Trade Protection and Market Power: Evidence from US Antidumping and Countervailing duties

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Discussion Paper 2010-43

Institut de Recherches Économiques et Sociales
de l'Université catholique de Louvain

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[Version November 2010]

Abstract

This paper uses a long panel of US 4-digit industries to analyse the impact of US Antidumping (AD) and Countervailing duties (CVD) on domestic producers' price-cost margins (PCM). In the analysis I account for selection bias in the imposition of AD/CVD as well as the intensity of the protection granted. I find evidence of a positive effect of AD/CVD on PCM. However, the point estimates are small suggesting that whilst the effects of these policies on the market of the products directly affected may be important, their sector level effects are modest.

Keywords: Antidumping, Countervailing duties, Import tariffs, Markup, Price-cost margin, Trade diversion, Competition

JEL Classifications: C33, D21, D43, F12, F13

The author especially thanks Hylke Vandenbussche and members of the International Economics Group at UCLouvain and KULeuven. This paper benefited also from comments by Ron Davies, Gilles Duranton, Joseph Francois, Holger Görg, Beata Javorcik, James Markusen, Fabio Mariani, Peter Neary, Mark Roberts, Maurizio Zanardi, Emanuele Forlani, Joel T. Strange, Ilke Vanbeveren and Ziga Zarnic. I also thank members of the Economic Research and Statistics Division at World Trade Organization, as well as participants of 2008 ETSG meeting in Warsaw, Poland, the 2009 Brixen Summer School in Italy and the 2010 RIEF Doctoral meeting in Kiel, Germany. The author is grateful for financial support from PAI grant n°P6/07 and ARC grant n°09/14-019.

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1. Introduction

Given the limitations imposed by the GATT/WTO system on the use of traditional forms of trade restrictions, they have been increasingly substituted by other instruments, particularly contingent protection measures such as Antidumping (AD) and Countervailing duties (CVD). In fact, the use of these instruments, especially AD, increased steadily during the eighties and nineties to the extent that they are today the most popular form of import protection worldwide. Originally, AD/CVD were conceived as instruments to protect domestic producers against competition from what was deemed as "unfairly" cheap imports, either because foreign firms were "dumping" their products in the domestic market in the case of AD, or because they were being subsidized in the case of CVD. However, given the way these policies are designed and implemented, trade literature tends to view them today mostly as industry policies tools aimed at protecting domestic producers in the face increasing import competition (Blonigen & Prusa, Antidumping, 2003; Konings & Vandenbussche, 2005). For this reason, it is key to evaluate the effects of these polices on domestic markets, particularly on competition. In this paper, I contribute to this debate by studying the impact of AD/CVD on domestic producers' market power. In particular, I analyse the changes in observable price-cost margins (*PCM*) in industries where AD/CVD are in place.

At first glance, AD/CVD are just another form of import tariffs. The effect of tariffs on domestic prices has been widely studied by trade theorist: import tariffs increase prices (Helpman & Krugman, 1989). Under general assumptions, in imperfectly competitive markets the same can be said about markups. A tariff on imports has an anticompetitive effect on the market, which decreases the elasticity of demand for the domestic product, allowing domestic firms to raise markups (Feenstra, 2004). Therefore, we will expect to observe an increase in *PCM* following the imposition of AD/CVD.

However, there are opposing forces that can offset these effects. Firstly, unlike other forms of trade restrictions, AD/CVD are imposed against particular importing countries. Therefore, duties may lead not only to a switch between imports and domestic production but also to trade diversion among import sources, limiting the ability of domestic producers to increase markups. Moreover, even if duties allow for large increases in domestic prices, effects on markups may be smaller if suppliers of protected sectors are able to capture part of these rents through increases in input prices (Pierce, 2009). Additionally, as is the case with any form of import restriction, the effects of AD/CVD on competition depend on the degree of contestability of the import competing industries. If the imposition of trade barriers increases entry by new domestic firms or through FDI (tariff jumping) this will also limit the ability of incumbent firms to raise markups (Konings & Vandenbussche, 2005).

I am not the first to analyse empirically the impact of contingent protection on market power. Previous studies have examined this phenomenon using a variety of methods and data, but the evidence remains mixed. Nieberding (1999) is an early reference providing some evidence of increased market power of protected firms. He tests the single difference change in market power of 9 US firms involved in 4 AD petitions resulting in three different outcomes: imposition of duties, termination by authorities and withdrawal by the complainants. He measures market power by means of a structural equation of *PCM* and finds that protected firms present higher market power after the imposition of AD duties. The opposite effect is present for the case where the petition was terminated by the authorities, and the results are ambiguous in the case of withdrawal. Konings & Vandenbussche (2005) study the change in EU firms' markups receiving AD duty protection. They use a panel of firms operating in sectors that received AD protection as well as a randomly drawn control group of firms in sectors not involved in AD. They find a positive effect of AD duties on markups, but they find no effect for sectors where an AD petition has been filed but no duty has been levied. Their results are robust to different methodologies to estimate markups. Blonigen, Liebman & Wilson (2007) study the impact of different trade measures on market power in the US steel industry using product data. In their study only voluntary restraint agreements (quotas) increase markups, while the rest (mostly tariffs, including AD and CVD) have little effect on market power. Finally, Pierce (2009) studies the impact of AD on US plants using a difference-in-difference approach and US Census plant level data. He finds that markups increase with the rate of protection but does not find a statistically significant average effect from the mere presence of AD duties.

