriers. These results remain unchanged if we focus on the smaller antidumping investigations sample.

5.2 Poisson and Negative Binomial regressions

One of the main econometric concerns with the results presented thus far is that our dependent variable is the number of products exported by Indian exporting firms. By definition, it is bound below by zero

[27] Rauch (1999) uses SITC rev. 2 nomenclature in its classifications. We used the publicly available concordance from WITS to concord these products to HS six-digit classification before matching. Also, we used the liberal definition of product differentiation available from Rauch (1999) but changing it to a more conservative definition does not alter our results.

[28] An alternative would be to use the share of products belonging to the differentiated products category or the corresponding weighted shares coupled with a threshold. However, we have not tried these alternative definitions.

and is a count variable thus using a linear regression technique will not give us the correct results. One potential solution is to impose more structure on the distributional assumptions and carry out non-linear regressions. In particular, it can be shown that unlike other non-linear estimation techniques, fixed effect Poisson does not suffer from incidental parameter problem (Cameron and Trivedi, 1998). Thus, one could use fixed effect Poisson regressions in the presence of count data. One of the obvious issues with using Poisson regression, however, is that it imposes strict distributional assumptions. In particular, in Poisson distribution the mean and the variance are the same. This assumption is certainly violated in the presence of overdisperson. This was the case in our sample, as can be seen in Table 1. In these scenarios, Hausman, Hall and Griliches (1984) recommend using fixed effects negative binomial regressions.[29]

Given that there is no obvious ranking of the appropriateness of Poisson and negative binomial regression in panel setting we report estimates using both techniques in Table 6. The first three columns of Table 6 report result from the Poisson regressions and the next two report negative binomial estimates. Estimates in equation (1) and (2) are based on the full sample, whereas, equation (3) reports regressions based on the smaller antidumping investigations sample. On the other hand, both equations (5) and (6) are based on the antidumping investigations sample, as the ones based on the full sample failed to converge. Another difference between the Poisson and the negative binomial results reported here is that we use a full set of firm-country and country-period fixed effects for the Poisson regressions. However, such high-dimensional fixed effects are not currently easily implementable for negative binomial estimates in STATA, so we only include firm-country and period fixed effects in equations (5) and (6).[30] Despite these differences in the estimation strategies and in the econometric techniques used our main results have not changed. Note that, the table reports the coefficient estimates and these should be converted into incidence rate ratios for comparisons with our previous results. Thus, from equation (1) we get that firms that face an antidumping duty tend to have 1.2 times more products.

5.3 Heterogeneous effects: Income groups and multi-sectoral Firms

Now that we have tested the robustness of our main result that US antidumping duties lead to an average increase in the number of products exported by Indian firms to other destinations, the next task is to identify the source of it. Is it largely being driven by only a few firms? A few export destinations? In the next two tables, Table 7a and Table 7b, we seek to explore these questions.

One possible explanation for our findings is that our results are primarily being driven by *trade deflection* (Bown and Crowley, 2007; Chandra, 2016). When US antidumping duties reduce the market access of Indian firms to the US markets, they respond by exporting these products to alternative destinations. Note that, this in itself would not be sufficient to explain our findings if Indian firms export the same products to each

[29] Note that, there is some controversy as to whether the fixed effects negative binomial is the appropriate method in these scenarios. For instance, Allison and Waterman (2002) argue that the fixed effects negative binomial regressions proposed by Hausman et al. (1984) are not true fixed effects. In any case, one needs to note while interpreting the results from Poisson and the negative binomial regression in the case of panel data, that the negative binomial fixed effects is not the fixed effect in the same sense as the fixed effects in Poisson. In the case of negative binomial, fixed effects refer to the dispersion parameter.

[30] We used STATA module by Guimaraes and Portugal (2010) for Poisson estimates. Also, while the standard errors are clustered at firm-country level for Poisson estimates, no robust or clustered standard errors are available for the negative binomial regressions.

destination. In that case we would see an increase in the size of firms' exports but not necessarily an increase in the product scope. To the extent that goods exported to different countries differ in terms of the product quality, the products exported to the US would be most similar in quality to exports to other developed countries. In that case, Indian exporters would find it easier to export those same products to say, EU, as opposed to, Sri Lanka. Thus, we expect most of the increase in product scope to come from developed country destinations. On the other hand, if India had already been exporting these products to other developed countries, we would only see an increase in the intensive margins for the developed countries. In that case, the increase in product scope would be bigger for the developing country destinations.

