Anti-dumping Duty Circumvention through Trade Re-routing: Evidence from Chinese Exporters*

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Abstract

We study the evasion of U.S. anti-dumping duties by Chinese exporters through trade re-routing via third countries or regions. Using detailed monthly trade data reported by China and the U.S. Customs during the period of 2002–2006, we find that U.S. anti-dumping actions against China lead to a stronger positive correlation between U.S. imports from third countries and Chinese exports to the *same* third countries. Such an effect is more pronounced for the products subject to anti-dumping duties (treatment groups) than similar products not subject to these duties (control groups), which is consistent with trade re-routing. We show further that the positive correlation increases with some product or third-country characteristics that are conducive to duty evasion.

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I. Introduction

Anti-dumping duties, usually much higher than the corresponding regular tariff levels, may cause immediate and significant distortions to international trade flows.[1] In this paper, we provide evidence that some Chinese firms may avoid U.S. anti-dumping duties by re-routing products through third countries/regions.

This kind of re-routing is similar but not identical to the often-used re-exporting or transshipment, although the terms may sometimes be used interchangeably. Both re-exporting and transshipment are means of *legal* indirect exporting through intermediaries in third countries/regions. Re-exports need to clear the Customs in the third countries/regions, whereas transshipment does not. Neither involves a change of the certificates of origin (C/O).[2] By contrast, re-routing in this paper refers to a type of indirect exporting with a change of C/O *illegally* from the true originating country to a third country/region, often motivated by tariff evasion.

It appears that this form of evasion has been long recognized by Customs Offices and the media. For example, China's shoe industry's tariff evasion by re-routing through Macau finally led to the anti-dumping decision by the European Union (EU) against Macau.[3] In October 2006, the EU imposed anti-dumping tariffs against China's shoe industry. According to the statistics from the EU side, from April to December 2005, the EU imported 0.5 million pairs of shoes from Macau. However, this number increased to 8.5 million pairs in 2007 for the corresponding months. At the same time, Macau's imports from Mainland China had also increased dramatically from only 10 thousand USD in 2005 to 3.3 million USD in 2006. Given the very limited production level of shoes in Macau, the EU decided to impose a 16.5% anti-dumping tariff in April 2008 on the shoes imported from Macau. Nita and Zanardi (2013) conducted a comprehensive review of the EU's anti-circumvention investigations. They show that China is the most common country involved in this type of investigations and that the circumventing countries/regions are mostly in Southeast Asia.

[1] See Blonigen and Prusa (2003), among others, for comprehensive reviews of anti-dumping.

[2] The WTO Agreements on the Rules of Origin can be accessed at the following website: https://www.wto.org/english/res_e/booksp_e/analytic_index_e/roi_e.htm.

[3] See COUNCIL REGULATION (EC) No 388/2008 of Official Journal of the European Union at http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1421807937250&uri=CELEX:32008R0388.

Another example concerns the U.S. investigation into the trade of mattress inner springs.[4] In 2007, the U.S. imposed an anti-dumping tariff against the imports of inner springs from China, Vietnam, and South Africa. An American company named **Leggett & Platt** accused Chinese firms of transshipping the related products through third countries or regions, such as Hong Kong, Thailand, and Cambodia. China's exports to these suspicious third countries/regions had increased, along with a significant increase in these countries' exports to the United States. A report prepared by Senator Ron Wyden in 2010 provided a fishing investigation of re-routing exporters and the transshipping companies that provide such re-routing services for quite a few products.[5] Although such anecdotal evidence as that above has appeared in the news, there is no research paper studying these kinds of evasion behavior systematically, to the best of our knowledge. In this paper, we intend to fill this gap in the literature.

Using monthly trade data for 2002–2006 reported by the U.S. and China Customs, we provide evidence of Chinese exporters' evasion of U.S. anti-dumping duties through trade re-routing. Anti-dumping tariffs are usually country and product specific, but they are also sometimes firm specific when firm level individual rates apply. This feature helps us to define a treatment group and a control group, and to apply a difference-in-difference approach to identify trade re-routing behaviors. Using a product-country level analysis, we find that anti-dumping actions lead to a stronger positive correlation between U.S. imports from third countries/regions and Chinese exports to these countries for the products subject to U.S. anti-dumping duties.

A simple glance at the raw data can also offer us some clues about possible trade re-routing through third countries. In Figure 1, we take Case US-AD-1013 as an example, using HS6=292511 for "Saccharin and Its Salts"[6] as the product under the treatment group (denoted by "1" in the series label names) and HS6=292519 for "Other Imides and Their Derivatives" as the product in the control group (denoted by "0" in the series label names). Some Chinese exporters seem to have re-routed Saccharin and its Salts to the United States through Korea

[4] See http://www.finance.senate.gov/imo/media/doc/050511kgtest.pdf

[5] See http://www.wyden.senate.gov/download/?id=ab312b37-d16b-495c-a103-c1887afb37af

[6] The affected product listed in the GAD is HS8=29251100, the only HS8 product under HS6=292511.

or Taiwan after the U.S. anti-dumping action against products from mainland China. According to Appendix 1, the preliminary and final anti-dumping decisions for this product were made on December 27, 2002, and July 9, 2003, respectively. The three dotted lines for the product in the control group did not move much before and after the anti-dumping action, while we see dramatic changes from the three solid lines for the product in the treatment group. Based on the trade data reported by the United States, U.S. imports of Saccharin and Its Salts from China plummeted from 5 million USD in 2002 to only 0.23 million USD in 2003 (trade destruction), while U.S. imports of this product from Korea and Taiwan (Y1) skyrocketed from 1.7 million USD in 2002 to nearly 5 million USD in 2003, and doubled again to 10 million USD in 2005. At the same time, the exports of this product reported by mainland China to Korea and Taiwan (X1) increased steadily from 3 million USD in 2002 to 6.5 million USD in 2006; part of the increased exports might have been due to re-routing, and the re-routed amount could be underestimated if some of the re-routed trade for evasion purpose was not reported. At the end of our sample period, China's exports of Saccharin and Its Salts to the United States seemed to start to recover, and at the same time, U.S. imports from Korea and Taiwan (Y1) dropped accordingly. These patterns are consistent with a story of trade re-routing through Korea and Taiwan. Anecdotal evidence of trade re-routing of Saccharin through Taiwan can also be found, for example, from Slip Op. 11-138 of the U.S. Customs and Border Protection: "Kinetic alleged that Taiwanese companies were purchasing Chinese saccharin, repackaging it to indicate a Taiwanese origin, and exporting it to the United States without the knowledge of the Chinese sources, thereby evading the anti-dumping duty on saccharin from the PRC."[7]

Even in the absence of re-routing, U.S. anti-dumping duties against China may increase its imports from *some* third countries (a trade diversion effect) and lead to an increase in Chinese exports to *some* third countries (a trade deflection effect; see Bown and Crowley, 2007). However, it is important to note that the third countries in both cases may or may not be the same group of countries. Without trade routing, we might actually expect to see a negative association between them: if U.S. anti-dumping against China diverts U.S. imports

[7] See https://www.cbp.gov/bulletins/Vol_45_No_50_Slip%20Op.pdf

from China to a third economy and helps this economy to build its production capacity—and hence its exports—we would expect to see fewer imports of the same products by this third country from China. Therefore, the trade diversion and deflection effects alone cannot explain a positive association between a third country's exports to the United States and its imports from China; it can be better explained by a trade re-routing story.

In addition, we find that the correlation between third countries' exports to the United States and imports from China is stronger for third countries/regions that are geographically closer to China and the United States and for those countries that are more populated with an ethnic Chinese population who might help exporters from China to collude in those third countries to obtain their local C/O documents. The third countries with these characteristics are better candidates to facilitate evasion due to the reduced transportation and collusion costs of trade re-routing. We also find that less–differentiated products are more likely to be re-routed for evasion purposes because it is usually more difficult to identify the true production origins of non-differentiated products, which in turn lowers the probability of being detected. These findings provide further support for the evasion hypothesis. These results hold regardless of whether we use trade value or quantity data in the regressions. We also verify that the results are not driven by alternative explanations, such as the memberships of third countries in regional trade agreements (RTAs). Finally, we also demonstrate the robustness of our results to the exclusion of some zero trade flows and other related U.S. anti-dumping, safeguard, and countervailing duty cases against third countries and the related third-country cases against China, which can potentially contaminate our key dependent and independent variables.

The rest of the paper is organized as follows: In Section II, we review related literature. We discuss the empirical strategy in Section III and describe the data in Section IV. Empirical results are presented in Section V, with robustness checks conducted in Section VI. We conclude in Section VII.

II. Literature review

A number of existing papers study the specific channels through which anti-dumping investigations and duties affect trade volume. When country A imposes anti-dumping duties

against country B, the most direct effect is trade destruction, that is, a decrease in country A's imports of the targeted products from country B. Prussa (2001) found that U.S. anti-dumping duties against Japan led to a reduction in Japanese exports to the U.S. Lu, Tao, and Zhang (2013) used China's trade data at the transaction level over 2000-2006 to investigate exporters' responses to U.S. anti-dumping investigations at different stages. They provided evidence for a trade dampening effect of anti-dumping investigations. The second direct effect is a trade diversion effect (or import source diversification effect), that is, an increase in country A's imports from third countries C (i.e., countries other than B). This has been investigated by Konings, Vandenbussche, and Springael (2001) and Romalis (2007).