The analysis presented in this paper differs from previous studies in several ways. Firstly, as opposed to earlier literature using firm or product level data, I use a panel of 4-digit industries. The use of aggregated data implies that I observe the net effect of AD/CVD on the industry comprising of both the direct effect on the product concerned by the tariff, and the potential indirect effects on other products lines within the sector. by looking at the net effect rather than the direct effect solely, it is possible to have an idea of how relevant these policies are for the industries as a whole. In this sense, the analysis presented in this paper complements what has been done previously and contributes to the literature on contingent protection by studying its effects at a more aggregated level. Also, given the length of the panel, I am able to look at a greater number of cases giving more generality to the analysis. In fact, I consider all AD/CVD petitions involving manufacturing sectors in the US in a period of 15 years. Moreover, unlike previous studies which focus on AD, here I consider both AD and CVD. Talk about these advantages first.

In the analysis presented in this paper, I use information on AD/CVD petitions filed in the US between 1980 and 1994, coming from the Global Antidumping Database (Brandeis University and World Bank). I chose this period of analysis since substantial changes were introduced to AD/CVD laws both in 1979 and 1995. I approximate markups by means of observed price-cost margins (*PCM*) as discussed by Tybout (2003), using 4-digit-sector-level data from 383 manufacturing industries, 91 of which received AD/CVD protection in the period. An important advantage of these industry data is that is annual, allowing the study of the changes in markups in a more dynamic setting and the use econometric techniques that take advantage of these dynamics. In my analysis, I use alternative specifications to capture the intensity of AD/CVD protection, including the number of duties in place, the share of product lines and trade flows affected and the level of duties. To account for potential endogeneity in AD/CVD I used two methods, instrumental variables and propensity score matching. I find evidence of a positive effect of AD/CVD on *PCM*. However, the low magnitude of the point estimates compared to the average industry *PCM*, as well as estimates from previous studies using more disaggregated data, suggests that the effects of these policies are rather limited in the aggregate. I also test for the presence of non-duty effects but obtain no statistically significant results.

The paper is organized as follows. In the next section, I present a brief description of US legislation on AD and CVD. In section 3, I describe the data and empirical methodology. In section 4, I present the results. In section 5, I conclude.

2. Overview of US legislation on Antidumping and Countervailing Duties

WTO rules allow member countries to use tariffs or quotas through two exceptions, "escape clause" and "Antidumping and Countervailing duties". In particular, AD/CVD are allowed under Article VI, which was incorporated into Title VII of US Trade Laws.

Consider first AD law. According US legislation, for AD duties to be imposed two criteria must be met: 1) the importing country must sell its product in the US market at "less than fair value", which means it charges a lower price than in its own home market or that is less than average cost of production; and 2) there must be "material injury" to the domestic industry, which is defined as "harm that is not inconsequential, immaterial, or unimportant".

Investigations are initiated following a request by domestic producers in the concerned industry and are carried out by two independent institutions: International Trade Commission (ITC) and the International Trade Administration of Department of Commerce (DOC). The ITC determines whether there is "material injury" to the domestic firm, while the DOC is in charge of establishing if the imported goods are sold in the US market by "less than fair value", and calculating the "dumping margin” and duties to be imposed.

The procedure is repeated in two phases of investigation, a preliminary ruling by both institutions, where preliminary duties can be granted, and a final decision. With the exception of the preliminary ruling by the DOC, if a negative decision is taken by either DOC or ITC, the case is terminated in both agencies. Apart from the two mentioned outcomes (imposition of duties and termination of cases), AD petitions may have two additional results. After an affirmative ruling by DOC and ITC, and in order to avoid the imposition of duties, foreign producers may agree to a suspension agreement, by which they consent to maintain a minimum price and limit their sales in the domestic market. Also, cases may be withdrawn by the petitioner.

The procedure leading to CVD is similar to AD, except that the DOC instead of looking for dumping, evaluates whether the foreign country is subsidising its exporters. Also, until 1995 no evidence of “material injury” was necessary if the country being targeted had not signed the Tokyo Round’s Subsidy Agreement.

AD/CVD laws were substantially modified by the Trade Act of 1979, and later amended by the Uruguay Round Agreements Act in 1995, which among other things, established "sunset reviews" to determine if AD/CVD orders should be revoked after five years. For these reason I chose to work with AD/CVD cases ranging from 1980 to 1994. The Trade and Tariff Act of 1984 also introduced several changes to the law, such as "cumulation" of imports from different sources in ITC's material injury determination. However, these amendments, while substantive, are not relevant for issues studied here.