Table 7a reports the findings for countries divided by the income group. The first four columns restrict the sample to only developed country destinations.[31] Moreover, columns (1) and columns (3) report results based on the full sample, whereas, columns (2) and (4) report corresponding estimates using the smaller antidumping investigations sample. Finally, the next four columns (5-8) report the same estimations for developing country destinations. We find that US antidumping duties are associated with a 0.6 unit increase in the average number of products to other higher income countries. Also, as earlier, we do not find any statistically significant difference across the homogenous and differentiated product exporters. Interestingly, we find similar results for developing country destinations too. However, the size of the coefficients is slightly larger. Nevertheless, the difference between the two groups is not statistically significant so we cannot rule out the possibility of an identical response of US antidumping duties across destinations.

Another potential source of heterogeneity might come from differences across firm types. As stated in Section 3, most of the firms in our sample are multi-sectoral firms. We define firms as being a single-sector firm if all products ever exported by that firm to any destination belong to the same sector. Here we classify a sector as all products belonging to single four-digit HS classification. The fact that most exporters export products belonging to more than one sector is consistent with similar evidence from around the world, including that for the US. This observation remains valid even if we define sectors more broadly at two-digit HS classification. To examine whether such firms are driving our results, we restrict our sample only to firms that export products that belong to at least two different sectors. We report these results in Table 7b. The first column of the table repeats our benchmark result from column (2) of Table 4a for ease of comparison. The next column repeats the same regression restricting the sample to only multiple-sector firms where sectors are defined at 4-digit HS. In column (3) we expand the definition of the sector to be at HS 2-digit. Finally, columns (4) and (5) report the same specifications but using the smaller antidumping investigations sample. However, our results remain unchanged both qualitatively and quantitatively across all specifications.

5.4 Outliers and Sample Size

Table 7c reports results from two additional sets of robustness tests. First, note that our original data set had Indian firms exporting to more than 180 countries, but we restrict our analysis to its top 38 trade partners.[32] There are two reasons why we decided to restrict ourselves to the top 38 countries. First, Bown and Crowley (2007), in one of the earliest papers to investigate the impact of antidumping duties on third countries, used a sample of 38 trade partners of Japan, and we just decided to follow their lead. Second, and more importantly, our main interest lies in investigating the impact of US antidumping duty on the product scope of

[31] Developed countries refer to those classified as high-income countries by the World Bank.
[32] The list of countries is given in Table A1. We have a total of 39 countries in Table A1 including the US. All of our main results except in Table 3a and Table 3b exclude the US.

Indian exporters in third country markets. If we restrict our analysis to only India's biggest trade partners where these firms might already be exporting all products, we will miss any effect on the extensive margins. On the other hand, if we include all of the trade partners we would inadvertently include countries where a firm rarely exports and where the fixed costs of introducing new products might be too high. This would lead to a downward bias in our estimates. Hence, we decided to restrict the sample to only some of the top trade partners. However, it is important to check whether our results are sensitive to the choice of the number of trade partners.

Secondly, as stated earlier, there is a large degree of variance in the size of the firms in our sample. On the one hand, some of the smaller firms export only a few products whereas the bigger firms might export as many as 95 products to a single destination in a given period. Similarly, there is great a degree of variance in the volume of exports in our sample. In order to ensure that our results are not being driven by a few outliers we drop the top and bottom 1% of the firms from our sample based on the value of their exports. The first three columns of Table 7c report the results after dropping the outliers, and the next three replicate the same set of regressions but for the top 20 trade partners. The first two equations in Table 7c are similar to equations (1) and (2) from Table 4a. Equation (3) uses the same specification as equation (2) but is restricted to the smaller antidumping investigation sample. Note that, our qualitative results do not change if we change the threshold to only top 20 countries or if we drop the outliers. But the magnitude of the effect increases slightly.