In addition, anti-dumping also has an indirect ripple effect in the pattern of international trade. When country A imposes anti-dumping tariff against country B, it also affects B's exports to and imports from third countries. First, the trade deflection effect describes the increase in country B's exports to third countries C′ while B's exports to A decline. Second, the trade depression effect describes the decrease in country B's imports from third countries C″. Since the domestic firms in country B export less to country A after the anti-dumping, they will focus more on their domestic market. As a result, the domestic market competition in country B would reduce its imports from other countries. Note that the above-mentioned third countries C, C′, and C″ may or may not be the same group of countries. Bown and Crowley (2006, 2007) used the Japanese export data of 4,800 products into 37 countries between 1992 and 2001 to investigate the effects of U.S. anti-dumping investigations on Japanese exports. Their findings support both trade deflection and depression effects.

In this paper, we build a connection between the trade diversion effect (i.e., an increase in imports of A from third countries) and the trade deflection effect (i.e., an increase in the exports of B to third countries). We show that their positive correlation is likely to be driven by anti-dumping duty evasion. Although the idea of using trade data to detect anti-dumping duty evasion behaviors is not new,[8] we make the first attempt in the literature to use rigorous

[8] For example, Vermulst (2012) shows that transshipment via third countries is the most common form of circumvention and was investigated by the EU based on the trade data reported by different countries involved. The U.S. Anti-dumping Manual describes similar rules (http://enforcement.trade.gov/admanual/) in Chapter 26. China was the mostly investigated target country. The methods they used, however, are at most suggestive of potential circumventing behaviors. For instance, they normally only examine one or a few products subject to

econometric methods to identify the evasion behaviors and disqualify various alternative mechanisms.

Successful evasion through re-routing requires a change of products' certificates of origins, which are used to define the nationality or origin of a product. It is also used to determine if the preferential tariffs should apply to a product (e.g., under a Free Trade Agreement (FTA) or a Customs Union). In the customs supervision practice or trade agreement negotiations, there is much discussion about the legal side of Rules of Origin (ROOs), as in Vermulst (1994). However, this area has been much more neglected by economists. Krishna (2005) reviewed the literature of ROOs and their relationship with free trade agreements (FTAs) and Customs Union in economic studies. She also discussed the theoretical partial equilibrium and general equilibrium results of ROO. According to Krishna (2005), ROOs can be based on the following four types of requirements: (1) domestic content; (2) change of tariff heading; (3) specified processes that must be performed within an FTA or CU; (4) substantial transformation of a product. However, the details of ROOs vary across products and countries and the scarcity of well-organized data on ROOs hampers the research on this topic.

Because an FTA favors countries inside the trading blocs over others, there is an incentive for countries outside the trading bloc to re-route their products through the member countries of the FTA to enjoy the lower preferential tariff rates. Using product-level data on trade between Canada and the U.S., Stoyanov (2012) presented evidence of tariff evasion and violation of the ROOs occurring under the Canada-U.S. Free Trade Agreement (CUSFTA). He shows that a larger Canadian tariff preference margin for the U.S. is associated with more goods originating in third countries being transshipped through the U.S. territory for re-exporting to Canada. This suggests the presence of persistent violations of CUSFTA's rules of origin. In our empirical analysis, we will investigate these alternative channels and show that our main finding is not driven by these factors. We show that, even in the absence of preferential tariffs in an FTA or Customs Union, firms may still have incentive to violate ROOs to evade tariffs through trade re-routing.

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anti-dumping duties without comparing to a control group.

During the final years of the Multifiber Agreement (2001–2005), the U.S. imposed quotas on Chinese apparel but gave African apparel duty- and quota-free access through the African Growth and Opportunity Act (AGOA). Rotunno, Vezina, and Wang (2013) show that the rapid but ephemeral rise of African exports can be explained in part by ethnic-Chinese firms using Africa as a quota-hopping export platform. We will show later that our main finding is not driven by the same story. There is a larger literature on tariff jumping, most of which involves legal means to avoid tariffs by investing directly in the importing countries (such as tariff jumping FDI; see Blonigen, 2002, for such as study related to U.S. anti-dumping), while this paper focuses on illegal means involving changes in C/Os in third countries.

Finally, the evasion of anti-dumping duties through trade re-routing renders anti-dumping less effective, which is consistent with existing findings in the literature about the weak or asymmetric trade destruction effects of anti-dumping. Based on a panel data analysis over 1960-2001, Egger and Nelson (2011) find negative and modest effects of anti-dumping duties on trade volume and welfare. Vandenbussche and Zanardi (2010) analyze the overall trade impacts of anti-dumping duties by new adopters over a period of 1980-2000. They found that the tough users would experience a chilling effect (i.e., a decline in the total imports of this country from other countries, not just the targeted countries), but the degrees vary across sectors. Our paper suggests that trade re-routing and increased imports of anti-dumping using countries from third countries can be another reason behind the weaker evidence of the chilling effect in some sectors.

III. Empirical strategy

Currently, there are many companies in China claiming on their business websites that they can help exporters to evade anti-dumping duties through trade re-routing. Appendix 5 shows an evasion procedure listed by a Chinese company: (1) we can export those products (made in China) to another country (e.g., Malaysia) at little cost to exporters; (2) we will finish custom clearance for those cargos in Malaysia and then send it to our warehouse, and then pick up and re-load them to a new container (booked with Malaysia); and (3) we will find a local factory to provide all the original C/O documents from Malaysia and then export

the products to your final destinations. This is illegal, however, because a product cannot be assigned a C/O of a third country without actual processing in that country.[9]

If country A imposes an anti-dumping duty against the exports of country B, but not against the exports of country C (a third country), the re-routing costs are composed of the trade costs of exporting goods from B to C and from C to A, including transportation costs, regular tariffs (if it clears the customs), the extra fees of obtaining C/O documents, potential penalty, etc. As long as a re-routing company is able to provide the related documents, it will be difficult for the U.S. to detect the circumvention. The third-country government is unlikely motivated to track down the evasion because there is no benefit of doing so and serving as a re-routing spot may actually benefit domestic transportation and logistics sectors. Therefore, the enforcement of the anti-dumping duty can be a problem. Of course, the U.S. could initiate a new anti-dumping case against the third country/region when it is suspected to facilitate the evasion. However, this kind of anti-circumvention practice is rarely used because it is usually hard to detect and prove re-routing.

In practice, circumvention investigation is initiated only when domestic firms appeal and penalty can be significantly delayed because suspicious firms are assumed to be innocent until the re-routing is firmly justified. Some anti-circumvention rules are still highly controversial (e.g., whether penalty should apply to only the investigated firms or all firms exporting the same or similar products), with no consensus under the WTO framework.[10] Some countries or regions set their own rules, while most of the other countries do not have specific rules. As documented by Vermulst (2012), even if circumvention is found and justified, the maximum amount of duty that can be extended to the circumvented imports is the "all others duty or residual duty" imposed in the original investigation on imports from a country, according to the EU anti-dumping regulations.[11] If the worst case for re-routing firms

[9] A simple search on alibaba.com using the key words "avoid anti-dumping duty" can provide a list of hundreds of companies that can help to facilitate the evasion.

[10] During the Uruguay Round of the GATT, the "Dunkel Draft" was proposed to outline the rules for anti-circumvention. However, due to the opposition from the United States, it was not written into the WTO agreements. See Matsushita (2010) for a detailed discussion.

[11] See "Compendium of Anti-dumping and Countervailing Duty Laws in the Western Hemisphere" for a related discussion. Available at http://www.ftaa-alca.org/Wgroups/WGADCVD/english/toc.asp

is to pay the anti-dumping rate as they should do, it is unlikely for this type of loose rules to stop re-routing practice. For the U.S., there is no clear rule about circumvention punishment. In addition, even if a circumvention investigation is initiated, it usually takes a couple of years to settle. Given the uncertain, small, and delayed punishment and the low chance of being caught, re-routing becomes a reasonable tool for exporters subject to from anti-dumping investigations. Nevertheless, the potential penalty or the fear of being on the black list and the costs associated with re-routing may be sufficient to deter some firms.

Our previous discussion suggests that, with trade re-routing, China's exports to a third country (X) and the U.S. imports from this third country (Y) should both increase after an anti-dumping action. Hence we would expect a positive association between X and Y for the products subject to U.S. anti-dumping duties. Our key identification strategy is to show that these two effects go hand-in-hand for the same third countries, which is less likely in the absence of evasion through trade re-routing as discussed in the introduction section.

To provide further support for the evasion hypothesis, we also investigate whether the evidence of trade re-routing is stronger for products and third countries with characteristics that are more conducive to evasion behaviors. The incentive to evade anti-dumping duties depends on the costs of trade re-routing and the benefits from evasion. One obvious cost factor of re-routing is the geographic distance from China to a third country C and the distance from C to the U.S. Therefore, we would expect to find stronger evidence of trade re-routing for third countries that are geographically closer to China and the U.S. Second, Rauch and Trindade (2002) show that business and social networks, proxied by ethnic Chinese population, have a considerable quantitative impact on international trade by helping to match buyers and sellers. Rotunno and Vézina (2012) find robust evidence that Chinese networks, proxied by ethnic Chinese migrant populations, increase tariff evasion. We suspect that the presence of an ethnic Chinese population may help to facilitate the collusion between Chinese exporters and third-country intermediaries and hence reduce the costs of re-routing. Therefore, we also examine how trade re-routing is affected by the size of Chinese population in third countries.