Figure 1 presents the evolution of the number of AD/CVD petitions in the US between 1980 and 1995 involving manufacturing industries (97% of total petitions). There is a sharp increase in the number of both AD and CVD petitions from 1982 onwards, however as the decade advances there is a clear tendency to prefer the use of AD to CVD. The share of petitions resulting in duties has increased also from 30% in 1980-1981 to 56% in 1994-1995 in the case of AD, and from 6% to 44% in the case of CVD. This difference in the share of affirmative decisions between AD and CVD at the beginning of the period may explain the higher AD activity found the following years. However, comparing petition outcomes in the whole period (figure 2), I find that for both AD and CVD petitions, the share of affirmative rulings is of almost 50% (imposition of duties plus suspension agreements), while around 42% cases were rejected. The remaining 17% petitions were withdrawn by petitioners.

3. Methodology and data

3.1. Data[1]

The industry data used in this paper comes from the NBER-CES Manufacturing Industry Database[2]. It contains sector-level data ranging from 1958 to 1996 on output, sales, employment, payroll and other input costs, investment and capital stocks. Industries are classified under 4-digit Standard Industry Classification (SIC) version 1987. Additional information on industry imports and exports was obtained from the U.S. Imports and Exports by 4-digit SIC Industry Database from NBER and The Center for International Data at the University of California, Davis[3]. It includes information on value of imports, exports and industry shipments, ranging from 1958 to 1994 of industries classified by their 1972 4-digit SIC code. A concordance table between the 1972 and 1987 versions, also available from NBER, was used to merge the two datasets.

The information on AD/CVD petitions comes from Global Antidumping Database (version 3.0, June 2007), funded by Brandeis University and the World Bank[4]. For the particular case of the US, it provides detailed information on AD/CVD cases from 1979 to 2005, including product descriptions, domestic and foreign firms involved in each case,

[1] See the data appendix for a more detailed description.
[2] Available at http://www.nber.org/nberces/nbprod96.htm. See Bartelsman (1996) for a description of the data.
[3] Available at http://www.nber.org/pub/feenstra/.
[4] The latest version of this database is available at the World Bank website (http://www.worldbank.org/) as part of the Temporary Trade Barriers database. See Bown (2007) for a description.

relevant dates (initiation, decisions, imposition of duties, revocations) as well as outcomes. Products are classified using the Tariff Schedule for The United States (TS) for cases initiated before 1989, and the Harmonized Commodity Description and Coding System (HS) for petitions initiated after 1989. In this study I consider all AD/CVD cases filed between 1980 and 1995 concerning manufacturing industries (figure 2). They are a total of 735 AD and 408 CVD petitions, of which 292 (40%) and 127 (31%) respectively ended in the imposition of import tariffs.

At this point I should clarify what I mean by "case". Domestic industries seeking AD/CVD protection may (and usually do) file petitions against various countries in the same product. In these instances, different case files are initiated for each named source. Although the impact of these countries' imports can be "cumulated" in the evaluation of material injury, dumping margins are calculated separately. In consequence, outcomes may differ. In fact, protection may be granted against one import source but not others. Also, even when duties are levied against various sources, the rates of duties usually differs from one named country to the other. For that reason, I will follow Sabry (2000) and consider an AD/CVD case or petition as a country-product pair. The same applies when referring to the number of duties.

In order to merge AD/CVD and manufacturing data, the relevant 4-digit industry SIC code had to be assigned for each AD/CVD case. This was done through a careful case by case analysis using information on TS/HS codes reported in the AD/CVD case, product descriptions and information on firms. A detailed explanation of this procedure is presented in the data appendix. I follow Staiger *et al.* (1994) and do not consider industries which are excluded of concordance tables. From an original sample of 459 industries, 73 industries are dropped. Three additional sectors were excluded due to missing values. The resulting sample contains 383 sectors, including 139 involved in AD/CVD petitions, of which 91 were granted AD/CVD tariff protection at least once between 1980 and 1994.

Table 1 presents a summary of the number of petitions by 2-digit SIC level. There is a great concentration of AD/CVD petitions and duties in metal sectors (SIC 33 and 34), representing around 60% of total AD/CVD activity. This will be taken into account in the empirical analysis below.

3.2. Methodology to estimate markups and basic estimated specification

In this study, I measure markups by means of observable price-cost margins (*PCM*). Rather than estimating price/cost ratios, this method is based on the Lerner index, and is calculated as follows:

$$PCM_{it} = \frac{p_{it}q_{it} - p_{Mit}M_{it} - w_{it}L_{it}}{p_{it}q_{it}} \quad (1)$$

where $p_{it}q_{it}$ are total sales, $p_{Mit}M_{it}$ are total expenditures on materials and $w_{it}L_{it}$ are total expenditures on labour. Assuming unit labour and material costs are linear on output; equation (1) is a monotonic transformation of the Lerner index.