5.5 Treating Country*Product as separate products

Several papers in the international trade literature rely on Armington assumptions. That is, these papers consider the same product sold to different countries as different varieties. In this section, we too make this assumption to see what happens to Indian exporters product scope if we consider each product-destination pair as a separate product. The advantage of this approach is that until now we mostly ignored an increase in trade partners. Instead, we focused on the changes in product scope within a given destination. However, if Indian exporters respond to US antidumping duties mainly by exporting to new destinations our earlier approach would miss these instances altogether. We thus now use firms as our unit of observation as opposed to firm-country pairs. Moreover, for this subsection, we classify each HS 8-digit product-country pair as a *product*.

These results are reported in Table 8a and Table 8b. For ease of comparison, we keep the structure of these tables to be the same as that in Table 4a and Table 4b. Thus, as in Table 4a and Table 4b, Table 8a reports regressions on the full sample whereas Table 8b reports the corresponding results for the smaller antidumping investigations sample. The only difference across the two sets is that we drop specifications corresponding to columns (4) and (5) from Table 4a as they do not change our results.[33] Instead, we add two additional columns to capture interaction effects for firms operating in differentiated sectors. As we can see, according to the estimates in column (2), US antidumping duty now leads to an increase of 2.2 country-product pair on average. In our sample an average Indian firm exports 2.5 country-product pairs. Thus, these antidumping duties are associated with an almost doubling of product-country pairs for an average exporter. The results remain unchanged across specifications. The most important difference between this and the earlier results is that now the interaction term on differentiated sectors is also positive and significant. Thus, if we classify firms as belonging to a differentiated sector independent of export destinations (i.e., use the typical Armington assumption), firms in the differentiated sectors are much more likely to expand their product scope.

[33] These results are available from the author on demand.

6. Conclusion

There is now a vast and continuously growing literature involving multiproduct firms in international trade. In many ways, this current focus stems from equally comprehensive presence of and the role played by the multiproduct firms. In this paper, we investigate the changes in the product scope of multiproduct firms in response to a trade cost shock. We explore how exporters respond to changes in the trade costs in third markets. Using a unique transaction-level data from India we find that Indian exporters respond to the US antidumping duties by increasing the number of products exported to third country markets. Moreover, this effect is quite sizeable. In particular, we find that Indian exporters affected by the US antidumping duties increased the number of products exported to an average third-country market by almost 40%. Additionally, the size of the effect is marginally higher for developing country destinations and the country's biggest trade partners, though the difference is not statistically significant. Finally, we also note that our benchmark results might actually be an underestimate of the true effects because some firms might respond to antidumping duty by exporting to newer markets and/or by exporting different products to different markets. However, because our main estimates are based on within firm variation for a given destination, it misses such market expansion effects. Regardless, the evidence presented in this paper shows that the impact of the antidumping duties may reverberate far beyond the countries directly involved in the disputes.

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Table 1: Summary statistics of our main variables

Variable	Observations	Mean	Std. Dev.	Min	Max
Firm-Country Pair: Full Sample					
$NProducts_{fct}$	393536	1.761	2.026	1	95
$lnExports_{fct}$	393536	9.275	1.898	-8.52	18.18
$Differentiated_{f}$	393536	0.906	0.292	0	1
$Tariffs_{fct}$	238057	6.329	7.292	0	276
$AD_{USA,fct}$	393536	0.007	0.082	0	1
Firm-Country Pair: AD Investigations Sample					
$NProducts_{fct}$	14504	2.460	3.606	1	95
$lnExports_{fct}$	14504	9.483	1.915	-0.83	17.12
$Differentiated_{f}$	14504	0.896	0.305	0	1
$Tariffs_{fct}$	7064	5.564	6.705	0	100
$AD_{USA,fct}$	14504	0.183	0.386	0	1
Firm level: Full Sample					
$NProducts_{ft}$	254667	2.252	2.839	1	106
$lnExports_{ft}$	254667	9.605	1.948	-8.52	18.18
$Differentiated_{f}$	254667	0.891	0.311	0	1
$Tariffs_{ft}$	174929	6.264	6.619	0	188
$AD_{USA,ft}$	254667	0.004	0.064	0	1
Firm level: AD Investigations Sample					
$NProducts_{ft}$	6368	4.391	6.221	1	106
$lnExports_{ft}$	6368	10.078	2.045	-0.83	17.54
$Differentiated_{f}$	6368	0.853	0.354	0	1
$Tariffs_{ft}$	3881	5.665	6.321	0	100
$AD_{USA,ft}$	6368	0.163	0.369	0	1

