

Import Effects of Antidumping in Colombia

Arielle Knudsen

Department of Economics

Trinity University

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Abstract

Using alternative control groups in a treatment effects analysis, this paper seeks to understand the effect of antidumping remedies in Colombia on imports of affected products. First, stylized facts demonstrate that varieties with an affirmative decision tend to have higher levels of imports than the same products from other countries at slightly lower prices. Second, comparisons with two control groups reveal that antidumping remedies only appear to reduce imports during the time between a preliminary decision and the first two years following an affirmative decision, demonstrating a lack of persistence. Third, prices of named varieties appear to increase slightly (although not necessarily statistically significantly). Fourth, antidumping remedies may contribute to firms exiting the marketing, primarily smaller firms with fewer products, and from named countries.

1 Introduction

With President Donald Trump calling for escalating tariffs on imports into the United States, including 25% tariffs on \$200 billion worth of Chinese goods (Swanson & Bradsher, 2018), along with additional tariffs on steel, aluminum, and automobiles, it is imperative that the effects of protectionist trade policies are well-understood. These policies, intended to boost the United States economy, can have harmful unintended consequences, such as Harley-Davidson signaling an intention to move some production abroad to avoid retaliatory tariffs from the EU (Rappeport, 2018). Even though these policies are being sold under the guise of protecting national security, it is instructive to consider the historical impacts of discriminatory tariffs from antidumping remedies to see what happens when a tariff is put into place on only a small number of exporting countries.

A companion paper to this one found that, despite being touted as protecting domestic labor markets, antidumping protection in Colombia did not significantly affect industry-level labor markets: only one of eight industries that received protection experienced higher employment levels.¹ Other industries saw either no change or further decreases in average wage or number of workers relative to synthetic control groups. This paper explores product-level imports using difference in differences empirical analysis to determine why not. The results are consistent with existing literature. First, following the initiation of an antidumping investigation, trade destruction occurs, where imports from the named country decline by approximately 20% in value and 30% in quantity. Likely due to the fact that the majority of dumping remedies in Colombia are price undertakings and increasing the price avoids a duty, the unit value (imported value divided by imported quantity, or average price) of those products increases by approximately 10%. These effects are not persistent; they only occur during the investigative stage while preliminary antidumping remedies are in place. In addition to trade destruction, trade diversion increases imports from nonnamed countries so that the aggregate amount of imports into Colombia is unaffected. While not reducing overall

¹See companion paper for detailed process of antidumping investigations in Colombia.

imports, antidumping investigations instead can affect who exports to Colombia. Smaller firms, firms with fewer products exported, and firms located in countries named in investigations are more likely to exit the Colombian market following a petition. Taken together, the lack of overall import adjustment in Colombia and the short-term nature of the import changes that did occur likely explain why labor markets did not respond to antidumping investigations.

The effects of antidumping policies have been widely studied. Using data from the United States and European Union, Staiger and Wolak (1994), Prusa (1997), Prusa (2001), Carter and Gunning-Trant (2010), Lasagni (2000), and Konings, Vandenbussche, and Springael (2001) estimate trade destruction from antidumping protection ranging from 20% to 60% reductions in trade value from the targeted partner, depending on the size of the dumping duty, the type of remedy, and the outcome of the investigation.² Staiger and Wolak (1994) further find that most of the effect occurs during the investigation stage regardless of the outcome. Along with the direct effect of reducing trade volumes, other non-target countries increase their exports to the investigating country in the targeted product, known as trade diversion. The above papers estimate trade diversion offsets trade destruction by 13% to 80%. Prusa (1997) found it is possible that the net effect for the petitioning country may be close to zero with trade destruction and diversion canceling each other out. Egger and Nelson (2011) show similar effects on aggregate trade volumes. Both trade volumes and welfare are harmed by antidumping policies through tariff and resource allocation distortions, higher prices from uncertainty, trade diversion, trade deflection (where the named country exports more to third parties), and the harassment of foreign firms. Though there are overall negative effects, they found that the effects were small. Conversely, Vandenbussche and Zanardi (2010) find large reductions in aggregate imports for new and tough users, suggesting that this chilling effect on trade, as they call it, may be greater for new or aggressive users of antidumping laws.

Lu, Tao, and Zhang (2013) take a micro-level approach by looking at the response of

²Blonigen and Prusa (2016) provides a thorough review of the recent literature on antidumping; Blonigen and Prusa (2008) review earlier literature.

foreign exporting firms after antidumping investigations. Specifically, they use monthly Chinese firm exports to the United States from 2000-2006 at the HS-6 digit product level matched with antidumping cases initiated by US firms against Chinese producers over the same period. A treatment group composed of products that had an investigation conducted is compared to two different control groups to determine the impact of the stages of antidumping investigations on exports (in terms of volume, number of exporters, unit value, and total export volume to other countries) from Chinese firms to the US. At the product level, aggregating all firm exports, they found a negative, statistically significant effect of preliminary and final duties on export volumes. However, they did not find significant effects in the initiation of the antidumping investigation. In analyzing if the trade dampening effect occurs on the intensive or extensive margin, they found that preliminary and final duties reduce the number of Chinese exporters of subject products (and again, there is no significant effect of initiating a case). Duties also reduce the amount surviving exporting firms sell to the US, but most of the dampening effects come from firms exiting the market. Furthermore, the firms that exit are ones with lower export volumes, even when controlling for firms that are trade intermediaries, which makes them also less likely to exit, instead of direct exporters. Single product direct exporters are more likely to exit than multiproduct direct exporters. In terms of prices they found that the export prices of surviving firms increase slightly, but statistically significantly, in response to preliminary duties, with no further increases afterwards.

Consistent with the literature, this paper uses treatment effects analysis to understand the effect of antidumping remedies in Colombia on imports of affected products. First, stylized facts demonstrate that varieties with an affirmative decision tend to have higher levels of imports than the same products from other countries at slightly lower prices. Second, comparisons with two control groups reveal that antidumping remedies only appear to reduce imports during the time between a preliminary decision and the first two years following an affirmative decision, demonstrating a lack of persistence. Third, prices of named varieties

appear to increase slightly (although not necessarily statistically significantly). Fourth, antidumping remedies may contribute to firms exiting the marketing, primarily smaller firms with fewer products, and from named countries.