There exist several methods to estimate markups all of which present advantages and disadvantages. The choice among them depends on the nature of the data available and the issue under study. The main advantage of using *PCM* is that it provides a separate estimation for each observation, therefore allowing for variations through time and between sectors. More sophisticated methods, such as the one developed by Roeger (1995) for example, estimate markups as the coefficient in a regression providing a measure of the average markup across time and sectors. Given the aggregated nature of my data and long time span, I opted in favour of flexibility in the measure of markups. Additionally, by using *PCM*, I am able to apply a panel difference-in-difference specification, which allows me to better isolate the effect of AD/CVD through the comparison of protected sectors and non-protected sectors.

The main concern when using *PCM* is that it does not allow disentangling effects on markups from changes in productivity. Therefore, in order to better interpret the results of this paper, it is important to have an idea of how productivity may be affected in the presence on AD/CVD. As discussed by Pierce (2009), the effect of contingent protection on productivity is *a priori* ambiguous. On the one hand, an extensive body of both theoretical and empirical literature[5] has shown that trade liberalization has a positive effect on average productivity, either through intra-firm reallocations or with-in firm productivity improvements. In this sense, it would be expected that import restrictions such as AD/CVD would have an adverse impact on average productivity.

On the other hand, dynamic models studying the impact of trade policy on technology adoption, shown that import protection may accelerate the rate of adoption of protected firms increasing their productivity (Miyagiwa & Ohno, 1995; Crowley, 2006). In fact, Konings & Vandenbussche (2008) find that average productivity of European firms improves moderately under AD protection. However, they also find that this increase is driven by low productivity firms that are able to reduce their productivity gap, while high productivity firms experience productivity losses.

For the case of the US, Pierce (2009) finds that revenue based productivity of protected plants increases with AD protection, but for a subsample of firms where he observes quantities, he finds that physical productivity decreases. In view of these results, it is safe to assume that potential increases in average industry *PCM* under AD/CVD protection will reflect to a greater extend changes in markups rather than productivity.

Following Tybout (2003) and Konings & Vandenbussche(2005), I estimate the following equation:

[5] This literature is too expensive to list here but it includes trade models with heterogeneous firms following the seminar papers by Melitz (2003) and Bernard, Eaton, Jensen, & Kortum (2003), as well as a rich body of empirical literature including Pavcnik (2002), Bernard, Jensen, & Schott (2006a) among many others; and more recently studies on the effects of trade on multiproduct firms, most notably Bernard, Redding & Schott (2010).

$$PCM_{it} = \alpha_1 PCM_{it-1} + \beta AD\_CVD_{it} + X_{it}\delta + \alpha_i + \alpha_t + \varepsilon_{it} \quad (2)$$

PCM_{it} is the price-cost margin for sector i in year t as defined in equation (1). AD_CVD_{it} is an indicator of AD/CVD protection. In the basic specification this variable measures the number of AD/CVD in place in sector i in year t. X_{it} is a group of control variables which includes capital intensity (measured as the ratio of capital over sales), import penetration (imports divided by the sum of sales and net imports), and industry level trade weighted tariff schedules (TWTS)[6]. α_i represents industry-fixed effects, α_i are time effects (year dummies) and ε_{it} is the error term. Summary statistics are presented in table 2. Note that given the inclusion of industry fixed effects and year dummies, equation (2) is a panel difference-in-difference specification where sectors not protected by AD/CVD are functioning as counterfactual.

Given its dynamic structure, I estimate equation (2) using the first difference generalized method-of-moments estimator (FDGMM) developed by Arellano & Bond (1991), as well as the system generalized method-of-moments estimator (SGMM) developed by Arellano & Bover (1995) and Blundell & Bond (1998). Both methods control for the presence of the unobserved individual effect α_i and the endogeneity of the lag of the dependent variables and other control variables. However, these methods are not without limitations. The FDGMM estimator can suffer from weak instruments bias if the basis series, in this case *PCM*, is close to a random walk (Bond, 2002). This will manifest in a bias towards zero in the coefficients of the lag dependent variable. However, if the coefficient is not close to unity, FDGMM will be preferable since it makes fewer assumptions than SGMM. Tentative estimations of equation (2) using ordinary least squared and fixed effects suggest great persistence in the *PCM* series, giving ground to believe that this may be a problem in my analysis.

Another problem with these estimators is that their ability to rid endogenous variables of their endogenous component is weakened as the number of instruments increases. This also weakens the Hansen test and hence the possibility of detecting the problem (Roodman, 2006). Given the length of the dataset used in this paper, even when I limit the number of lags used as instruments to the minimum, the number of instruments is still somewhat large. To account for this, I turn to the version of the FDGMM and SGMM developed by Roodman (2006), which allows limiting the number of instruments without losing information by "collapsing" them. Moreover, this method allows me to increase efficiency by adding more lags as instruments without incurring the problems linked to instrument proliferation. Note that since I have industry data since 1958, I can increase efficiency by adding more lags as instrument without losing observations.