$NProducts_{ft}$ is the total number of distinct HS eight-digit products exported by the Indian firm in time period *t*. Whereas, $NProducts_{fct}$ is the total number distinct HS eight-digit products exported by the Indian firm to a given country *c* in a given time period. $AD_{USA,fct}$ takes the value one if at least one of the products exported by the firm *f* to country *c* has an active AD duty against India in that month. $Differentiated_{f}$ is a firm level indicator which shows whether that firm has produced a product classified as differentiated products according to the Rauch (1999) classification.

Table 2: Evolution of the number of products exported by firms to a given country in our sample.

Month*Year	Mean	Std. Dev.	Median	Min	Max
Firm-Country Pair: Full Sample					
April, 2000	1.669	1.686	1	1	31
October, 2000	1.767	1.995	1	1	39
April, 2001	1.748	2.117	1	1	85
October, 2001	1.858	2.303	1	1	94
April, 2002	1.799	2.033	1	1	33
October, 2002	1.768	2.026	1	1	40
March, 2003	1.750	1.889	1	1	48

Table 3a: Impact of US AD duties on Indian firms' product level exports to the US -Value

Dependent Variable	$ln(Exports)_{hft}$				$gr(Exports)_{hft}$	
$AD_{USAf,ht}$	-0.1706***	-0.1700***	-0.4447***	-0.4438***	-0.8597***	-0.8660***
	(0.0325)	(0.0325)	(0.0438)	(0.0442)	(0.0670)	(0.0661)
$TotalExports_{ft-1}$			0.0010			
			(0.0129)			
$TotalExports_{ft-1}(-h)$				0.0033		
				(0.0026)		
Constant	9.5195***	9.5105***	10.0655***	10.0562***	-0.0026***	-0.0029***
	(0.0000)	(0.0000)	(0.1416)	(0.0158)	(0.0000)	(0.0000)
R-squared	0.76	0.76	0.76	0.76	0.13	0.12
Number of Observations	62239	62579	28064	28064	28064	28153
Product*Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm*Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Month*Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Product*Year Fixed Effects	Yes	No	Yes	Yes	Yes	No
Industry Fixed Effects	No	Yes	No	No	No	Yes

* p<0.10, ** p<0.05, *** p<0.01

Robust standard errors clustered at the firm and the product level using multi-way clustering as in Cameron, Gelbach and Miller (2011) and implemented using Correia (2017) estimator for high-dimensional fixed effects reported in parenthesis.

Table 3b: Impact of US AD duties on Indian firms' product level exports to the US – Quantity

Dependent Variable	$ln(Quantity)_{hft}$				$gr(Quantity)hft$	
$AD_{USAf,ht}$	-0.3102***	-0.3049***	-0.6977***	-0.6980***	-1.4084***	-1.4146***
	(0.0351)	(0.0344)	(0.0505)	(0.0499)	(0.0724)	(0.0716)
$TotalExports_{ft-1}$			-0.0029			
			(0.0125)			
$TotalExports_{ft-1}(-h)$				0.0038		
				(0.0029)		
Constant	7.8706***	7.8624***	8.4917***	8.4372***	0.0014***	0.0014***
	(0.0000)	(0.0000)	(0.1365)	(0.0179)	(0.0000)	(0.0000)
R-squared	0.81	0.81	0.81	0.81	0.13	0.12
Number of Observations	62239	62579	28064	28064	28064	28153
Product*Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm*Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Month*Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Product*Year Fixed Effects	Yes	No	Yes	Yes	Yes	No
Industry Fixed Effects	No	Yes	No	No	No	Yes

* p<0.10, ** p<0.05, *** p<0.01

Robust standard errors clustered at the firm and the product level using multi-way clustering as in Cameron, Gelbach and Miller (2011) reported in parenthesis. The estimations were performed using Correia (2017) estimator for high-dimensional fixed effects.