The remainder of this paper is as follows: Section 2 describes the data and stylized facts about products receiving protection; Section 3 describes the methodology and presents results; and Section 4 concludes.

2 Data Description

The data comes from two primary sources. The Colombian firm-level trade data is provided through Indiana University’s access to DataMyne. A single observation is a firm’s total quantity and value imported (exported) of an HS 10-digit product in a quarter (aggregated from daily observations) from 2007 through 2013. The data includes the selling (purchasing) foreign firm and country of origin, and the exchange rate. Antidumping data is from the Temporary Trade Barriers Database from Chad Bown and the World Bank. The 22 antidumping cases considered are those initiated and completed between 2007 and 2013. The 22 cases named firms in five different countries (China- 15 cases; Brazil, Mexico, and Venezuela- two cases each; and Korea- one case). Twenty-nine different HS-10 digit products were investigated, covering nine HS 2-digit sector codes. Nine cases resulted in an affirmative decision with duties, six resulted in an affirmative decision with no duties because causality could not be established, three cases resulted in negative findings, and four cases were withdrawn.³ Cases identify HS 10-digit products, named country, and named firm.⁴ Because both trade and antidumping product data are at the 10-digit level for Colombia, there is no loss of specificity in merging the data sets. Lu et al. (2013) face the issue in their study where

³Of the withdrawn cases, one was previously filed as a global safeguard three years prior, then filed and withdrawn as antidumping and refiled within two months of being withdrawn, resulting in an affirmative decision with no duties; two were filed as global safeguard cases three years later; and one was previously filed as a China-specific safeguard.

⁴Since the database lists the initiating domestic firms, the cases and products can also be matched to domestic firm export data.

the Chinese export data was at the HS-8 digit level, while the US antidumping data was at the HS-10 digit level. Merging the Chinese data and the US data, they had to aggregate the data to the common HS 6-digit level, losing some of the disaggregated information.

Further production data is taken from the statistical department of Colombia, *Departamento Administrativo Nacional de Estadística* (DANE). DANE provides indices on real sales, production, and employment in ISIC-4 digit industries on a monthly basis. These indices use 2001 as the base year. DANE also publishes data on quarterly GDP growth of Colombia. Using a process similar to the broad index generated by the US Federal Reserve Board (Loretan, 2005),⁵ I utilized the Colombian import data to construct a quarterly exchange rate index. The raw data reports the exchange rate each transaction faces. The exchange rate index for quarter t , I_t , depends on the volume imported from each country and the current exchange rate faced in the transaction.

3 Method and Results

Figures 1 through 6 compare imports quantities and sales from named countries in each case over time with imports of the same products from all other countries, divided into groups by the final outcome (either no duty assigned despite affirmative findings, a duty with a low dumping margin, or a duty with a high dumping margin). These graphs hint at the endogeneity problem of studying antidumping remedies: in the time shortly before a petition is filed, an import surge usually increanses the import quantity from named countries relative to all other countries.

The endogeneity of dumping remedies renders causal effects identification difficult. I use country fixed effects and time fixed effects to account for gravity variables such as distance and common language, as well as global events like the financial crisis. Further exploiting the

⁵The US broad index actually only weights $\varepsilon_{COL,j,t}$ with 1/4 and includes a third term, also weighted by 1/4 that measures the competition between US goods and foreign goods in third country markets. Since this requires data not found in my primary data set (foreign goods in third markets), I have omitted the final term and adjusted the weights.

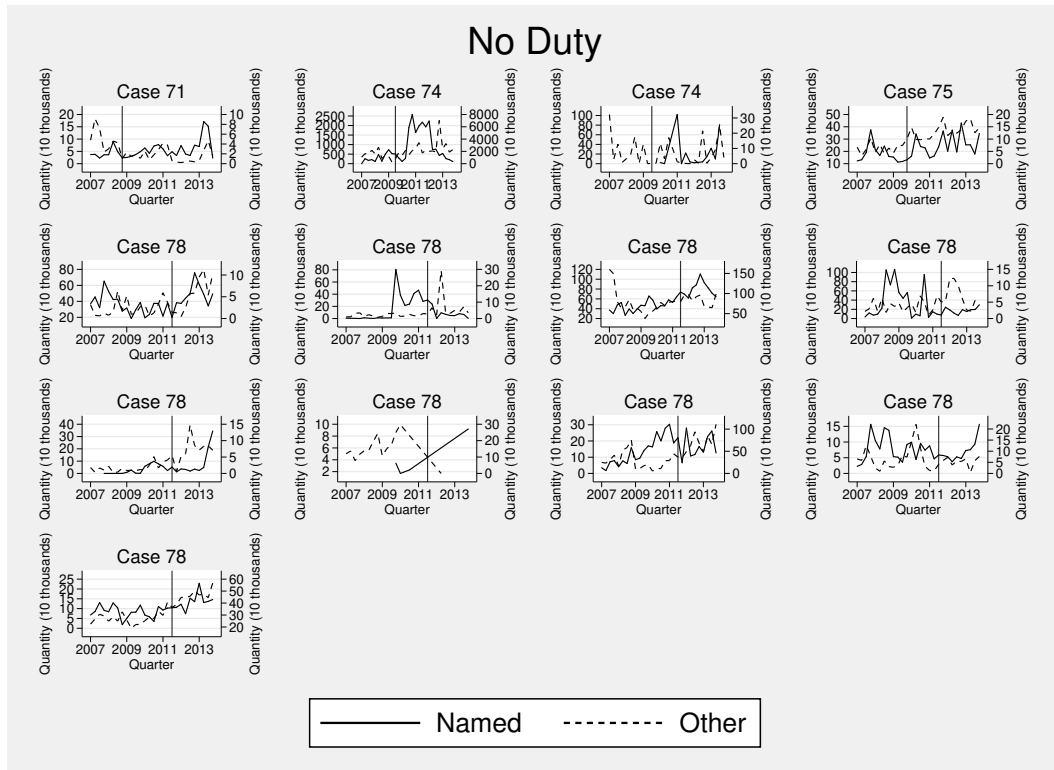


Figure 1: Quantity adjustment following initiation of an antidumping case for imports of products under investigation from named countries (left axis) compared to imports from non-named countries (right axis). Vertical lines indicate the time of initiation.