Moreover, we also analyze the product characteristics associated with re-routing. For example, we divide the products in our sample into differentiated and non-differentiated

groups based on Rauch's product classification (Rauch 1999), and expect to find stronger support for evasion from non-differentiated products because it is arguably easier and safer to obtain third-country C/O illegally for non-differentiated products which do not have many country-specific features such as brand names.

In our regressions, we add some interaction terms between the above mentioned third-country or product characteristics (Z*) with some other explanatory variables. Using a difference-in-difference strategy, we specify the regression as follows:

$$lnY_{cit} = \beta_X lnX_{cit} + \beta_T T_i + \beta_P P_t + \beta_{TP} T_i P_t + lnX_{cit}(\beta_{XT} T_p + \beta_{XP} P_t + \beta_{XTP} T_i P_t) + \boldsymbol{Z\beta_Z}$$
$$+ \left(\beta_{XZ^*} lnX_{cit} + \beta_{TZ^*} T_i + \beta_{PZ^*} P_t + \beta_{XPZ^*} lnX_{cit} P_t + \beta_{XTZ^*} lnX_{cit} T_i\right.$$
$$\left. + \beta_{TPZ^*} T_p P_t + \beta_{XTPZ^*} lnX_{cit} T_i P_t\right) Z^* + \lambda_{ci} + \lambda_t + e_{cit}$$

where subscript c denotes a third country except China and U.S.; subscript i denotes the product at HS6 level; and subscript t denotes time (year and month). Y_{cit} stands for the U.S. imports of product i from country c at time t. X_{cit} stands for China's exports of product i to country c at time t. T_i equals one when an HS6 product is in the treatment group (i.e., under anti-dumping), and zero otherwise; its coefficient cannot be estimated separately due to its collinearity with product fixed effects. P_t equals one for post-anti-dumping period, and zero otherwise; its coefficient cannot be estimated separately either due to its collinearity with year*month dummies. **Z** is a vector of time-varying gravity equation variables including log(GDP) and log(GDP/capita)) for third countries. To identify the evasion behaviors, we also include all of the interaction terms between Z* and the full set of variables based on the combinations of X, T, and P. Z* is a specific element or a subset of vector **Z** and refers to some country or product level variables discussed earlier that may be related to the costs of evasion through trade re-routing. λ_t stands for year*month fixed effects, λ_{ci} refers to the country*product fixed effects, and e_{cit} is the error term. β is the coefficient, whose subscript refers to each corresponding variable. With these fixed effects, our estimation is based on the within variations over time (year*month) across country*product pairs.

Our dependent variable covers only U.S. imports from third countries, so only a subset of common bilateral gravity equation variables and some third-country variables are

considered. U.S.-related gravity variables such as U.S. GDP or GDP/capita will be dropped in regressions with time dummies. Because China and the U.S. cannot be the re-routing countries of Chinese exports to the U.S., both of them are dropped out from our analysis.[12] Our dataset is at HS 6-digit product level (i) across third countries (c) over time (t).

The evasion hypothesis suggests a positive coefficient β_{XTP} for the 3-way interaction term, while the sign of β_{XTPZ^*} for the 4-way interaction term depends on the specific product or third-country characteristics Z*.

IV. Anti-dumping and trade data

The anti-dumping data are from the Global Anti-dumping Database (GAD) (Bown 2010), available through the World Bank Temporary Trade Barriers Database (TTBD).[13] GAD covers more than 30 anti-dumping using countries from 1980s to 2015 (as of July 2016). In this database, the master sheet provides the basic information of the anti-dumping cases such as initiation dates, preliminary decision dates, final decision dates, revoke dates, preliminary rates, final rates, etc. The HS codes of the products under anti-dumping investigations are available. There is also firm level information such as the names of petition firms and targeted foreign firms and the individual duty rates.

Our analysis is carried out at the HS 6-digit level, covering all of the HS 6-digit products under the investigations (treatment group) as well as the other similar HS 6-digit products under the same HS 4-digit categories but not under the investigation (control group). Following Lu, Tao, and Zhang (2013), we choose similar products with the same HS 4-digit sector to define the control groups to make two groups comparable. Although the trade data we have are at HS 10-digit level for the U.S. and HS 8-digit level for China, we construct our data at HS6 level because this is the most disaggregated level that is internationally comparable. The anti-dumping cases and related products covered in this paper are listed in Appendix 1 (see also special treatments for several cases in Appendixes 2-3).

[12] There is another method of circumvention called destination country assembly. For example, when bicycles are subject to anti-dumping duties, bicycle producers may export different bicycle parts of bicycles to the U.S. and then assemble them in the U.S. into final goods. We do not intend to analyze this kind of circumvention in this paper.

[13] The TTBD can be accessed at: http://go.worldbank.org/KJWGLO6DL0

The monthly transaction level export data of China are from China Customs Statistics for the period of 2002–2006.[14] U.S. monthly import data are from the U.S. Imports of Merchandise (2002–2006).[15] There are lots of zero trade flows at Country-HS6-Month level. We calculate X as log(China exports to third country + 1) and Y as log(US imports from third country + 1) to retain zeroes in the data. Otherwise, zero trade flows will be dropped when we take logarithms. Since the trade value is measured in dollar, the measurement error due to the added one dollar is minimal.

Besides the value data, we also check whether the trade quantity data support our story as well. Due to multiple quantity unit used to record some trade data, we need to make sure that the unit is the same when aggregating higher level of HS lines to HS6. There are two units in the trade data from China Customs: mostly weight in kilogram but number count for a small number of products. Fortunately, the unit is always unique for all of the HS8 products within each HS6 category in our sample. For the trade data at the U.S. side, the first or primary unit for general imports is kilogram for most of the HS10 products within an HS6 product category with only a few exceptions which we will drop from our regressions when using quantity data. Same as before, zero quantity data are retained by adding one unit before we take logarithms.

The data for third countries' real GDP and GDP/capita are from the Penn World Table. The data and sources for other variables (Z*) will be described later when introduced.

V. Empirical results

5.1 Baseline regression results

In this section, we use regression analysis to identify the evasion behaviors based on a positive correlation between U.S. imports of a product from a third country and China's exports of the same product to the same third country. When constructing the trade flow data at HS6-Country-Year-Month level, we include only the HS6 lines in our treatment and

[14] We have China's customs data for the period 2000–2006. To avoid the complication related to China's WTO entry in 2001, we use the data for 2002–2006.

[15] We could also use third countries' imports from China and their exports to the U.S. But detailed monthly data are not available to us for other countries. In addition, we believe that it is better to use the data reported by two largest trading nations to ensure consistency and comparability.

control groups as listed in Appendix 1, but drop those lines that China had never exported to any countries during our sample period (2002–2006) and also drop the third countries to which China had never exported any covered product during our sample period. The logic of our sample choice is simple: if China had never exported a product to any countries or never exported any of the related products to a country, then this product or country will be irrelevant to our re-routing story.

In Table 1, we use a baseline specification with only the 3-way interactions X*P*T. X and Y are based on trade value data in the first three columns, but trade quantity data in the last three columns. Country*HS6 and year*month dummies (5 years * 12 months = 60 dummy variables) are always included in the regressions. As a result, T and P are dropped from the regression due to collinearity. Post-anti-dumping dummy (P) in regressions (1) and (4) is defined based on preliminary anti-dumping decision dates and P2 in regressions (2) and (5) is based on final decision dates. In regressions (3) and (6), however, we include both P and P2 and define them mutual exclusively by considering both preliminary and final decision dates: P equals one after a preliminary decision but before a final decision and P2 is one after a final decision was made. These dates are listed in Appendix 1.

In all of the regressions, the coefficients of X*T*P and X*T*P2 are always positive and significant at the 1% level, consistent with the trade re-routing story. The magnitude of the coefficients is similar in the first two regressions no matter if we use P or P2. In regression (3), the estimated coefficient of X*T*P is smaller than that of X*T*P2 (0.007 vs. 0.013). With quantity data, the coefficients of P and P2 are similar in regressions (4)-(6). These results suggest that preliminary decisions also matter, so we will always use the preliminary decision dates to define P in all of the following tables. Otherwise, if we used only final decision dates, we would mis-classify the preliminary decision period into the default category without anti-dumping actions. Indeed, according to the U.S. anti-dumping law, once the preliminary decision is affirmed, the targeted importers are supposed to pay a certain amount of deposits for anti-dumping duties and this would have an immediate effect on their exports.

We take the result in regression (1) as an example to discuss the magnitude of the estimated effect. Consistent with our re-routing story, the marginal effect of lnX on lnY (or

the elasticity of Y with respective to X) for products in the treatment group is 2 percentage points higher after the preliminary anti-dumping decisions were made, while the corresponding effect for products in the control groups is only 0.8 percentage point higher. The magnitude of the effect is modest on average, but it could be much larger for some products and third countries. The positive effect for the control group is probably due to a chilling or spillover effect of anti-dumping actions on similar products as shown by Vandenbussche and Zanardi (2010). Without the chilling effect, the estimated net effect of anti-dumping should be even larger. In addition, because some Chinese exporters might not report their exports to the Customs when exporting to third countries for evasion purposes, this can lead to measurement errors in the already noisy monthly level trade data. Without these problems, the true correlation between X and Y for the treatment groups can be even stronger than what we get from the regressions. Therefore, our estimate can be a very conservative one.

5.2 Regressions with 4-way interactions with third countries variables

To provide further support for the evasion hypothesis, in this sub-section we investigate whether the evidence of trade re-routing is stronger for third countries with characteristics that are more conducive to evasion behaviors, including the distance of a third country to the U.S. and China, and the size of the ethnic Chinese population in a third country. We add the interaction terms between these variables and others to our regressions.