Table 4a: Impact of US AD duties on the number of products exported by Indian firms' to countries other than the US – Benchmark results

Dependent Variable = Number of Products Exported$_{fct}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$AD_{USA,fct}$	0.6650***	0.5771***	0.5316***	0.5277***	0.5548***	0.8383***	0.8153***
	(0.1264)	(0.1223)	(0.1181)	(0.1192)	(0.1225)	(0.2137)	(0.2166)
$lnExports_{fct}$		0.3333***	0.3238***	0.2777***	0.2537***		
		(0.0225)	(0.0338)	(0.0263)	(0.0216)		
$Tariffs_{fct}$			0.0014	0.0016			
			(0.0014)	(0.0014)			
$Number\ Indian\ Ports_{fct}$				0.8819***	0.5806***		
				(0.0277)	(0.0611)		
$Number\ of\ US\ Ports_{fct}$					0.4174***		
					(0.0152)		
$grExports_{fct}$						0.2154***	0.3343***
						(0.0139)	(0.0226)
$grExports_{fct-1}$							0.1838***
							(0.0118)
Constant	1.8094***	-1.3216***	-1.2602***	-1.7986***	-1.7366***	2.1369***	2.3541***
	(0.0009)	(0.2121)	(0.3207)	(0.2743)	(0.2320)	(0.0017)	(0.0018)
R-squared	0.51	0.55	0.58	0.60	0.57	0.57	0.61
Number of Observations	350850	350850	212329	212329	350850	163164	105119
Firm*Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country*Period Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* p<0.10, ** p<0.05, *** p<0.01

Robust standard errors clustered at the firm and the country level using multi-way clustering as in Cameron, Gelbach and Miller (2011) reported in parenthesis. The estimations were performed using Correia (2017) estimator for high-dimensional fixed effects.

Table 4b: Impact of US AD duties on the number of products exported by Indian firms' to countries other than the US – Antidumping investigations sample

Dependent Variable = Number of Products Exported$_{fct}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$AD_{USA,fct}$	0.6778***	0.5304***	0.5134***	0.5016***	0.4935***	0.9011***	0.8605***
	(0.1382)	(0.1285)	(0.1200)	(0.1236)	(0.1336)	(0.2320)	(0.2048)
$lnExports_{fct}$		0.5463***	0.4228***	0.3784***	0.4613***		
		(0.0724)	(0.0525)	(0.0498)	(0.0753)		
$Tariffs_{fct}$			0.0073	0.0082			
			(0.0098)	(0.0100)			
$Number\ Indian\ Ports_{fct}$				0.9980***	0.6932***		
				(0.0971)	(0.1855)		
$Number\ of\ US\ Ports_{fct}$					0.6076***		
					(0.0508)		
$grExports_{fct}$						0.3522***	0.5326***
						(0.0443)	(0.0751)
$grExports_{fct-1}$							0.2581***
							(0.0550)
Constant	2.3735***	-2.8087***	-1.8080***	-2.5079***	-3.5337***	2.9015***	3.3190***
	(0.0244)	(0.6995)	(0.5204)	(0.4965)	(0.8103)	(0.0416)	(0.0377)
R-squared	0.51	0.55	0.69	0.70	0.57	0.56	0.61
Number of Observations	13608	13608	6525	6525	13608	6893	4510
Firm*Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country*Period Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* p<0.10, ** p<0.05, *** p<0.01

Robust standard errors clustered at the firm and the country level using multi-way clustering as in Cameron, Gelbach and Miller (2011) reported in parenthesis. The estimations were performed using Correia (2017) estimator for high-dimensional fixed effects.