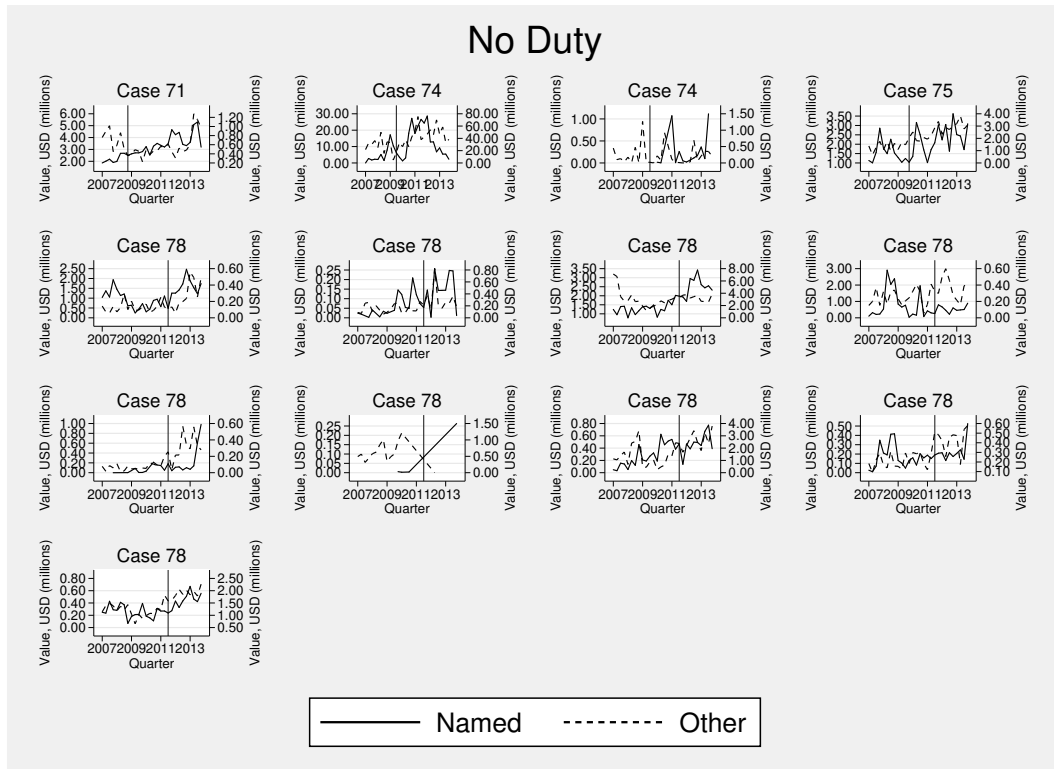


Figure 2: Value adjustment following initiation of an antidumping case for imports of products under investigation from named countries (left axis) compared to imports from non-named countries (right axis). Vertical lines indicate the time of initiation.

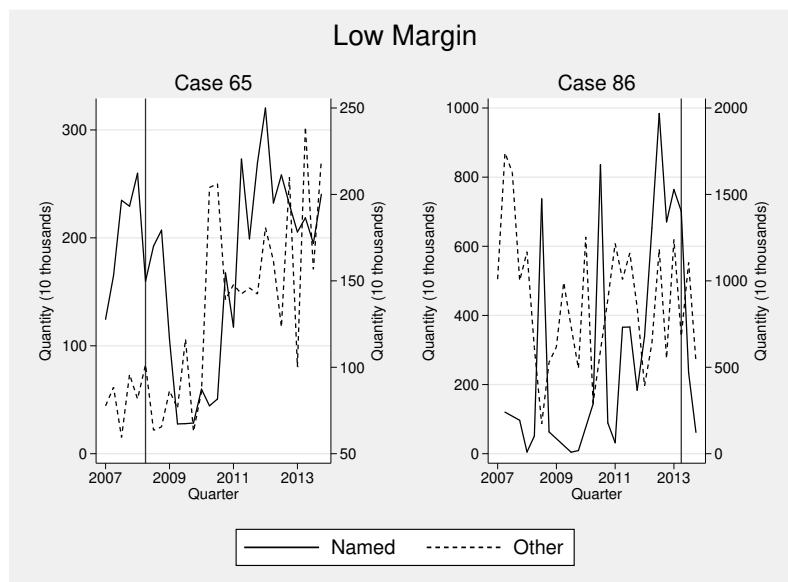


Figure 3: Quantity adjustment following initiation of an antidumping case for imports of products under investigation from named countries (left axis) compared to imports from non-named countries (right axis). Vertical lines indicate the time of initiation.

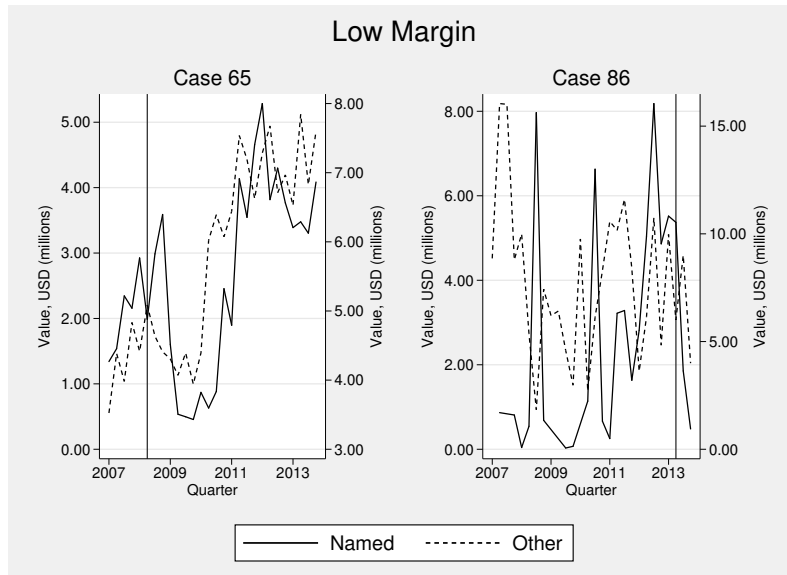


Figure 4: Value adjustment following initiation of an antidumping case for imports of products under investigation from named countries (left axis) compared to imports from non-named countries (right axis). Vertical lines indicate the time of initiation.