Since the aim of this paper is not to model *PCM* but rather estimating the impact of AD/CVD duties on it, in the next section I estimate equation (2) using the alternative

[6] See the data appendix for a more detailed discussion on how these variables were constructed.

specifications and methods discussed and show that the effects of AD/CVD found hold. Although here I will present my preferred results, I experimented with different sets of instruments and verified that results were robust. In all cases, I use the more efficient two-step estimators and calculate standard errors using the Windmeijer (2005) finite sample correction. Results are also robust to estimating equation (2) using the first difference Two-Stage-Least- Squares estimator proposed Anderson & Hsiao (1982), not presented here.

3.3. Controlling for selection bias

As explained in section 2, AD/CVD are the result of a process in which firms request import protection to the competent authorities, who grant it or not on the basis of an investigation where market conditions are evaluated. Therefore, AD/CVD are not exogenously assigned, which implies that estimation of equation (2) is potentially subject to selection bias.

The sign of this bias is *a priori* ambiguous. If a given sector is experiencing a downturn in its performance and lower profits, this may translate in lower *PCM*. Additionally, these sectors may be more likely to file for protection and get an affirmative injury ruling by the ITA. This would imply that direct estimation of equation (2) underestimates the effect of AD/CVD on *PCM*. On the other hand, producers in sectors that are more concentrated may find it easier to coordinate in order to file an AD/CVD petition and lobby for a positive ruling. At the same time, these producers may enjoy higher market power and hence higher *PCM*. This does not constitute a problem for first difference estimations if the degree of concentration does not vary over time. However, if *PCM* is increasing (decreasing), then estimation of equation (2) may overestimating (underestimating) the effect of AD/CVD[7].

In order to deal with the bias associated with selection, I use two alternative approaches: instrumental variables and propensity score matching. The first involves estimating (2) considering AD_CVD as an endogenous variable and adding additional external instruments. To the instruments included in the basic specification, I add employment, percentage change in employment and percentage change in shipments, all lagged two periods, as well as the lags of AD_CVD. The choice of instruments is based on the analysis of the determinants of AD/CVD petitions discussed below.

The second approach involves estimating the difference-in-difference specification in equation (2) on a reduced sample, where affected sectors are compared to a control group selected on the basis of a propensity score matching. The first step in this procedure is to estimate the propensity score, i.e. the probability that a given sector receives AD/CVD

[7] A possible way of addressing this latest concern is to introduce a variable measuring concentration in equation (2). The US Bureau of Census publishes series on various concentration indexes, including the Herfindahl-Hirschman Index for 50 largest companies (HHI) and the share in shipments of the 4, 8, 20 and 50 largest companies. However, these indexes are calculated only every five years, which means that for my sample I only had data for 82, 87 and 92. Therefore, I could not include these variables in the estimation in first differences. Instead, I tried estimating equation (2) with five year differences, using a simple IV method instrumenting with lags of 6 years. Although estimated coefficients where similar in sign and magnitude, they resulted to be not significant. However, this is probably due to the reduced number of observations (from 5736 to 656) which affects the efficiency of the estimators.

protection in a given year. I use two alternative specifications to do so. Firstly, following Konings & Vandenbussche (2008), I estimate a multinomial logit model in which the dependent variable take three possible values: "no AD/CVD petition was filed in the sector, that is, the sector presents no AD/CVD activity in that year", "one or more petitions were filed in the sector but none ended in tariff protection", and "one or more petitions were filed in the sector resulting in tariff protection".

However, for my purposes this specification is not completely satisfactory since it does not take into consideration the different intensity of protection received by each sector. In fact, not only may the presence of AD/CVD be endogenous but also its intensity, resulting in additional bias. For this reason, I use an alternative specification to estimate propensity scores where the dependent variable takes different values on the basis of the number of duties imposed at a given point in time. More precisely, the new dependent variable takes five possible values: "no AD/CVD petition was filed in the sector", "one or more petitions were filed in the sector but none ended in tariff protection", "one petition was filed in the sector resulting in tariff protection", "two to four petitions were filed resulting in tariff protection", and "five or more petitions were filed resulting in duties". These cut-offs were selected on the basis of the distribution of the number of duties in the sample as well as experimentation with different cut-offs, choosing the model that best fit the data. Given the clear ordered nature of this dependent variable, this second model was estimated using an ordered logit specification.

The explanatory variables included in these models were selected following Blonigen & Park (2004) and earlier literature on the determinants of AD/CVD petitions and duties[8]. These variables are the lag of import penetration and its lag squared, the lag of the percentage change in shipments, the lag of employment, the percentage change in employment, the lag of value added per worker and its lag squared, the number of AD/CVD petitions filed in the industry in the three previous years[9], the lag of *PCM*, and US Real GDP growth rate. I also included a dummy variable for metal sectors (2-digit SIC codes 33 and 34).