Table 5: Impact of US AD duties on the number of products exported by Indian firms' to countries other than the US – Differentiated Products

Dependent Variable = Number of Products Exported$_{fct}$	Full Sample			AD Investigations Sample		
	(1)	(2)	(3)	(5)	(6)	(7)
$AD_{USA,fct}$	0.4223***	0.3627***	0.3243***	0.4374***	0.3340***	0.3520***
	(0.0716)	(0.0649)	(0.0619)	(0.0813)	(0.0705)	(0.0722)
$AD_{USA,fct}$ * $Differentiated\ Sector_f$	0.2695	0.2382	0.2348	0.2671	0.2182	0.1829
	(0.1642)	(0.1692)	(0.1456)	(0.1661)	(0.1783)	(0.1453)
$lnExports_{fct}$		0.3333***	0.3238***		0.5462***	0.4225***
		(0.0225)	(0.0338)		(0.0724)	(0.0524)
$Tariffs_{fct}$			0.0014			0.0073
			(0.0014)			(0.0098)
Constant	1.8094***	-1.3215***	-1.2600***	2.3750***	-2.8064***	-1.8042***
	(0.0008)	(0.2121)	(0.3208)	(0.0233)	(0.6987)	(0.5187)
R-squared	0.51	0.55	0.58	0.51	0.55	0.69
Number of Observations	350850	350850	212329	13608	13608	6525
Firm*Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Country*Period Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

* p<0.10, ** p<0.05, *** p<0.01

Robust standard errors clustered at the firm and the country level using multi-way clustering as in Cameron, Gelbach and Miller (2011) reported in parenthesis. The estimations were performed using Correia (2017) estimator for high-dimensional fixed effects.

Table 6: Impact of US AD duties on the number of products exported by Indian firms' to countries other than the US – Poisson and Negative Binomial

Dependent Variable = Number of Products Exported$_{fct}$	Poisson			Negative Binomial	
	(1)	(2)	(3)	(4)	(5)
$AD_{USA,fct}$	0.1701***	0.2018***	0.1927***	0.2927***	0.2153***
	(0.0276)	(0.0386)	(0.0419)	(0.0728)	(0.0714)
$AD_{USA,fct}$ * $Differentiated\ Sector_f$		-0.0337	-0.0399	-0.0756	-0.0633
		(0.0483)	(0.0500)	(0.0756)	(0.0738)
$lnExports_{fct}$	0.2005***	0.2005***	0.2578***		0.2498***
	(0.0022)	(0.0022)	(0.0100)		(0.0060)
Constant				2.3114***	0.9297***
				(0.0653)	(0.1118)
Log likelihood	-	-	-	-18421	-17546
Chi-square	-	-	-	201.75	1955.04
Number of Observations	350850	350850	13608	13756	13756
Firm*Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Country*Period Fixed Effects	Yes	Yes	Yes	No	No
Month*Year Fixed Effects	No	No	No	Yes	Yes

* p<0.10, ** p<0.05, *** p<0.01

The numbers reported here refer to the coefficient estimates not incidence-rate ratios. Robust standard errors clustered at firm*country reported for Poisson regressions. Poisson regressions estimated using high-dimensional estimator by Guimaraes and Portugal (2010). Note that, STATA does not allow robust or clusters with negative binomial. Also, the negative binomial regression reported for the antidumping investigations sample as the ones for the full sample failed to converge.

Table 7a: Impact of US AD duties on the number of products exported by Indian firms' to countries other than the US – Developed vs. Developing

Dependent Variable = Number of Products Exported$_{fct}$	Developed Countries				Developing Countries			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$AD_{USA,fct}$	0.5626***	0.5075***	0.3352***	0.3357***	0.6134***	0.5779***	0.4457**	0.2598
	(0.1577)	(0.1688)	(0.0574)	(0.0657)	(0.1850)	(0.1745)	(0.1805)	(0.1729)
$AD_{USA,fct}$ * $Differentiated\ Sector_f$			0.2534	0.1915			0.1849	0.3511
			(0.2171)	(0.2298)			(0.2742)	(0.2770)
$lnExports_{fct}$	0.3465***	0.4880***	0.3465***	0.4878***	0.2921***	0.6779***	0.2921***	0.6785***
	(0.0247)	(0.0590)	(0.0247)	(0.0590)	(0.0320)	(0.1685)	(0.0320)	(0.1685)
Constant	-1.4030***	-2.1841***	-1.4028***	-2.1803***	-1.0626***	-4.2086**	-1.0626***	-4.2119**
	(0.2337)	(0.5726)	(0.2337)	(0.5713)	(0.2959)	(1.6414)	(0.2959)	(1.6403)
R-squared	0.64	0.70	0.64	0.70	0.55	0.57	0.55	0.57
Number of Observations	258034	8853	258034	8853	92816	4755	92816	4755
Firm*Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country*Period Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* p<0.10, ** p<0.05, *** p<0.01

Robust standard errors clustered at the firm and the country level using multi-way clustering as in Cameron, Gelbach and Miller (2011) reported in parenthesis. The estimations were performed using Correia (2017) estimator for high-dimensional fixed effects.