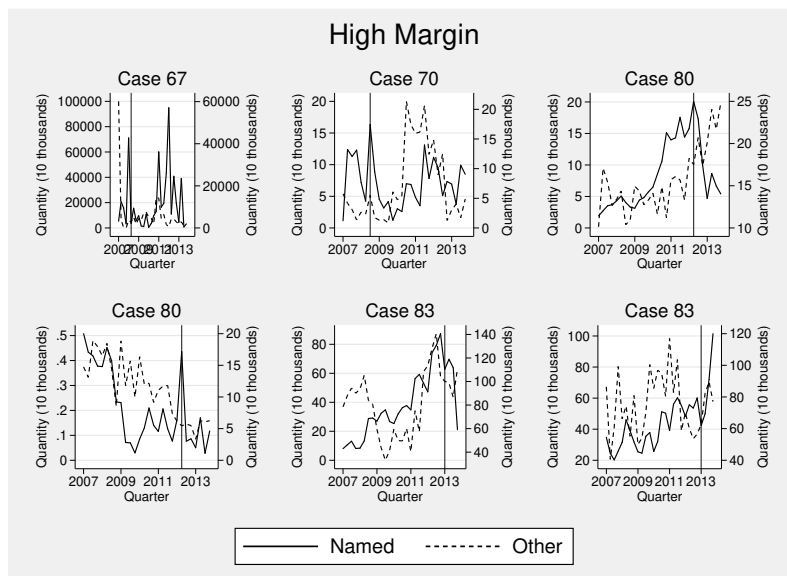


Figure 5: Quantity adjustment following initiation of an antidumping case for imports of products under investigation from named countries (left axis) compared to imports from non-named countries (right axis). Vertical lines indicate the time of initiation.

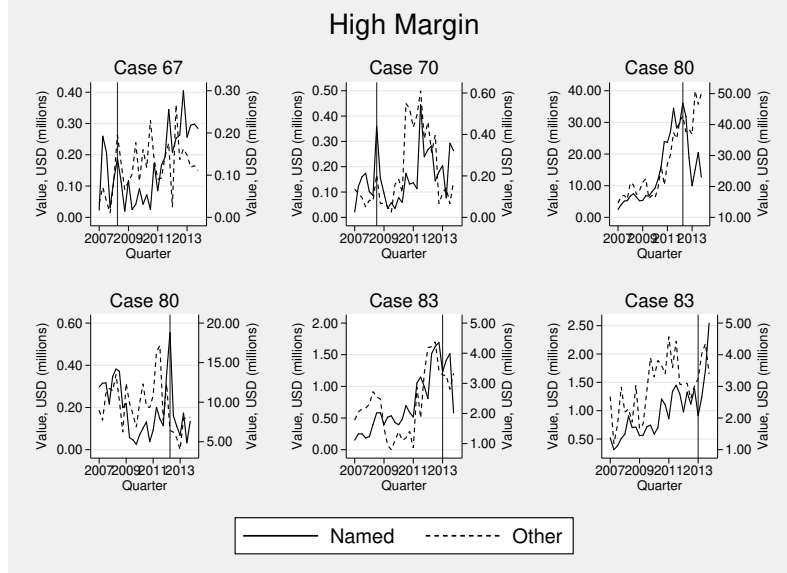


Figure 6: Value adjustment following initiation of an antidumping case for imports of products under investigation from named countries (left axis) compared to imports from non-named countries (right axis). Vertical lines indicate the time of initiation.

panel structure of the data, fixed effects for country-product imports control for additional unobservables. Even with these fixed effects, endogeneity concerns remain.

To address these concerns and determine the effects of antidumping protection on imports (in terms of sales, quantities, and unit prices) of protected products, I create two counterfactual groups for comparison. The treatment group contains products that have had an antidumping investigation result in an affirmative decision between 2007 and 2013 in Colombia.⁶ The first control group is comprised of products with the same first 4 digits in their HS codes as products that are in the treatment group but have not themselves been the subject of a previous investigation.⁷

⁶In Colombia, only one government agency handles antidumping cases. If they conclude that dumping occurred, then they set a price undertaking if they believe the dumping harmed the domestic injury. If no causality is established between domestic injury and the dumping prices, then despite the affirmative findings, no price undertakings are set. Causality is determined through tests of how domestic prices and profits are affected by imports. For example, if, in spite of lower priced imports, import-competing firms raise their prices without losing market share, then the investigating board may conclude that any injury in the domestic industry was not caused by low-priced (dumped) imports. I consider cases with an “affirmative” decision, whether or not a price undertaking was put into place, to be treated because of Staiger and Wolak (1994), which found most of the effects of antidumping duties occur during the investigation stages.