The geographic distance data are from the CEPII.[16] We calculate the sum of the distance from China to a third country and the distance from this third country to the U.S., and use it as a proxy for the cost of re-routing. The data for ethic Chinese population are from the Ohio University Library.[17] The data are available to most of but not all of the countries covered in the data used in Table 1. When calculating log(Chinese), we use log(Chinese+1) to retain the zero values in the original data. Since population is measured in person, the measurement error due to the added one person is minimal.

The results are reported in Table 2. The trade value data are used to define X and Y in

[16] http://www.cepii.fr/CEPII/fr/bdd_modele/presentation.asp?id=6

[17] http://cicdatabank.library.ohiou.edu/opac/population.php

the first two regressions, while trade quantity data are used in the last two regressions. The first regression uses the interaction terms with log(dist) and the same set of fixed effects as in Table 1, while the second regression includes the interactions with both log(dist) and log(Chinese). The coefficient of the 4-way interaction term X*T*P*log(dist) bears a negative sign and the coefficient of X*T*P*log(Chinese) is positive, and they are always significant at the 10% level. This suggests that the evidence for re-routing of the products under anti-dumping is weaker in third countries that are far from China and the U.S. but stronger in third countries with a larger ethnic Chinese population.[18] In the last two columns of Table 2, we use quantity data for X and Y, and receive similar results.[19]

5.3 product differentiation and re-routing

In this subsection, we examine if a product characteristic, the level of product differentiation, affects re-routing. We define a *diff* dummy, which equals one for differentiated products and zero for non-differentiated products. The data used to define the *diff* dummy are from Rauch (1999), who classify SITC 4-digit products into homogenous, reference-priced and differentiated goods. Based on a concordance between HS 6-digit products to SITIC 4-digit products, we categorize HS6 products into differentiated products and non-differentiated products (including homogenous and referenced products).

The results are reported in Table 3. X and Y use trade value data in the first three regressions but trade quantity data in the last three columns. In the first regression, we add the interaction terms between the *diff* dummy and other variables. The negative coefficient of the 4-way interaction term indicates stronger evidence of re-routing for non-differentiated products, probably because it is relatively easier and safer to change the C/O documents

[18] We have tried calculating the cutoff value of distance, where we may see that the partial effect of ln(X) on ln(Y) switches signs. If we consider only the cases for T=P=1, then the results in the first column of Table 2 give us a cutoff distance just above the maximum of the total distance (USA-3rd distance + 3rd – China distance). It means that the partial derivative of ln(Y) with respective to ln(X) decreases with distance but stays always positive.

[19] We also tried including the share of a third country's aggregate trade with China and the U.S. among its total trade as a proxy for the level of integration of this third country with China and the U.S. Its interaction term with X*T*P is always insignificant in the regressions, possibly due to the endogeneity of this share variable and the limited time variations in aggregate trade share.

illegally for less differentiated products. Alternatively, we also split the full sample into two subsamples for differentiated and non-differentiated products and report the results in the second and third columns of Table 3, respectively. With the subsamples, we use a specification with only a triple interaction as in Table 1. As expected, X*T*P is positive and significant only in the non-differentiated product sample. In the last three columns using trade quantity data, the results are similar: although X*T*P is also positive and significant for differentiated products, the magnitude of the coefficient is less than a half of the corresponding coefficient for non-differentiated products.

VI. Alternative mechanisms and robustness checks

In this section, we will investigate some possible alternative stories behind trade re-routing besides duty evasion and perform some robustness checks.

6.1 Alternative mechanisms

It is possible that some third countries are chosen by Chinese exporters as re-routing locations for reasons other than anti-dumping duty evasion. We consider in this section some other third-country characteristics that are also possibly conducive to trade re-routing, such as FTAs and U.S. tariffs.

To enjoy the preferential rates under an FTA, Chinese exporters also need to obtain the C/O, Form A and/or other types of forms from the third countries in such a trading bloc. China did not have any FTA relationship with the U.S. during our sample period, while the U.S. had signed a number of FTAs with some third countries during the sample period.[20] The lower preferential U.S. tariffs can be another motivating factor behind trade re-routing of Chinese exports through these third countries. The FTA data are from Liu (2015), who draws information from seven different data sources and covers a comprehensive list of FTAs.

We investigate this alternative story in the first two columns in Table 4, using trade value and quantity data respectively. We add to our baseline regressions a dummy variable indicating if a third country had an FTA with the U.S. (*FTAwUSA*), as well as its interaction

[20] During our sample period, U.S. only has free trade areas with some third countries, without any Customs Unions or partial scope preferential trade arrangements.

term with X. The coefficient for the newly added interaction term with *FTAwUSA* is positive and significant at the 10% level, suggesting that some Chinese exporters may evade U.S. tariffs by re-routing trade through U.S.'s FTA partners such as Mexico. Although the positive correlation between X and Y may be partially attributed to FTAs, the coefficient of X*T*P remains positive and significant, with the same magnitude as in Table 1. The effect of anti-dumping is estimated to be stronger than the effect of FTAs.

Second, we haven't considered U.S. tariffs in our regressions because tariff data are available only for a subset of HS6 products. However, U.S. tariffs, if omitted, may lead to biased coefficient estimates. For example, higher U.S. tariffs should reduce U.S. imports from third countries (Y), which may in turn increase the domestic supply in these third countries and reduce their imports of the same products from China (X). Omitting U.S. tariffs may lead to a positive bias in the coefficient of the 3-way interaction term. To make sure that our previous results are not driven by this omitted bias, we add to our regression U.S. tariff variable and its interaction term with X. The results are reported in the last two columns of Table 4, where X and Y are defined based on trade value and quantity data respectively. U.S. tariff data are from UN TRAINS database. We use statutory tariffs which are based primarily on MFN tariffs but replaced by preferential tariffs whenever they apply. The sample sizes are much smaller due to limited product coverage of the tariff data. The interaction term of tariff variable with X is always highly insignificant, and the coefficient of X*T*P remains highly significant and is actually much higher than the corresponding estimate from the baseline regressions in Table 1. Due to very different sample coverage, however, we cannot compare these coefficients directly. These results suggest that the positive coefficient of X*T*P in our previous results is not driven by omitted U.S. tariff variable.

Third, although we have dropped those HS6 lines that China had never exported to any countries during our sample period (2002–2006) and also dropped the third countries to which China had never exported any related product during our sample period, there are still a lot of zeroes in our Country-HS6-Month level data. To make sure that the positive correlation between X and Y are not simply driven by the observations with both X and Y being zeroes, we drop those Country-HS6 observations if both X and Y are always zeroes during our sample period. The results are reported in Table 5. The regressions use the same

specifications as in Table 1 and our previous findings still hold well – even a bit stronger.

Finally, as discussed in Sectiono 2, Rotunno Vezina and Wang (2013) show that Chinese exporters transhipped their products via "screwdriver plants" in AGOA to avoid MFA quotas. Our sample period is covered by the time period of their study (1996-2008) and is almost overlapped with the final years of the Multifiber Agreement (2001–2005). To check if our results are driven by the same story, we show the robustness of our finding to the exclusion of textile products. In our sample, only one textile product HS6=590190 (Tracing Cloth; Prepared Painting Canvas; Buckram) was affected by U.S. anti-dumping action against China in Case 1091. Table 6 shows that our results are essentially unchanged if we drop Case 1091 from our analysis.

6.2 Other related cases and the echo effect

We so far consider only U.S. anti-dumping actions against China. It is also important to take into account other related anti-dumping cases which may generate an echoing effect when different countries sequentially imposing anti-dumping measures on the same product from the same exporter (Zanardi and Tabakis, forthcoming). If any of the other temporary trade barriers of a third country against China or temporary trade barriers of the U.S. against a third country was erected against any HS 4-digit product covered by the U.S. anti-dumping actions against China during 2002–2006, we consider them as related cases. These cases would directly affect China's trade flows to third countries and third countries' trade flows to the U.S. If a third country erected any temporary trade barriers against China, this country will unlikely be chosen by Chinese exporters to re-route trade. This will affect China's exports to the third countries (our independent variable X). At the same time, if the U.S. took trade protection actions against third countries during the same period, this country will be unlikely chosen by Chinese exporters to re-route trade either. This will affect U.S. imports from third countries (our dependent variable Y). We conduct a robustness check by deleting all of the related HS6 products in the affected HS4 categories for these related countries. We consider not only anti-dumping cases (AD), but also other temporary barriers including countervailing duties (CVD), and safeguard (SG), which are all available through the World Bank Temporary Trade Barriers Database (TTBD). The deleted related country-HS4 cases

can be found in Appendix 4. The results, reported on Table 7 using the same specifications as in Table 1, do not change much. The results from regressions using other specifications are also robust to the exclusion of these related cases, but are not shown to save space.

VII. Concluding remarks

This paper provides evidence of evasion of U.S. anti-dumping duties by Chinese exporters by re-routing trade through third countries. Anti-dumping or countervailing investigations almost always single out some particular countries. However, the exporters in the targeted countries may be able to successfully avoid paying the high duties by re-routing their products through a third country.