Results are presented in table 3. Columns (1) and (2) present the results for the second and third outcomes of the multinomial logit, while column (3) presents results for the ordered logit. The base outcome for the multinomial logit is the first (no AD/CVD petitions) and therefore the coefficients presented should be interpreted as representing the comparison of the corresponding outcome to the no-petition case. Since significance tests are sensitive to the choice of base outcome, a joint Wald test was performed for each variable to corroborate significance when lifting the zero-coefficient assumption for the base category.

Most coefficients present the expected sign and are consistent with the previous literature. The probability of both filing and receiving protection increases with import

[8] This includes Hansen (1990), Hansen & Prusa (1996) and (1997), Baldwin & Steagall (1994), Sabry (2000), Knetter & Prusa (2003). For a review of this literature, see Blonigen & Prusa (2003).

[9] I experimented including the number of petitions filed in the sector in the previous 5 years and the results are not changed. I also included the number of AD/CVD imposed in the last 3 and 5 years but obtained insignificant coefficients.

penetration and employment, while it decreases with the percentage change in shipment. This latter finding reflects the fact that industries which are experiencing a downturn are more likely to ask for protection and receive it. Also, past AD/CVD activity is positively correlated with the probability of filing and receiving protection. As for the variable of interest, *PCM*, its coefficient is negative but not significant which would imply that it is not related to the probability of filing and receiving protection. However, in the interest of caution and since its *p-value* is close to 0.1, I chose to leave it in the model so that it is part of the matching procedure.

From the models in table 3, I obtained the predicted probability that a sector receives AD/CVD protection in a given year (outcome "3" for the multinomial logit) or a given level of AD/CVD protection (outcomes "3" to "5" for the ordered logit). On the basis of the propensity scores thus calculated, I apply a nearest neighbour matching with replacement[10] year by year to find sectors that had the closest predicted probability of being protected but that were not[11]. Table 4 presents balancing tests for the two alternative control groups. For all variables and both control groups, I do not reject the null that the means of protected sectors and controls are equal at 5%. This is also confirmed by Hotteling's joint test.

4. Results

4.1. Basic specification

Table 5 presents the results of estimating equation (2) using the alternative methods described above. In columns (1) to (4), I include the estimations of the basic specification on the complete sample using alternatively FDGMM and SGMM. The greater magnitude of the coefficient of the lag of *PCM* in the SGMM estimation (column 3) with respect to that of the FDGMM estimation (column 1) confirms the suspicion regarding the potential bias in the FDGMM estimation. Note that under SGMM even the second lag of the dependent variable is significant. When I collapse instruments, the Hansen test still indicates that the instruments are valid (columns 2 and 4). Moreover, increasing efficiency by adding more lags as instruments does not dramatically change the SGMM estimation, but changes the FDGMM estimation to a level similar to the SGMM coefficient. In the SGMM estimation with collapsed instruments (column 4), the second lag of *PCM* is no longer significant. I decided to leave it since its exclusion tends to cause autocorrelation. None the less, results hold when the second lag is excluded.

Regarding the variable of interest AD_CVD, all methods yield similar results and indicate the presence of a positive and statistically significant effect of AD/CVD on *PCM*. Yet, the coefficient is rather small: an additional AD/CVD tariff increases *PCM* on average by

[10] See Leuven & Sianesi (2003) for details on propensity score matching.

[11] The results presented here were obtained by considering a matched control group drawn from all sectors that did not receive AD/CVD protection, including those that were involved in petitions that did not result in tariffs. The reason to do this is that it allows for better matches to the protected sectors. I also run a matching drawing controls only from sectors not involved in AD/CVD petitions at all. Although the quality of the matching was lower, the main results and conclusions were unaltered.

around 0.08 percentage points, which represents 0.21% of the average *PCM.* However, usually more than one AD/CVD is in place in a given point in time. The average number of tariffs in place (when AD/CVD are present) is 3.29. A change from zero tariffs to this average would imply an increase in *PCM* of 0.26 percentage points (0.7% of average *PCM*). This is still a quite limited impact. For example, Konings & Vandenbussche (2005) find an increase in *PCM* of 4 percentage points following the imposition of AD duties.

One concern regarding these results is the fact that some industries are much heavier users of AD/CVD than others. As table 1 shows, Primary Metals (SIC 33) represent almost 50% of the AD/CVD imposed in the period. Moreover, considering also petitions involving Fabricated Metal Products (SIC 34), metal industries alone represent almost 60% of AD/CVD filings and duties. In view of these numbers, it should be verified whether these industries are not driving the results. To this end, I add the interaction between AD/CVD variables and a dummy indicating whether the 4-digit sector belongs to the 33 and 34 2-digit SIC groups (*AD_CVD * metal*). Results for this alternative specification are presented in column (5)[12].