⁷Lu et al. (2013) use a similar design with products sharing the first same HS-4 digits as those in the treatment group since their data is at the HS-6 digit level. As a robustness check, they run their main regressions with interactions between the key explanatory variables and the number of HS-10 products in

The second control group takes into account the likelihood of an investigation, similar to Blonigen and Park (2004). Using a logit model, I estimate the probability that a product has a petition filed, given the characteristics of products that have been investigated in the past.

$$P_{it} = \beta_0 + \beta_1 imp_pen_{it-1} + \beta_2 imp_pen_{it-1}^2 + \beta_3 GDP_{it} + \beta_4 exr_{it} \\ + \beta_5 emp_{it-1} + \beta_6 prior_ad_{it} + \alpha_j + \delta_k + u_{it}$$

$$P_{it} = \begin{cases} 1 & \text{if product is investigated} \\ 0 & \text{otherwise} \end{cases}$$

The right hand side variables include: a one quarter lag of import penetration (the total imported value of goods in an aggregated industry⁸ as a share of domestic demand in that Colombian industry) and import penetration squared, Colombian GDP growth, an exchange rate index, lagged industry employment index to account for the importance of the sector in the Colombian economy, an indicator if the product experienced a prior investigation, HS-2 digit product fixed effects, and country of origin fixed effects. Only observations of goods subject to investigation from before initiation are included since an antidumping investigation may alter the trade volume or industry characteristics. The logit specification is repeated for each antidumping case separately so that the “similar” products can be mapped to the related case. Table 1 shows the results from the logits with country-product level observations. In seven out of ten cases, at least one of two conditions is satisfied: (i) either the coefficient on lagged import penetration is positive and the coefficient on the squared term is negative (and both are statistically significant); or (ii) the coefficient on the lagged employment index is positive and significant. The former indicates that products with higher import penetration ratios are more likely to file for protection up to a point; at some point, the

each HS-6 category and conclude that there is no real effect from the aggregation.

⁸aggregations are based on important sectors of activity in the Colombian economy and are not conveniently mapped into international categories

Colombian economy relies heavily on imports (or perhaps there is no import-competition to file a petition) and the probability of filing a petition decreases. In the latter case, a higher employment index means the industry hires more workers, and a petition for protection is more likely to occur. Products with probabilities within the 75th percentile of products in the treatment comprise the second control group.

Using these two control groups, I run two difference in differences models with time, country, and country-product fixed effects as described above, along with controls for the treatment group before the start of an investigation, during the initial investigation stage, between the preliminary decision and final decision, and after the final decision (controlling separately for the first eight quarters and following the first eight quarters).

$$Volume_{it} = \beta_0 + \beta_1 Pre_{it} + \beta_2 Init_{it} + \beta_3 Prelim_{it} + \beta_4 Final_{it} \\ + \beta_5 TwoYears_{it} + \alpha_t + \delta_i + \eta_{exp} + u_{it}$$

$Volume_{it}$ can be FOB value, quantity, unit value (value divided by quantity), and the number of exporting firms from the country of origin of the product, and is logged.

First, I consider the effects at the country-product, or variety, level. Table 2 quantifies the differences between the named varieties and non-named varieties from Figures 1-6 by limiting the sample to only those varieties. This helps to establish stylized facts about the products that are named: import sales revenues and quantities from named varieties are 38.2% and 47.5% higher than non-named varieties before the initiation of a petition, although the price may be similar: the coefficient in column 3 of Table 2 is negative, indicating named varieties have a lower price than non-named varieties, but the coefficient is not statistically significantly different from zero. Named countries also tend to have 17.6% more exporters than non-named countries, from column 4. While the differences persist between the filing of a petition and the preliminary decision, the differences for sales and quantities imported disappear between the preliminary decision and the two year period following

Table 1: Likelihood of Initiating a Case, by Antidumping Case

VARIABLES	(1) Case 65	(2) Case 67	(3) Case 70	(4) Case 71	(5) Case 74	(6) Case 75	(7) Case 78	(8) Case 80	(9) Case 83	(10) Case 86
ImportPenetration	4.378** (2.184)	3.265 (2.745)	2.824* (1.443)	1.109 (1.074)	-0.00900 (0.0986)	0.128 (0.118)	-0.285*** (0.0591)	0.282* (0.168)	0.212* (0.109)	-0.0914 (0.226)
ImportPenetrationSq	-0.0258** (0.0127)	-0.0193 (0.0159)	-0.0169** (0.00845)	-0.0159 (0.0124)	-5.54e-05 (0.000446)	-0.000278 (0.000231)	0.00162*** (0.000326)	-0.00271* (0.00142)	-0.00195** (0.000860)	0.000519 (0.00121)
GDP_Growth	-0.0595 (0.472)	0.123 (0.705)	0.253 (0.461)	0.186 (0.274)	-0.0788 (0.380)	-0.173 (0.506)	0.110 (0.0991)	0.0161 (0.209)	-0.167 (0.162)	-0.232 (0.312)
ExchangeIndex	0.0535 (0.0609)	0.0291 (0.0833)	0.0145 (0.0616)	0.0629 (0.0621)	0.0673 (0.0417)	0.0523 (0.0521)	-0.0838*** (0.0144)	-0.0157 (0.0232)	-0.0192 (0.0175)	-0.0336 (0.0421)
Employment	-0.0657 (0.0785)	0.0155 (0.169)	0.0707 (0.110)	1.052* (0.540)	0.223*** (0.0712)	0.0441 (0.0497)	0.0867*** (0.00747)	0.0751 (0.0604)	0.0177 (0.0398)	0.0502 (0.0406)
Constant	-186.8** (90.33)	-146.6 (109.6)	-131.0** (57.03)	-131.2* (72.04)	-36.36*** (10.35)	-24.77 (17.87)	7.660** (3.011)	-16.53** (7.612)	-9.303* (5.225)	-2.512 (11.77)
Observations	2,888	1,064	2,132	2,731	2,888	64	1,201	1,897	4,695	1,111
PseudoR2	0.219	0.195	0.209	0.215	0.181	0.425	0.157	0.0529	0.0873	0.0170

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

the final decision, which would mean the remedies are potentially accomplishing what they should accomplish.⁹ However, this effect is not persistent; differences reemerge to a larger degree after the two year period passes, surging to 73.9% more sales revenues for named varieties than non-named varieties, and 83% higher quantities, suggesting that antidumping remedies are only temporarily effective. With this basic definition of control and treatment groups, there are many identification concerns. In particular, treatment is still endogenous, and the treatment of certain varieties almost certainly affects imports of untreated varieties. The next sets of regressions will address the complementarities between varieties.