The welfare implication of the evasion behaviors identified in this paper depends on whether the initial anti-dumping actions are justified. If Chinese exporters had indeed dumped products in the U.S. market, then anti-dumping actions are justified and the evasion of anti-dumping duties may be welfare-reducing. If the anti-dumping actions are just used as excuses to protect domestic industries by importing countries, then the evasion behaviors actually do no harm by rendering trade distorting policies ineffective. In any case, trade re-routing reduces the transportation efficiency because this is not the most efficient way to ship products from China to the U.S. In addition, the finding in this paper is also important from development perspective. The increase in the exports of third countries to the U.S. of the re-routed products does not imply economic booming and export growth in the related sectors of the re-routing countries. These countries simply serve as intermediaries to facilitate the re-routing and do not produce much value added.

Although this paper focuses on U.S. anti-dumping actions against China, the evasion can be prevalent across countries, so the method used in our analysis can be easily applied to other countries, such as the European Union (see e.g., Nita and Zanardi (2013) for a review of the actual anti-circumvention investigations in the EU). This paper is the first attempt to identify this type of evasion behaviors using rigorous econometric methods. We expect to see more studies along this line in the future.

Reference

Blonigen, Bruce A., 2002. "Tariff-jumping Antidumping Duties." *Journal of International Economics* 57: 31-49.

Blonigen, Bruce A., and Thomas Prusa, 2003. "Antidumping", in James Harrigan and E. Kwan Choi (eds), *Handbook of International Trade*, Vol. I. Oxford: Blackwell, pp. 251-284.

Bown, Chad P., 2010. "Global Antidumping Database." The World Bank. Available at http://econ.worldbank.org/ttbd/gad/

Bown, Chad P., and Meredith A. Crowley, 2006. "Policy Externalities: How US Antidumping Affects Japanese Exports to the EU." *European Journal of Political Economy* 22: 696-714.

Bown, Chad P., and Meredith A. Crowley, 2007. "Trade Deflection and Trade Depression." *Journal of International Economics* 72: 176-201.

Egger, Peter, and Douglas Nelson. 2011. "How Bad Is Antidumping? Evidence from Panel Data." *Review of Economics and Statistics* 93: 1374-90.

Konings, Joezf, Hylke Vandenbussche, and Linda Springael, 2001. "Import Diversion under European Antidumping Policy." *Journal of Industry, Competition, and Trade* 1:3 283-299.

Krishna, Kala, 2005. "Understanding Rules of Origin." NBER Working Paper No 11150.

Liu, Xuepeng, 2015. "Trade Agreements and Economic Growth." Forthcoming in *Southern Economic Journal*.

Lu, Yi, Zhigang Tao, and Yan Zhang, 2013. "How Exporters Respond to Antidumping Investigations?" *Journal of International Economics* 91, 290-300.

Prusa, Thomas J., 2001. "On the Spread and Impact of Anti-Dumping." *Canadian Journal of Economics* 34: 591-611.

Matsushita, Mitsuo, 2010. "Some International and Domestic Antidumping Issues." *Asian Journal of WTO & International Health Law and Policy* 5(2): 249-68. Available at SSRN: http://ssrn.com/abstract=1729454

Nita, Andreea C., and Maurizio Zanardi, 2013."The First Review of European UnionAntidumpingReviews." *The World Economy* 36(12): 1455-77.

Romalis, John, 2007. "NAFTA's and CUSFTA's Impact on North American Trade." *The Review of Economics and Statistics* 89(3): 416-435

Rauch, James, 1999. “Networks versus Markets in International Trade.” *Journal of International Economics* 48(1): 7-35.

Rauch, James E., and Vitor Trindade, 2002. "Ethnic Chinese Networks In International Trade," *The Review of Economics and Statistics* 84(1): 116-130.

Rotunno, Lorenzo, Pierre-Louis Vézina, and Zheng Wang, 2013. “The rise and fall of (Chinese) African apparel exports.” *Journal of Development Economics* 105: 152–63.

Rotunno, Lorenzo, and Pierre-Louis Vézina, 2012. “Chinese Networks and Tariff Evasion.” *The World Economy* 35 (12): 1772–94.

Stoyanov, Andrey, 2012. “Tariff Evasion and Rules of Origin Violations under the Canada-U.S. Free Trade Agreement.*” Canadian Journal of Economics* 45(3): 879–902.

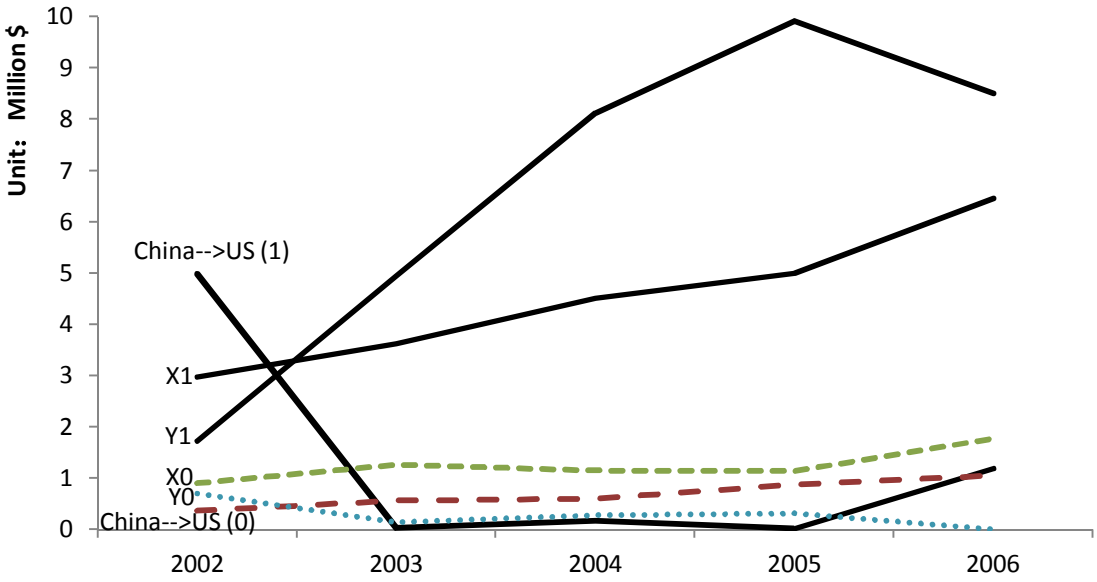
Vandenbussche, Hylke, and Maurizio Zanardi. 2010. "The Chilling Trade Effects of Antidumping Proliferation." *European Economic Review* 54: 760-77.

Vermulst, Edwin, 1994. “Rules of Origin in International Trade: A Comparative Study.” In *Studies in International Trade Policy*. Eds. Waer, P. and Jacques Bourgeois. University of Michigan Press: Ann Arbor.

Vermulst, Edwin, 2012. “EU Anti-Circumvention Rules And Practice”. Web address: http://eeas.europa.eu/delegations/thailand/documents/thailande_eu_coop/eu_anti_circumvention_rules_and_practice_by_mr_edwin_vermulst_en.pdf

Zanardi, Maurizio, and Chrysostomos Tabakis, “Antidumping Echoing,” *Economic Inquiry*, forthcoming.

Figure 1: Trade Re-routing through Korea and Taiwan, the Case of US-AD-1013



Notes: "1" in the series label names denotes HS6=292511 in the treatment group of US-AD-1013 (the three solid lines), while "0" in the label names denotes HS6=292519 in the control group of the same case (the three dotted lines). The preliminary and final decision dates of this case are 12/27/2002 and 7/9/2003, respectively. China→US refers to US imports from China. Y refers to US imports from Korea & Taiwan. X refers to China's exports to Korea & Taiwan.

Table 1: Baseline Regression Results

	Value			Quantity		
	(1)	(2)	(3)	(4)	(5)	(6)
log(GDP)	-0.272***	-0.286***	-0.271***	-0.110**	-0.119***	-0.111**
	(0.058)	(0.058)	(0.058)	(0.046)	(0.046)	(0.046)
log(GDP/capita)	0.270***	0.284***	0.269***	0.127***	0.136***	0.127***
	(0.061)	(0.061)	(0.061)	(0.049)	(0.049)	(0.049)
X	0.002***	0.004***	0.002***	0.001	0.002***	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
X*P	0.008***		0.008***	0.003***		0.003***
	(0.001)		(0.001)	(0.001)		(0.001)
X*T	-0.009***	-0.008***	-0.009***	-0.008***	-0.005***	-0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
T*P	-0.019***		-0.019	-0.023***		-0.028***
	(0.007)		(0.012)	(0.005)		(0.009)
X*T*P	**0.012*** **		**0.007*** **	**0.013*** **		**0.013*** **
	(0.001)		**(0.002)**	**(0.001)**		**(0.002)**
X*P2		0.006***	0.008***		0.002***	0.003***
		(0.001)	(0.001)		(0.001)	(0.001)
T*P2		-0.016**	-0.018**		-0.017***	-0.021***
		(0.007)	(0.007)		(0.006)	(0.006)
X*T*P2		**0.011*** **	**0.013*** **		**0.010*** **	**0.013*** **
		(0.001)	**(0.001)**		**(0.001)**	**(0.001)**
Observations	1,780,681	1,780,681	1,780,681	1,780,681	1,780,681	1,780,681
R-squared	0.818	0.818	0.818	0.807	0.807	0.807

Notes: Dependent variable (Y) refers to U.S. imports from third countries in logarithms. X refers to Chinese exports to third countries. Country*HS6 and Year*Month fixed effects are used in all of the regressions. In regression (1), P refers to a *post*-antidumping dummy based on the preliminary decision dates; it equals one for the period since a preliminary decision was made (including also the period after a final decision), and zero otherwise. In regression (2), P2 refers to a post-antidumping dummy based on the final decision dates; it equals one for the period after a final decision was made, and zero otherwise. In regression (3), P2 is defined in the same way as before, but P equals one only for the period since a preliminary decision and *before a final decision*. T is a treatment dummy which equals one for products in the treatment group and zero for the control group. The first three columns use trade values to measure X and Y, while the last three columns use trade quantity to measure X and Y. *** p<0.01, ** p<0.05, * p<0.1.