I find that these sectors are affecting the coefficient of *AD_CVD* not upwards but downwards. In fact, the effect of AD_CVD is now of 0.18 percentage points for non-metal industries, implying an increase of 0.59 percentage points at the average of AD_CVD when tariffs are in place. Although it is more than double the effect found in the basic specification, it is still fairly small[13].

Column (6) presents the results when considering AD_CVD as endogenous in equation (2) and instrumenting for it (SGMM IV). The effect is still positive and significant but of a much smaller magnitude than before. Results using the reduced sample of sectors on the basis of the propensity score matching are presented in columns (7) and (8). The estimated coefficient for AD_CVD is again positive and significant, and falls between the SGMM IV and SGMM estimations. In sum, the basic conclusions are unchanged, except that the estimated effect is smaller implying an increase in *PCM* between 0.07 to 0.14% of average *PCM*.

4.2. Weighting by the number of product lines affected by the duty

When analysing the effects of AD/CVD, especially when using industry aggregated data, it is important to account for the intensity of protection. In the results presented in the previous section, I considered the intensity of protection on one level, the number of importing sources against which the sector is being protected. More than that, I considered the number of country-product pairs in which duties are in place. Another dimension in which protection can differ from one case to the other is the relative importance of the products affected by the duty within the sector.

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[12] Since SGMM is clearly the preferable estimator, I present alternative specifications and robustness checks using this method. However, the main conclusions discussed below hold if I estimate the model using FDGMM.

[13] Another possible explanation for this result is that the relationship between the dependent variable and AD/CVD is non linear. For this reason, I repeated the estimation of equation (2) introducing the square of the corresponding AD/CVD variable but obtained non significant coefficients for the squares, while the levels remained practically unchanged.

Ideally, this would require information on the relative share of the affected products in total production or sales of the 4-digit industry. However, since this data is not available for the period considered, I use an alternative approximation and consider the number of product lines the tariffs applies to and how this compares with the total number of product lines belonging to the industry concerned. More precisely, I calculate the share of the number of TS/HS codes named in the AD/CVD filing relative to the total number of TS/HS codes corresponding to a given 4-digit-SIC.

This share can differ greatly from one case to the other. Firstly, some sectors comprise many more product lines than others. For example, the number of trade codes (TS/HS) corresponding to a given 4-digit-SIC industry can vary between one and almost a thousand codes, with an average of around 40 product lines per sector. Also, the number of codes named in a given AD/CVD petition is on average 12 codes, but can vary from one to over 64 for AD and from one to more than 500 for CVD.

I constructed a new variable (AD_CVD_tshs) in which I weight each AD/CVD case by the ratio of the number of TS/HS codes named in the case to the total number of TS/HS related to the 4-digit-sector[14]. Table 5 shows the results of estimating equation (2) including this new variable. As before, in the first four columns I present the basic results using the complete sample and the alternative estimation methods discussed above. In all cases the coefficient of AD_CVD_tshs is positive and significant and of a larger magnitude than in the previous section.

Given the way the AD_CVD_tshs variable is constructed, interpretation of its coefficient is less straight forward. One possible way to interpret it is to say that if a new AD/CVD were imposed covering all product lines of a given sector, *PCM* would increase on average approximately by 0.44 percentage points (1.78% of average *PCM*). More interesting is to compare the effects at different values of AD_CVD_tshs. At the average level of protection, the effect is 0. 21 percentage points (0.57% of average *PCM*). At the maximum of AD_CVD_tshs, however, *PCM* increases by 4.69 percentage points (12.51% of average *PCM*). As before, I find that changes in average industry *PCM* following the imposition of AD/CVD are rather small except for extremely high levels of protection.

Column (5) presents the results of adding the interaction of AD_CVD_tshs with a metal industries dummy. As in the basic specification presented, I find that the coefficient of the AD/CVD variable is still positive and significant and of a slightly larger magnitude. Additionally, I re-estimate the model instrumenting for AD_CVD_tshs (column 6) and using the matching-constructed sub-samples (columns 7 and 8). The estimated coefficients imply an increase in *PCM* at the average level of protection of 0.09 to 0.17 percentage points (0.25% to 0.46% of average *PCM*), and of 2.08 to 3.83 percentage points (5.54% to 10.23% of average PCM) at the maximum.

[14] To be consistent to what I have done so far and in order not to lose the country-product dimension, I still consider cases involving different countries in the same product line separately. In consequence, AD_CVD_tshs is not a share taking values between 0 and 1, they still correspond the sum of the number of duties/cases, except that now each unit is weighted by the share of codes affected by the duty.