Tables 3 and 4 show the results when using the previously defined control groups, where Control 1 is comprised of products under the same HS 4-digit code (excluding the non-named varieties with the same product code) and Control 2 is comprised of products likely to be under antidumping investigation. The effects are qualitatively similar between the two control groups. The same stylized facts generally hold: treated varieties are imported at higher volumes with lower prices and more exporting firms. These patterns are diminished after the preliminary decision, but return following eight quarters after the final decision. One variable that does see a more persistent, though not statistically significant, change is unit value, which steadily increases over the course of an investigation for products in the treatment group. Importantly, the variable *TreatmentPre* indicates differences in trends between the treatment group and control group in the year leading up to the initiation of an antidumping case. For identification purposes to consider treatment effects of antidumping investigations, it is imperative that this variable is not significant- that is, the treatment and control groups are experiencing the same trends before the investigation period. Notably, when the regression uses levels of variables, it becomes obvious (as one might expect) that the treatment and control groups do not satisfy this assumption. Tables 5 and 6 use differences in variables and satisfy the same pre-treatment trend assumption.

⁹At this point, it is unclear what happens to overall imports and how the domestic market might be affected; all this information can say is that after the preliminary decision, there is zero statistically significant difference between named and non-named varieties.

VARIABLES	(1) Value	(2) Quantity	(3) Price	(4) Number of exporters
Before treatment	0.382** (0.154)	0.475** (0.180)	-0.0912 (0.0663)	0.176** (0.0727)
Initiated	0.423* (0.230)	0.500** (0.221)	-0.0745 (0.137)	0.180* (0.0880)
Preliminary	0.176 (0.156)	0.208 (0.178)	-0.0290 (0.0839)	0.232*** (0.0638)
Final	0.386 (0.261)	0.418 (0.302)	-0.0299 (0.0932)	0.277** (0.111)
After two years	0.739*** (0.207)	0.830*** (0.251)	-0.0868 (0.118)	0.280*** (0.0694)
Constant	9.728*** (0.116)	7.328*** (0.145)	2.399*** (0.0546)	0.845*** (0.0250)
Observations	7,209	7,216	7,209	7,216
Number of varieties	663	664	663	664
Country Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Country-Product FE	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2: Country-Product Imports: Named varieties and Non-named Varieties of Same Products. Dependent variables are logged. Right hand side variables are indicator variables interacted with the treatment group. The times are: before a case is initiated, between initiation and the preliminary decision, between the preliminary decision and the final decision, the first eight quarters following the final decision, and later than the first eight quarters.

VARIABLES	(1) Value	(2) Quantity	(3) Price	(4) Number of exporters
Before treatment	0.385** (0.156)	0.493*** (0.174)	-0.109* (0.0599)	0.136** (0.0674)
Initiated	0.420* (0.227)	0.434** (0.213)	-0.0135 (0.131)	0.128 (0.0796)
Preliminary	0.133 (0.158)	0.102 (0.186)	0.0314 (0.0850)	0.165*** (0.0542)
Final	0.366 (0.246)	0.359 (0.290)	0.00663 (0.0947)	0.197** (0.0989)
After two years	0.669*** (0.226)	0.619** (0.248)	0.0488 (0.118)	0.156 (0.0951)
Constant	8.847*** (0.0699)	6.523*** (0.0809)	2.324*** (0.0374)	0.693*** (0.0237)
Observations	28,351	28,360	28,351	28,360
Number of varieties	3,000	3,003	3,000	3,003
Country Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Country-Product FE	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3: Country-Product Imports: Control Group 1 Dependent variables are logged. See caption of Table 2 for definition of right hand side variables.

VARIABLES	(1) Value	(2) Quantity	(3) Price	(4) Number of exporters
Before treatment	0.233 (0.148)	0.343** (0.169)	-0.110* (0.0599)	0.0446 (0.0631)
Initiated	0.161 (0.232)	0.216 (0.210)	-0.0551 (0.121)	-0.00811 (0.0839)
Preliminary	-0.163 (0.161)	-0.172 (0.191)	0.00881 (0.0883)	-0.00991 (0.0543)
Final	-0.0220 (0.245)	-0.0325 (0.293)	0.0105 (0.0957)	-0.0261 (0.0994)
After two years	0.0664 (0.216)	0.0520 (0.241)	0.0144 (0.114)	-0.196** (0.0913)
Constant	10.11*** (0.0604)	9.291*** (0.0722)	0.815*** (0.0403)	1.612*** (0.0198)
Observations	16,534	16,534	16,534	16,534
Number of varieties	710	710	710	710
Country Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Country-Product FE	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4: Country-Product Imports: Control Group 2 Dependent variables are logged. See caption of Table 2 for definition of right hand side variables.

These data show a statistically significant decrease in the change in expenditures (column 1 in each of Tables 5 and 6) from an antidumping investigation in the period between a preliminary decision and final decision, a time when preliminary duties are in place. Treated products saw a 22.2% decline in import sales when compared to Control 1 (same HS4 codes). Other time periods do not see a significant difference between the control groups and treatment groups. Treated products also saw a 33.7% decline in quantities imported relative to similar products during the investigation stage (column 2). These effects are summarized by the change in unit value: an 11.4% increase in unit value (column 3) relative to similar products.

Trade diversion and price adjustments are likely the reasons there are very little labor market effects found in Colombia. Even if the countries named in investigations export less, other suppliers fill in the gaps, leading to no reallocation of resources domestically. However, that is not to say there is zero impact of antidumping. Column 4 of the regression results counts the number of exporting firms by country for each variety. The number of exporters is consistently smaller for treated varieties after final stage of an investigation; it appears that antidumping investigations can reduce the extensive margin in terms of the number of foreign competitors. The next section explores the extent of the effect on the extensive margin.