Table 2: Results from Regressions with Interactions with Third Country Characteristics

	Value		Quantity	
	(1)	(2)	(3)	(4)
log(GDP)	-0.261***	-0.145	-0.113**	0.002
	(0.058)	(0.105)	(0.046)	(0.084)
log(GDP/capita)	0.258***	0.169	0.129***	0.048
	(0.062)	(0.110)	(0.049)	(0.088)
X	0.154***	0.148***	0.078***	0.063*
	(0.034)	(0.040)	(0.029)	(0.035)
X*P	-0.147***	-0.170***	-0.130***	-0.157***
	(0.029)	(0.034)	(0.025)	(0.030)
X*T	-0.035	0.031	-0.070	0.023
	(0.069)	(0.084)	(0.058)	(0.071)
T*P	0.294	0.428	-0.014	0.097
	(0.313)	(0.421)	(0.248)	(0.335)
X*T*P	0.231***	0.142**	0.248***	0.193***
	(0.059)	(0.071)	(0.050)	(0.061)
X*log(dist)	-0.016***	-0.015***	-0.008***	-0.006*
	(0.003)	(0.004)	(0.003)	(0.004)
P*log(dist)	-0.004***	-0.012***	-0.003***	-0.007***
	(0.001)	(0.001)	(0.000)	(0.001)
X*T*log(dist)	0.003	-0.004	0.006	-0.002
	(0.007)	(0.009)	(0.006)	(0.007)
X*P*log(dist)	0.016***	0.017***	0.014***	0.015***
	(0.003)	(0.003)	(0.003)	(0.003)
T*P*log(dist)	-0.030	-0.042	0.000	-0.007
	(0.032)	(0.043)	(0.025)	(0.034)
X*T*P*log(dist)	**-0.023*** **	**-0.015** **	**-0.024*** **	**-0.021*** **
	(0.006)	**(0.007)**	**(0.005)**	**(0.006)**
X*log(chinese)		0.000		0.000
		(0.000)		(0.000)
P*log(chinese)		0.009***		0.006***
		(0.001)		(0.001)
X*T*log(chinese)		0.000		-0.001
		(0.001)		(0.000)
X*P*log(chinese)		0.001***		0.001***
		(0.000)		(0.000)
T*P*log(chinese)		-0.003		-0.006***
		(0.003)		(0.002)
X*T*P*log(chinese)		**0.001***		**0.002*** **
		(0.000)		**(0.000)**
Observations	1,780,681	1,259,432	1,780,681	1,259,432
R-squared	0.818	0.819	0.807	0.811

Notes: log(dist)=log(distance from U.S. to a third country + distance from China to the same third country or regions). log(chinese) = log(ethnically Chinese population in a third country + 1). The first two columns use trade values to measure X and Y, while the last two columns use trade quantity to measure X and Y. Country*HS6 and Year*Month fixed effects are used in all of the regressions. *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Results from Regressions using Interactions with Product Differentiation

	Value			Quantity		
	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample	Diff	Non-diff	Full Sample	Diff	Non-diff
log(GDP)	-0.241***	-0.723***	-0.053	-0.074	-0.429***	0.066
	(0.059)	(0.127)	(0.065)	(0.046)	(0.087)	(0.055)
log(GDP/capita)	0.242***	0.779***	0.030	0.093*	0.501***	-0.070
	(0.063)	(0.135)	(0.069)	(0.050)	(0.092)	(0.059)
X	0.005***	-0.003*	0.005***	0.003***	-0.004***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
X*P	0.003***	0.013***	0.004***	0.001	0.005***	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
X*T	-0.013***	-0.003	-0.012***	-0.014***	0.001	-0.014***
	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
T*P	-0.038***	0.031**	-0.034***	-0.031***	0.002	-0.030***
	(0.008)	(0.015)	(0.008)	(0.006)	(0.010)	(0.006)
X*T*P	**0.015*** **	**0.003**	**0.015*** **	**0.018*** **	**0.008*** **	**0.018*** **
	(0.002)	**(0.002)**	**(0.002)**	**(0.002)**	**(0.002)**	**(0.002)**
X*diff	-0.007***			-0.008***		
	(0.002)			(0.001)		
P*diff	-0.008			-0.010*		
	(0.007)			(0.005)		
X*T*diff	0.011***			0.015***		
	(0.003)			(0.003)		
X*P*diff	0.011***			0.006***		
	(0.001)			(0.001)		
T*P*diff	0.086***			0.043***		
	(0.016)			(0.013)		
X*T*P*diff	**-0.013*** **			**-0.011*** **		
	(0.003)			**(0.002)**		
Observations	1,688,299	483,881	1,204,418	1,688,299	483,881	1,204,418
R-squared	0.821	0.845	0.794	0.810	0.829	0.800

Notes: The first three columns use trade values to measure X and Y, while the last three columns use trade quantity to measure X and Y. Diff is a dummy which equals one for differentiated products and zero for non-differentiated products. Country*HS6 and Year*Month fixed effects are used in all of the regressions. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Investigating Alternative Mechanisms

	(1)	(2)	(3)	(4)
	value	quantity	value	quantity
log(GDP)	-0.277***	-0.112**	2.585***	1.314**
	(0.058)	(0.046)	(0.708)	(0.562)
log(GDP/capita)	0.276***	0.129***	-1.700**	-0.485
	(0.061)	(0.049)	(0.753)	(0.598)
X	0.002**	0.001	0.015***	0.006**
	(0.001)	(0.001)	(0.003)	(0.003)
X*P	0.008***	0.003***	-0.008***	-0.009***
	(0.001)	(0.001)	(0.003)	(0.002)
X*T	-0.009***	-0.008***	-0.018***	-0.014***
	(0.001)	(0.001)	(0.006)	(0.005)
T*P	-0.019***	-0.023***	-0.168***	-0.201***
	(0.007)	(0.005)	(0.050)	(0.040)
X*T*P	**0.012*** **	**0.013*** **	**0.027*** **	**0.034*** **
	(0.001)	**(0.001)**	**(0.006)**	**(0.005)**
FTAwUSA	-0.056***	-0.054***		
	(0.016)	(0.013)		
X*FTAwUSA	**0.007*** **	**0.003*** **		
	(0.002)	**(0.001)**		
US_tariff			-0.035***	-0.003
			(0.009)	(0.007)
X*US_tariff			**0.000**	**-0.001**
			(0.001)	**(0.001)**
Observations	1,780,681	1,780,681	303,455	303,455
R-squared	0.818	0.807	0.660	0.720

Notes: FTAwUSA is a dummy variable indicating third country's FTA relationship with the U.S. US_tariff refers to the U.S. statutory tariffs which are MFN tariffs for most of the third countries but preferential tariffs for third countries that enjoy preferential rates. Country*HS6 and Year*Month fixed effects are used in all of the regressions. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Dropping Country-HS6 Observations with Both X and Y Being Always Zeroes

	Value			Quantity		
	(1)	(2)	(3)	(4)	(5)	(6)
log(GDP)	-0.451***	-0.470***	-0.451***	-0.184**	-0.197**	-0.186**
	(0.103)	(0.103)	(0.103)	(0.082)	(0.082)	(0.082)
log(GDP/capita)	0.448***	0.465***	0.448***	0.216**	0.228***	0.218**
	(0.111)	(0.111)	(0.111)	(0.088)	(0.088)	(0.088)
X	0.003***	0.004***	0.003***	0.001	0.002**	0.001*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
X*P	0.005***		0.006***	0.001		0.002
	(0.001)		(0.001)	(0.001)		(0.001)
X*T	-0.010***	-0.009***	-0.010***	-0.009***	-0.006***	-0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
T*P	-0.040***		-0.034*	-0.041***		-0.046***
	(0.011)		(0.019)	(0.009)		(0.015)
X*T*P	**0.014*** **		**0.008*** **	**0.015*** **		**0.015*** **
	(0.002)		**(0.003)**	**(0.002)**		**(0.003)**
X*P2		0.003***	0.004***		0.000	0.001
		(0.001)	(0.001)		(0.001)	(0.001)
T*P2		-0.037***	-0.040***		-0.034***	-0.041***
		(0.011)	(0.012)		(0.009)	(0.010)
X*T*P2		**0.013*** **	**0.015*** **		**0.012*** **	**0.015*** **
		(0.002)	**(0.002)**		**(0.001)**	**(0.002)**
Observations	1,076,244	1,076,244	1,076,244	1,076,244	1,076,244	1,076,244
R-squared	0.805	0.805	0.805	0.798	0.798	0.798

Notes: These regressions follow exactly the same specifications as in Table 1, except that Country-HS6 observations with both X and Y being zeroes throughout our sample period are dropped. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Dropping Case 1091 Related to Textiles