Table 7b: Impact of US AD duties on the number of products exported by Indian firms' to countries other than the US – Single sector firms vs. multi-sectoral firms

Dependent Variable = Number of Products Exported$_{fct}$	Full Sample			AD Investigations Sample	
	(1)	(2)	(3)	(4)	(5)
$AD_{USA,fct}$	0.5771***	0.5731***	0.5742***	0.5330***	0.5364***
	(0.1223)	(0.1223)	(0.1265)	(0.1280)	(0.1334)
$lnExports_{fct}$	0.3333***	0.3496***	0.3637***	0.5475***	0.5492***
	(0.0225)	(0.0242)	(0.0261)	(0.0726)	(0.0733)
Constant	-1.3216***	-1.3927***	-1.4737***	-2.8088***	-2.7869***
	(0.2121)	(0.2278)	(0.2455)	(0.7009)	(0.7056)
R-squared	0.62	0.62	0.62	0.64	0.64
Number of Observations	350850	314224	286338	13544	13285
Firm*Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Country*Period Fixed Effects	Yes	Yes	Yes	Yes	Yes

* p<0.10, ** p<0.05, *** p<0.01

Robust standard errors clustered at the firm and the country level using multi-way clustering as in Cameron, Gelbach and Miller (2011) reported in parenthesis. The estimations were performed using Correia (2017) estimator for high-dimensional fixed effects.

Table 7c: Impact of US AD duties on the number of products exported by Indian firms' to countries other than the US – Outliers and Top trade partners

Dependent Variable = Number of Products Exported$_{fct}$	Outliers Dropped			Top 20 Destinations		
	(1)	(2)	(3)	(3)	(4)	(5)
$AD_{USA,fct}$	0.6455***	0.5648***	0.5244***	0.7327***	0.6435***	0.6104***
	(0.1381)	(0.1326)	(0.1353)	(0.1448)	(0.1410)	(0.1402)
$lnExports_{fct}$		0.3673***	0.6077***		0.3222***	0.5211***
		(0.0213)	(0.0731)		(0.0286)	(0.0846)
Constant	1.7953***	-1.6579***	-3.3885***	1.7922***	-1.2600***	-2.6989***
	(0.0009)	(0.2007)	(0.6993)	(0.0009)	(0.2712)	(0.8275)
R-squared	0.58	0.61	0.62	0.59	0.62	0.63
Number of Observations	343864	343864	13106	291521	291521	10411
Firm*Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Country*Period Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

* p<0.10, ** p<0.05, *** p<0.01

Robust standard errors clustered at the firm and the country level using multi-way clustering as in Cameron, Gelbach and Miller (2011) reported in parenthesis. The estimations were performed using Correia (2017) estimator for high-dimensional fixed effects.

Table 8a: Impact of US AD duties on the number of products exported by Indian firms' to countries other than the US – Treating Country*Product as separate products

Dependent Variable = Number of Products Exported$_{ft}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$AD_{USA,ft}$	2.4896***	2.1779***	2.1622***	2.4738***	2.3745***	0.7369***	0.7728***
	(0.2750)	(0.2664)	(0.3292)	(0.2842)	(0.3218)	(0.2063)	(0.2485)
$AD_{USA,ft}$ * *Differentiated Sector*						1.7594***	1.7399***
						(0.3806)	(0.4719)
$lnExports_{ft}$		0.4585***	0.4713***			0.4585***	0.4712***
		(0.0081)	(0.0089)			(0.0081)	(0.0089)
$Tariffs_{ft}$			0.0005				0.0005
			(0.0015)				(0.0015)
$grExports_{ft}$				0.2734***	0.4129***		
				(0.0061)	(0.0098)		
$grExports_{ft-1}$					0.2289***		
					(0.0072)		
Constant	2.0851***	-2.3260***	-2.3819***	2.3583***	2.7760***	-2.3245***	-2.3795***
	(0.0268)	(0.0859)	(0.0951)	(0.0364)	(0.0452)	(0.0858)	(0.0950)
R-squared (within)	0.01	0.09	0.10	0.05	0.07	0.09	0.10
Number of Observations	254667	254667	174929	146534	104647	254667	174929
Number of Firms	41117	41117	30780	20985	14264	41117	30780
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month*Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* p<0.10, ** p<0.05, *** p<0.01
Robust standard errors clustered at Firm level reported.