3.1 Firm Exit

For firms that sold the products under investigation before the investigation began, I examined their probability of exiting the market after the investigation concludes using a probit model for firm i .

$$\begin{aligned} Pr(Exit_i = 1|X_i) = & \Phi(\beta_0 + \beta_1 \ln_average_value_i + \beta_2 \ln_num_prods_i \\ & + \beta_3 named_firm_i + \beta_4 named_country_i + \alpha_i + u_i) \end{aligned}$$

VARIABLES	(1) Value	(2) Quantity	(3) Price	(4) Number of exporters
Before treatment	0.0306 (0.0878)	-0.00955 (0.0932)	0.0402 (0.0445)	-0.0474* (0.0280)
Initiated	-0.124 (0.175)	-0.136 (0.217)	0.0117 (0.188)	-0.179* (0.102)
Preliminary	-0.222* (0.118)	-0.337** (0.139)	0.114** (0.0540)	-0.0295 (0.0490)
Final	-0.129 (0.107)	-0.132 (0.141)	0.00309 (0.0525)	-0.102*** (0.0362)
After two years	-0.0687 (0.172)	-0.170 (0.225)	0.101 (0.0801)	-0.0631 (0.0504)
Constant	0.127** (0.0564)	0.161** (0.0721)	-0.0339 (0.0408)	0.0736*** (0.0192)
Observations	20,380	20,380	20,380	20,380
Number of varieties	1,756	1,756	1,756	1,756
Country Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Country-Product FE	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Country-Product Imports: Control Group 1 First differences of logged dependent variables. See caption of Table 2 for definition of right hand side variables.

VARIABLES	(1) Value	(2) Quantity	(3) Price	(4) Number of exporters
Before treatment	0.00745 (0.0861)	-0.0272 (0.0954)	0.0347 (0.0456)	-0.0528* (0.0283)
Initiated	-0.131 (0.177)	-0.123 (0.216)	-0.00789 (0.189)	-0.159 (0.102)
Preliminary	-0.263** (0.112)	-0.398*** (0.134)	0.135*** (0.0513)	-0.0483 (0.0480)
Final	-0.167 (0.106)	-0.198 (0.141)	0.0305 (0.0525)	-0.120*** (0.0367)
After two years	-0.123 (0.169)	-0.253 (0.223)	0.130* (0.0785)	-0.0837* (0.0508)
Constant	0.104 (0.0708)	0.304*** (0.0877)	-0.199*** (0.0521)	0.125*** (0.0242)
Observations	14,781	14,781	14,781	14,781
Number of varieties	709	709	709	709
Country Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Country-Product FE	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6: Country-Product Imports: Control Group 2 First differences of logged dependent variables. See caption of Table 2 for definition of right hand side variables.

$\ln_average_value_i$ is the logged average exports to Colombia each quarter by a firm, and $\ln_num_prods_i$ is the logged number of products exported to Colombia by a firm. The former variable measures the size of a firm; the latter measures potential substitutes. The model also takes into account whether the firm was named in an investigation and if the firm is located in a named country. Finally, the model includes HS 2-digit fixed effects. The results are in Table 7. Firms whose average exports to Colombia are higher are less likely to exit, as are firms that produce more products. These may be larger firms that can absorb the impacts of the investigation better, or firms that may reallocate their resources to produce alternative products. However, firms that are named in the investigations are more likely to exit than other firms from the same country that were not named or from other non-named countries. This suggests that antidumping protection may be more effective as a retaliatory tool against certain competitors rather than a tool to reduce overall import-competition.

4 Conclusion

Using alternative control groups in a treatment effects analysis, this paper seeks to understand the effect of antidumping remedies in Colombia on imports of affected products. First, stylized facts demonstrate that varieties with an affirmative decision tend to have higher levels of imports than the same products from other countries at slightly lower prices. Second, comparisons with two control groups reveal that antidumping remedies only appear to reduce imports during the time between a preliminary decision and the first two years following an affirmative decision, demonstrating a lack of persistence. Third, prices of named varieties appear to increase slightly (although not necessarily statistically significantly). Fourth, antidumping remedies may contribute to firms exiting the marketing, primarily smaller firms with fewer products, and from named countries.

Applying these results to the companion paper on employment in Colombia, it appears that there is little visible reallocation of labor across industries in part because of the tem-

Table 7: Likelihood of Firm Exit, given entered before petition

VARIABLES	(1) Exit	(2) Exit	(3) Exit
log(average export value)	-0.101*** (0.00576)	-0.155*** (0.00645)	-0.158*** (0.00650)
log(number of products)		-0.339*** (0.0103)	-0.345*** (0.0105)
Named firm			0.528** (0.257)
Named country			0.211*** (0.0410)
Constant	1.298*** (0.0749)	3.029*** (0.0989)	2.958*** (0.0998)
Observations	10,544	10,544	10,544
2-Digit Fixed Effects	Yes	Yes	Yes

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

porary effects of the antidumping remedies and because of the minimal change in overall imports. Foreign exporters from named countries slightly adjust their prices to comply with price undertakings. An interesting line of questioning regarding welfare may then be whether a price undertaking is less distortionary than an antidumping duty.

5 Appendix

5.1 Calculation of the Exchange Rate Index

The exchange rate index for quarter t , I_t , is as follows.

$$I_t = I_{t-1} * \prod_{j=1}^{N(t)} (e_{j,t}/e_{j,t-1})^{w_{j,t}}$$

where $e_{j,t}$ is the price of a Colombian peso in terms of currency j

$w_{j,t}$ is the weight of currency j

$N(t)$ is the number of foreign currencies in index

$$\sum_{j=1}^{N(t)} w_{j,t} = 1$$

The weight of a currency j in quarter t depends on the competition in domestic and foreign markets.

$$w_{j,t} = \frac{1}{2}\mu_{COL,j,t} + \frac{1}{2}\varepsilon_{COL,j,t}$$

$$\text{where } \mu_{COL,j,t} = \frac{M_{COL,j,t}}{\sum_{j=1}^{N(t)} M_{COL,j,t}}$$

$M_{COL,j,t}$ are imports from j to Colombia

$$\varepsilon_{COL,j,t} = \frac{X_{COL,j,t}}{\sum_{j=1}^{N(t)} X_{COL,j,t}}$$

$X_{COL,j,t}$ are exports from Colombia to j

5.2 Colombia Antidumping Cases

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Table 8: Colombian Antidumping Cases Initiated after January 1, 2007