	Value			Quantity		
	(1)	(2)	(3)	(4)	(5)	(6)
log(GDP)	-0.262***	-0.275***	-0.260***	-0.102**	-0.111**	-0.103**
	(0.058)	(0.058)	(0.058)	(0.046)	(0.046)	(0.046)
log(GDP/capita)	0.260***	0.273***	0.259***	0.119**	0.128***	0.120**
	(0.062)	(0.062)	(0.062)	(0.049)	(0.049)	(0.049)
X	0.002***	0.004***	0.002***	0.001	0.002***	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
X*P	0.008***		0.008***	0.003***		0.003***
	(0.001)		(0.001)	(0.001)		(0.001)
X*T	-0.009***	-0.008***	-0.009***	-0.008***	-0.005***	-0.008***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
T*P	-0.022***		-0.025**	-0.025***		-0.033***
	(0.007)		(0.012)	(0.005)		(0.009)
X*T*P	**0.012*** **		**0.007*** **	**0.013*** **		**0.013*** **
	(0.001)		**(0.002)**	**(0.001)**		**(0.002)**
X*P2		0.006***	0.008***		0.002***	0.003***
		(0.001)	(0.001)		(0.001)	(0.001)
T*P2		-0.018**	-0.020***		-0.018***	-0.023***
		(0.007)	(0.007)		(0.006)	(0.006)
X*T*P2		**0.011*** **	**0.012*** **		**0.010*** **	**0.013*** **
		(0.001)	**(0.001)**		**(0.001)**	**(0.001)**
Observations	1,771,981	1,771,981	1,771,981	1,771,981	1,771,981	1,771,981
R-squared	0.819	0.819	0.819	0.808	0.808	0.808

Notes: These regressions follow exactly the same specifications as in Table 1, except that observations related to Case 1091 are dropped (see Section 6.2 for details). *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Dropping Country-HS6 Observations Affected by Related Cases

	Value			Quantity		
	(1)	(2)	(3)	(4)	(5)	(6)
log(GDP)	-0.223***	-0.236***	-0.222***	-0.110**	-0.117***	-0.109**
	(0.056)	(0.056)	(0.056)	(0.045)	(0.045)	(0.045)
log(GDP/capita)	0.223***	0.236***	0.222***	0.125***	0.133***	0.125***
	(0.059)	(0.059)	(0.059)	(0.048)	(0.048)	(0.048)
X	0.001*	0.003***	0.001*	0.000	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
X*P	0.007***		0.008***	0.003***		0.003***
	(0.001)		(0.001)	(0.001)		(0.001)
X*T	-0.009***	-0.008***	-0.009***	-0.007***	-0.005***	-0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
T*P	-0.012*		-0.012	-0.019***		-0.022**
	(0.007)		(0.011)	(0.005)		(0.009)
X*T*P	**0.012*** **		**0.005** **	**0.012*** **		**0.011*** **
	(0.001)		**(0.002)**	**(0.001)**		**(0.002)**
X*P2		0.005***	0.007***		0.002***	0.003***
		(0.001)	(0.001)		(0.001)	(0.001)
T*P2		-0.011	-0.011		-0.015***	-0.018***
		(0.007)	(0.007)		(0.005)	(0.006)
X*T*P2		**0.012*** **	**0.014*** **		**0.010*** **	**0.013*** **
		(0.001)	**(0.001)**		**(0.001)**	**(0.001)**
Observations	1,639,833	1,639,833	1,639,833	1,639,833	1,639,833	1,639,833
R-squared	0.811	0.811	0.811	0.798	0.798	0.798

Notes: These regressions follow exactly the same specifications as in Table 1, except that Country-HS6 observations affected by related cases are dropped (see Section 6.2 for details). *** p<0.01, ** p<0.05, * p<0.1.

Appendix 1: List of treatment & control groups and antidumping dates, ordered by case numbers

Case ID	Treatment	Control	Preliminary AD DATE	Final AD DATE
990	730711, 730719	730721, 730722, 730723, 730729,730791, 730792, 730793, 730799	09/25/2002	04/07/2003
1010	730890, 732690	730810, 730820, 730830, 730840, 732611, 732619,732620	12/04/2002	06/12/2003
1013	292511	292512, 292519, 292520	12/27/2002	07/09/2003
1014	390530	390512, 390519, 390521, 390529, 390591,390599	03/20/2003	10/01/2003
1020	283660	283610, 283620, 283630, 283640, 283650,283670, 283691,283692, 283699	08/06/2003	10/01/2003
1021	730719	730721, 730722, 730723, 730729,730791, 730792, 730793, 730799	06/06/2003	12/12/2003
1022	281810	281820, 281830	05/06/2003	11/19/2003
1034	852812	852813, 852821,852822,852830	11/28/2003	06/03/2004
1043	392321	392310,392329,392330,392340, 392350,392390	1/26/2004	8/9/2004
1046	293213	293211,293212,293219,293221, 293229,293292,293293,293294, 293299	1/27/2004	8/6/2004
1047	940320, 940390	940310, 940330, 940340, 940360, 940370, 940380	2/3/2004	8/6/2004
1058	700992	700970,700991	6/24/2004	1/4/2005
1059	871680, 871690	871610,871620,871631, 871639, 871640	5/24/2004	12/2/2004
1060	320417	320411,320412,320413,320414, 320415,320416,320419,320420, 320490	6/24/2004	12/29/2004
1064	030613	030611,030612,030614,030619, 030621,030622,030623,030624, 030629	7/16/2004	2/1/2005
1070	480230,480254,480261,480262, 480269,480431,480439,480591, 480640,480830,480890,481190, 481890,482050,482390, 950590	480210, 480220,480240,480255, 480256, 480257, 480258,480411, 480419, 480421, 480429, 480441, 480442, 480449, 480451, 480452, 480459, 480511, 480512, 480519, 480524, 480525, 480530, 480540, 480550, 480592, 480593, 480610, 480620, 480630, 480810, 480820, 481110, 481141, 481149, 481151, 481159, 481160, 481810, 481820, 481830, 481840, 481850, 482020, 482030, 482040, 482090, 482312, 482319, 482320, 482340, 482360, 482370, 950510	9/21/2004	1/25/2005 or 2005-03-30
1071	810419, 810430	810411, 810420, 810490	10/4/2004	4/15/2005
1082	293369	293311, 293319, 293321, 293329, 293331, 293332, 293333, 293339, 293341, 293349, 293352, 293353, 293354, 293355, 293359, 293361, 293371, 293379, 293391, 293399	12/16/2004	6/24/2005
1091	590190	590110	11/07/2005	06/01/2006
1095	481022	481013, 481014, 481019, 481029, 481031, 481032, 481039, 481092, 481099	04/17/2006	09/28/2006

Notes: As a subset of the previous Case 990, Case 1021 is not included separately in our regressions. Appendix 2 addresses the overlapping products between Cases 1047 and 1058. Appendix 3 discusses the overlapping products between Cases 1070a, 1070b and 1095. For Case 1064, HS6=160520 was investigated but ruled negative by the ITC in the final decision, so it is not included in our analysis. Finally, we exclude the following two types of cases from our analysis: (1). Cases with negative decisions: USA-AD-989 (Initiated on 02-21-2002), USA-AD-994 (Initiated on 04-05-2002), USA-AD-1036 (Initiated on 05-23-2003), USA-AD-1092 (Initiated on 05-10-2005), USA-AD-1099 (Initiated on 11-18-2005), USA-AD-1107 (Initiated on 11-06-2006). (2). Cases that were withdrew or terminated: USA-AD-1030 (Initiated on 04-08-2003), USA-AD-1102 (Initiated on 02-02-2006), USA-AD-1049 (Initiated on 08-11-2003), and USA-AD-1073 (Initiated on 10-08-2004).

Appendix 2: Addressing Overlapping Products between Cases 1047 & 1058

USA-AD-1047 investigated Ironing Tables and Certain Parts Thereof (HS=940320.0011 & 940390.8040), and USA-AD-1058 investigated Wooden Bedroom Furniture (HS=700992.5000 & 940350.9040 & 940350.9080). In the GAD data, the anti-dumping decision dates for the two cases are as follows:

Action	1047	1058
Initiation	2003-07-08	2003-11-10
Preliminary Injury	2004-02-03	2004-06-24
Preliminary Dumping	2003-08-20	2004-01-28
Preliminary Antidumping	**2004-02-03**	**2004-06-24**
Final Dumping	2004-06-24	2004-11-17
Final Injury	2004-08-04	2004-12-28
Final Antidumping	**2004-08-06**	**2005-01-04**
Revoke Date	In Force	In Force

As long as an HS6 or higher level product in a related HS4 category appears in the GAD data in either case 1047 or 1058, we assign it into the treatment group. For the rest of the HS6 products in the same HS4 category, we assign them into the control group. The treatment status of the related HS6 products for these two cases can be found as follows (1-treatment group; 0-control group).

HS6	Treatment under 1047	Treatment under 1058
940310	0	0
940320	1	0
940330	0	0
940340	0	0
940350	0	1
940360	0	0
940370	0	0
940380	0	0
940390	1	0
700910	Not covered	0
700991	Not covered	0
700992	Not covered	1

The three HS6 products in HS4=7009 are covered only by Case 1058 and the decision dates for 1058 apply. Because case 1047 was initiated earlier, we assign 940320 and 940390 to the treatment group and all of the other HS6 (except 940350) to the control group based on case 1047 decision dates.

An additional complication arises in the HS4=9403 category. Products HS6=940320 and 940390 are covered by Case 1047, and a similar product HS6=940350 is covered later by Case 1058. We take the other HS6 lines in HS4=9403 as the products in the control group for Case 1047 and assign the dates of Case 1047 to them. Strictly speaking, these products should also be in the control group for the later Case 1058 as well, but we cannot apply different dates based on Case 1058 in the same dataset when pooling the two cases together. To avoid this complication, we simply drop HS6=940350 from our analysis, so it does not show up in the treatment group of Case 1047 or the control group for Case 1058.