Table 8b: Impact of US AD duties on the number of products exported by Indian firms' to countries other than the US – Treating Country*Product as separate products (difference-in-difference)

Dependent Variable = Number of Products Exported$_{ft}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$AD_{USA,ft}$ * $Treatment_f$	2.4776***	1.7814***	1.7723***	2.3955***	2.2328***	0.3606	0.5041*
	(0.2734)	(0.2389)	(0.2855)	(0.2819)	(0.3199)	(0.2528)	(0.3004)
$AD_{USA,ft}$ * *Differentiated Sector*						1.7363***	1.5925***
						(0.3993)	(0.4755)
$lnExports_{ft}$		1.0310***	1.0031***			1.0304***	0.9992***
		(0.0966)	(0.1157)			(0.0966)	(0.1151)
$Tariffs_{ft}$			-0.0150				-0.0152
			(0.0173)				(0.0172)
$grExports_{ft}$				0.4582***	0.6483***		
				(0.0456)	(0.0655)		
$grExports_{ft-1}$					0.3789***		
					(0.0495)		
Constant	3.0338***	-7.2653***	-6.7725***	3.7504***	4.1954***	-7.2067***	-6.6743***
	(0.3684)	(1.1468)	(1.3905)	(0.3118)	(0.3759)	(1.1414)	(1.3789)
R-squared (within)	0.04	0.14	0.15	0.08	0.10	0.14	0.15
Number of Observations	6368	6368	3881	4644	3727	6368	3881
Number of Firms	474	474	392	378	319	474	392
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month*Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* p<0.10, ** p<0.05, *** p<0.01
Robust standard errors clustered at Firm level reported.

Appendix Table A1: Sample Countries

ARE *	EUN *	MDV	PHL *
ARG *	HKG *	MEX	QAT
AUS *	IDN *	MUS	RUS *
BGD *	JPN	MYS *	SAU
BHR	KEN *	NGA	SGP *
BRA *	KOR	NOR	THA *
CAN *	KWT *	NZL	TUR *
CHE *	LKA	OMN	TWN *
CHN *	MAC *	PAN *	ZAF *
USA *	VNM *	PAK *	

We only have tariff data available for those with a *. Note that, except for Table 3a and Table 3b we exclude USA from our sample.

Appendix Table A2: AD cases relevant for our sample.

Case ID	Product	Date Initiation	Duty Imposed
USA-AD-561	Sufanilic Acid	05/14/1992	Yes
USA-AD-638	Stainless Steel Wire Rod	01/12/1993	Yes
USA-AD-639	Stainless Steel Flanges	01/12/1993	Yes
USA-AD-679	Stainless Steel Bar	01/07/1994	Yes
USA-AD-778	Certain Preserved Mushrooms	01/16/1998	Yes
USA-AD-817	Cut-To-Length Carbon Steel Plate	02/24/1999	Yes
USA-AD-900	Hot-Rolled Carbon Steel Products	11/22/2000	Yes
USA-AD-923	Oleoresin Paprika	03/14/2001	No
USA-AD-929	Silicomanganese	04/18/2001	Yes
USA-AD-933	Polyethylene Terephthalate Film	05/29/2001	Yes
USA-AD-971	Cold-Rolled Steel Products	10/05/2001	No
USA-AD-998	Oil Country Tubular Goods	04/05/2002	No
USA-AD-1025	Prestressed Concrete Steel Wire Strand	02/07/2003	Yes
USA-AD-1029	Allura Red Coloring	03/11/2003	No

Note that some of the AD cases were initiated before the beginning of our sample. However, the duty was still active during our sample.