Case ID	Country Named	Product HS	Product Description	Initiation Date	Preliminary Decision	Decision Date
64	CHN	6107110000 6107120000	Men's Undergarments	6/2007	Affirmative	10/2007
65	CHN	7318159000	Bolts	6/2008	Affirmative	8/2008
66	CHN	7318160000	Nuts	6/2008	Affirmative	8/2008
67	CHN	8305200000	Staples in Strips	6/2008	Affirmative	9/2008
68	CHN	8546200000 8547109000	Electrical Insulators	6/2008	Affirmative	10/2008
69	CHN	8201100000	Spades and Shovels	9/2008	Affirmative	12/2008
70	CHN	8201300000	Hoes/ Digging Bars/ Picks	9/2008	Affirmative	12/2008
71	BRA	4012904100	Tire Rubber Bands	12/2008	Affirmative	4/2009
72	MEX	same as Case 71		12/2008	Affirmative	4/2009
73	CHN	8509401000	Blenders	2/2009	Affirmative	6/2009
74	CHN	7304290000 7306290000	Iron or Steel Tubes and Pipes	8/2009	Affirmative	12/2009
75	CHN	same as Case 73		10/2009	Affirmative	1/2010
76	BRA	7213911000 7213919000 7227900010	Low Carbon Steel Bars and Rods	1/2010	Bypassed	
77	MEX	same as Case 76		1/2010	Bypassed	
78	CHN	7604210000 7604291000 7604292000 7608109000 7608200000 7606929000 7606923000 7606919000 7606110000	Extruded Aluminum Profiles	8/2011	Affirmative	9/2011
79	VEN	same as Case 78		8/2011	Affirmative	9/2011
80	CHN	4011201000 4011209000	Tires for Trucks and Buses	6/2012	Partial	8/2012
81	CHN	Included first 5 products of Case 78, excluded last 4	Extruded Aluminum Profiles	3/2013	Affirmative	4/2013
82	VEN	same as Case 81		3/2013	Affirmative	4/2013
83	CHN	3920430000	Flexible PVC Film	3/2013	Affirmative	5/2013
84	CHN	3920490000	Rigid PVC Film	3/2013	Negative	5/2013
85	KOR	same as Case 84		3/2013	Negative	5/2013
86	CHN	7210490000	Galvanized Steel Sheets	4/2013	Affirmative	7/2013

Table 9: Colombian Antidumping Cases Initiated after January 1, 2007

Case ID	Final Decision	Final Decision Date	Duty	Dumping Margin	Notes
64	Withdrawn	12/2007			
65	Affirmative	2/2009	Diff btwn US\$1.31/kg and price	46.63	
66	Negative	2/2009			
67	Affirmative	4/2009	Diff btwn US\$1.66/kg and price	204.01	
68	Negative	7/2009			
69	Negative	6/2009			
70	Affirmative	6/2009	Diff btwn US\$1.32/kg and price	235.99	
71	Affirmative	11/2009			No causality; no duty
72	Affirmative	11/2009			No causality; no duty
73	Withdrawn	8/2009			
74	Affirmative	8/2010			No causality; no duty
75	Affirmative	7/2010			No causality; no duty
76	Withdrawn	4/2010			
77	Withdrawn	4/2010			
78	Affirmative	7/2012			No causality; no duty
79	Affirmative	7/2012			No causality; no duty
80	Partial	6/2013	Diff btwn US\$5.37/kg and price	423.77	
81	Affirmative	11/2013	Diff btwn US\$3.60/kg and price	89.74	
82	Affirmative	11/2013	Diff btwn US\$3.72/kg and price	555.33	
83	Affirmative	9/2013	Diff btwn US\$3.21/kg and price	211.52	
84	Affirmative	9/2013	Diff btwn US\$3.29/kg and price	156.12	
85	Affirmative	9/2013	Diff btwn US\$3.18/kg and price	111.18	
86	Affirmative	2/2014	Diff btwn US\$824.57/ton and price	48.97	

Case	Domestic Firms	Foreign Firms
64	PRIMSA S.A. Vestimundo S.A.	
65	Fábrica de Tornillos Gutemberto S.A. Cato S.A. Mundial de Tornillos S.A. Tornillos y Partes Plaza S.A. Redica Ltda. Torhefe S.A. Tornapar Ltda. Ferreteria Barbosa & Cia S. en C.S. Tornirap Ltda.	
66	same as Case 65	
67	Sociedade General Metalica S.A.-GEMA S.A.	
68	Electroporcelana Gamma S.A.	
69	Herramientas Agricolas S.A.-HERRAGO S.A.	Tangshan Rnhe Hardware Tool Co. Ltd. Luannan Guozhu Hardware Tool Manufacturing Co. Ltd.
70	same as Case 69	same as Case 69
71	Automundial S.A.	Borrachas Viapal S.A.
72	same as Case 71	Hules Banda S.A. de C.V.
73	Groupe SEB Colombia S.A.	
74	Tubos del Caribe Ltda.-TUBOCARIBE	
75	same as Case 73	
76	Acerias Paz del Rio S.A.	
77	same as Case 76	
78	Aluminio Nacional-ALUMINA Aluminio Reynolds Santo Domingo Empresa Metalmecánica de Aluminio-EMMA y Cia S.A.	All firms
79	same as Case 78	Extrusión de Aluminio C.A.-EXTRUDAL Flamingo Aldoca Alreyven CVG Alcasa
80	GoodYear de Colombia S.A. Industria Colombiana de Llantas S.A.-Icollantas	Giti Tire (Anhui) Co. Ltd. Triangle Tyre Co. Ltd. Shandong Wanda Boto Tyre Co. Ltd. Quigdao Doublestar Tire Industrial Co. Ltd. Hangzhou Zhongce Rubber Co. Ltd. Aeolus Tire Co. Ltd.
81	Aluminio Nacional- ALUMINA Empresa Metalmecánica de Aluminio-EMMA y Cia S.A.	
82	same as Case 81	
83	Filmtex S.A.S.	
84	same as Case 83	
85	same as Case 83	
86	Acesco S.A.S.	Tangshan Iron and Steel Group

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