Appendix 3: Dealing with the Overlapping Products among Cases 1070a, 1070b & 1095

Cases 1070a (crepe paper) and 1070b (tissue paper) share most of the products with almost the same investigation processes but sometimes different decision dates. Case 1095 also covers three similar products. The original product coverage and antidumping dates are listed as follows.

Product coverage

Case 1070a	Case 1070b	Case 1095
480230	480230	
480254	480254	
480261	480261	
480262	480262	
480269	480269	
	48029000[21]	
	4804311000	
	4804312000	
	4804314020	
	4804314040	
	4804316000	
480439	480439	
	4805911090	
	4805915000	
	4805917000	
	48059190	
480640	480640	
480830	480830	
480890	480890	
		48102250
481190	481190	48119090
481890		
		48201020
	48205000	
482390	482390	
95059040	95059040	

Anti-dumping decision dates

Action	1070a	1070b	1095
Initiation	2004-2-23	2004-2-23	2005-9-19
Preliminary Injury	2004-4-15	2004-4-15	2005-10-31
Preliminary Dumping	2004-9-21	2004-9-21	2006-4-17
Preliminary Antidumping	2004-9-21	2004-9-21	2006-4-17
Final Dumping	2004-12-3	2005-2-14	2006-9-8
Final Injury	2005-1-24	2005-3-25	2006-9-25
Final Antidumping	2005-1-25	2005-03-30	2006-9-28
Revoke Date	In Force	In Force	In Force

Data source: GAD database

[21] HS6=480290 does not appear in the U.S. HS system during our sample period, so we drop it from our analysis.

Appendix 3 continued…

We combine Cases 1070a and 1070b into Case 1070 (as listed in Appendix 1). For each covered HS6 products, we always use the earlier decision dates of the two cases.

HS6=481190 is in the treatment group in all three cases, so we use the preliminary and final antidumping dates of case 1070a for this product.

An additional complication arises in the HS4=4820 category. HS6=482050 is covered by Case 1070b, and a similar product HS6=482010 is covered later by Case 1095. We take the other HS6 lines in HS4=4802 as the products in the control group for Case 1070 and assign the dates of Case 1070b to them. Strictly speaking, these products should also be in the control group for the later Case 1095 as well, but we cannot apply different dates based on Case 1095 in the same dataset when pooling these cases together. To avoid this complication, we simply drop HS6=482010 from our analysis, so it does not show up in the treatment group of Case 1095 or the control group for Case 1070.

For all the products in the treatment and control groups under HS4=4810 which is covered only by Case 1095, we use the dates of Case 1095.

Appendix 4: Actions Taken to Address the Related Cases

Main Cases	Related Cases	Target Country	Related Countries & Products
USA-AD-990	ARG-AD-219	CHN	ARG; HS4=7307
	CAN-AD-318	CHN	CAN; HS4=7307
	CAN-AD-319	CHN	CAN; HS4=7307
	CAN-AD-320	CHN	CAN; HS4=7307
	EUN-AD-281	CHN	EUN; HS4=7307
	EUN-AD-449	CHN	EUN; HS4=7307
	ISR-AD-28	CHN	ISR; HS4=7307
	MEX-AD-68	CHN	MEX; HS4=7307
	MEX-AD-239	CHN	MEX; HS4=7307
	PHL-AD-2	CHN	PHL; HS4=7307
	TUR-AD-90	CHN	TUR; HS4=7307
	EUN-SG-1	All Countries	EUN; HS4=7307
USA-AD-1010	ISR-AD-42	CHN	ISR; HS4=7326
	USA-AD-1094	JPN	JPN; HS4=7326
USA-AD-1013	IND-AD-386	CHN	IND; HS4=2925
	IND-AD-395	CHN	IND; HS4=2925
	IND-AD-416	CHN	IND; HS4=2925
	MEX-AD-103	CHN	MEX; HS4=2925
USA-AD-1014	KOR-AD-119	CHN	KOR; HS4=3905
	USA-AD-1015	DEU	DEU; HS4=3905
	USA-AD-1016	JPN	JPN; HS4=3905
	USA-AD-1017	KOR	KOR; HS4=3905
	USA-AD-1018	SGP	SGP; HS4=3905
	USA-AD-1088	TWN	TWN; HS4=3905
USA-AD-1020	AUS-AD-460	CHN	AUS; HS4=2836
	EUN-AD-583	CHN	EUN; HS4=2836
	BRA_AD_20	CHN	BRA; HS4=2836
	IND-AD-106	CHN	IND; HS4=2836
	IND-AD-118	CHN	IND; HS4=2836
	IND-AD-164	CHN	IND; HS4=2836
	IND-AD-328	CHN	IND; HS4=2836
	KOR-AD-14	CHN	KOR;HS4=2836
USA-AD-1034	ARG-SG-6	All	ARG; HS4=8528
	EUN-AD-74	CHN	EUN; HS4=8528
	EUN-AD-238	CHN	EUN; HS4=8528
	MEX-AD-102	CHN	MEX; HS4=8528
	TUR-AD-169	CHN	TUR;HS4=8528
USA-AD-1043	USA-AD-1044	MYS	MYS; HS4=3923
	USA-AD-1045	THA	THA; HS4=3923
	EUN-AD-619	CHN	EUN; HS4=3923
USA-AD-1046	EUN-AD-252	CHN	EUN; HS4=2932
	EUN-AD-294	CHN	EUN; HS4=2932
	EUN-AD-561	CHN	EUN; HS4=2932
	IND-AD-168	CHN	IND; HS4=2932
	MEX-AD-103	CHN	MEX; HS4=2932
USA-AD-1047 & 1058	AUS-AD-395	CHN	AUS; HS4=9403
	PHL-SG-5	All	PHL; HS4=7009
USA-AD-1060	USA-AD-1061	IND	IND; HS4=3204
	USA-CVD-507	IND	IND; HS4=3204
USA-AD-1064	LVA-SG-2	All	LVA; HS4=0306
	USA-AD-1063	BRA	BRA; HS4=0306
	USA-AD-1065	ECU	ECU; HS4=0306
	USA-AD-1066	IND	IND; HS4=0306
	USA-AD-1067	THA	THA; HS4=0306

	USA-AD-1068	VNM	VNM; HS4=0306
USA-AD-1070	IND-AD-216	CHN	IND; HS4=4809, 4811, 4816
	IND-AD-423	CHN	IND; HS4=4806
	KOR-AD-90	CHN	KOR; HS4=4802, 4809, 4816
	MEX-AD-101	CHN	MEX; HS4=9505
	TWN-AD-125	CHN	TWN; HS4=4802
	USA-AD-1096	IND	IND; HS4=4811,4820
	USA-AD-1097	IDN	IDN; HS4=4811,4820
	USA-CVD-512	IND	IND; HS4=4811,4820
	USA-CVD-513	IDN	IDN; HS4=4811,4820
	VEN-SG-6	All Countries	VEN;HS4=4802,4823
USA-AD-1071	BRA-AD-163	CHN	BRA; HS4= 8104
	BRA-AD-164	CHN	BRA; HS4= 8104
	EUN-AD-387	CHN	EUN; HS4=8104
	IND-AD-42	CHN	IND; HS4=8104
	USA-CVD-370	CAN	CAN; HS4=8104
	USA-AD-1072	RUS	RUS; HS4=8104
USA-AD-1082	EUN-AD-590	CHN	EUN; HS4=2933
	MEX-AD-103	CHN	MEX; HS4=2933
	MEX-AD-222	CHN	MEX; HS4=2933
	IND-AD-120	CHN	IND;HS4=2933
	IND-AD-182	CHN	IND;HS4=2933
	IND-AD-192	CHN	IND;HS4=2933
	IND-AD-215	CHN	IND;HS4=2933
	IND-AD-216	CHN	IND;HS4=2933
	IND-AD-364	CHN	IND;HS4=2933
	IND-AD-401	CHN	IND;HS4=2933
	USA-AD-1083	ESP	ESP;HS4=2933
USA-AD-1095	USA-AD-1096	IND	IND; HS4=4810
	USA-AD-1097	IDN	IDN; HS4=4810
	USA-CVD-512	IND	IND; HS4=4810
	USA-CVD-513	IDN	IDN; HS4=4810
	USA-CVD-515	IDN	IDN; HS4=4810
	USA-CVD-516	KOR	KOR; HS4=4810

Notes: "AD" refers to antidumping cases. SG refers to safeguard cases. Country codes use the three letter ISO codes. EUN (European Union: http://europa.eu/about-eu/countries/member-countries/index_en.htm) covers the following countries: Austria (AUT), Belgium (BEL), Bulgaria (BGR), Croatia (HRV), Cyprus (CYP), Czech Republic (CZE), Denmark (DNK), Estonia (EST), Finland (FIN), France (FRA), Germany (DEU), Greece(GRC), Hungary (HUN), Ireland (IRL), Italy (ITA), Latvia (LVA), Lithuania (LTU), Luxembourg (LUX), Malta (MLT), The Netherlands (NLD), Poland (POL), Portugal (PRT), Romania (ROM), Slovakia (SVK), Slovenia (SVN), Spain (ESP), Sweden (SWE), United Kingdom (GBR).

Appendix 5: A Screenshot of A Re-routing Company's Website