4.3. Considering trade-weighted duties

In the previous section, I presented an alternative specification to account more precisely for the intensity of AD/CVD protection. However, this is not completely satisfactory since some AD/CVD may be affecting greater trade flows than others. Additionally, AD/CVD also differ significantly on the level of the duties imposed, an element that has been neglected so far. In this section, I present an alternative measure of AD/CVD that accounts for these two elements.

To illustrate the first issue, table 7 presents three measures of the relative importance of imports affected by AD/CVD. They were calculated using import data of the year before the initiation of the AD/CVD petition. Firstly, I present the share of imports from named countries in the affected product on total imports of the good. This is a measure of the importance of the targeted source in the market of the specific product. On average, each country targeted by AD/CVD represents around 20% of the import market of the affected product. However, the average hides much heterogeneity among cases, with some having a very small participation while others represent almost a 100% of imports in the product. It is important to bear in mind that table 7 presents separately shares of different countries. In a given moment a greater part of total imports of a particular product may be affected by AD/CVD if simultaneous tariffs are levied against different sources.

The second ratio presented in table 7 is the share of imports of the affected product from all sources on total imports competing with the 4-digit SIC industry. Therefore, this share measures the importance in terms of imports of the affected product relative to other products of the industry. On average, products named in an affirmative AD/CVD petition represent around 17% of total imports of the industry, but it can vary between 0.01% and 100%.

Finally, I combine these two ratios by considering the share of the imports from the named country in the affected product on total imports of the industry, that is, the share of imports directly concerned on all imports competing with the 4-digit SIC industry. This is the third ratio presented in table 7. Affected imports on average represent around 4% of total imports of the industry, ranging from almost zero to 90%.

Regarding the level of the duties imposed, AD/CVD cases can vary significantly too. Table 8 presents descriptive statistics of AD/CVD duty levels. I use information contained in the Global Antidumping database regarding "all other firms'" duties. These are the duties imposed against firms importing the affected product from the targeted country, who have not been named in the case. They are calculated by DOC as the trade weighted average of the firm-specific duties levied against named firms (Gallaway, Blonigen, & Flynn, 1999). As the first part of table 8 shows, the level of duties can vary a great deal from case to case, ranging from a mere 0.02% to almost 260%. Also, AD duties are on average much higher than CVD duties.

I use the import shares described above to calculate two versions of trade-weighted duties. In the first specification, I weight AD/CVD by the share of imports in the affected product on total imports of the 4-digit SIC industry (TWD_{prod}). And in the second, I weight duties by the share of imports from the targeted country in the affected product on total imports of the sector (TWD_{tcty}).

Table 9 presents a summary of the results of estimating equation (2) using these two measures alternatively. The coefficients of both TWD_{prod} and TWD_{tcty} are positive and significant. Results are similar when controlling for endogeneity of AD/CVD as presented in columns (4) to (8). These coefficients are more difficult to interpret since they related to the effect of trade weighted duties that can vary either because the duty imposed is higher or because it is imposed against a country or in a product with higher participation on imports. As an exercise, let us consider the change from zero tariffs to the average trade weighted duties presented in table 8 and the coefficients presented in column (2). The estimated effect of an AD/CVD tariff thus calculated is of 0.04 and 0.06 percentage points for each measure respectively. As discussed above, this only takes into consideration the effect of a single tariff, but in general more than one is in place for a given sector. Considering instead a change from zero to the means of TWD_{prod} and TWD_{tcty} in the sample when tariffs are in place, the estimated effect is of 0.14 and 0.22 percentage points respectively (0.054% and 0.082% of average *PCM*). At the maximum level of TWD_{prod} and TWD_{tcty}, the estimated impact are 5.31 and 3.29 percentage points (14.19% and 8.79% of average *PCM*).

4.4. Non-duty effects of AD/CVD petitions

So far, I have analyzed the effects of AD/CVD following the imposition of import tariffs. However, AD/CVD petitions may also have “non-duty effects”. Staiger *et al.* (1994) study this phenomena for US AD and identify three possible non-duty effects: a "filing effect" (effects caused by the fact that a petition has been filed before any decision is reached), a "suspension effect" (for cases ended in a suspension agreement between the parties) and a "withdrawal effect" (for cases that are withdrawn by petitioners before a decision is made by the authorities).

In the case of AD, the presence of a filing effect is related to the fact that duties are calculated on the basis of the dumping margin, which is the difference between the price charged by the foreign firm in the US market and the prices charged in their home market (except when this is not available and a constructed “fair value” is used). Therefore, foreign producers may in fact reduce the level of the duties or even eliminate them by increasing their prices during the period of the investigation. This would lead to a drop in imports, restricting competition in the market and allowing domestic producers to increase markups.

An additional reason for finding a filing effect in both AD and CVD petitions is the imposition of preliminary duties. As I discussed in section 2, before reaching a final decision, the DOC and ITA announce preliminary rulings. If these are affirmative, the targeted importer must make a cash deposit for each entry equal to the preliminary margin determined by the DOC. This order stays in place until a final decision is reached (Gallaway, Blonigen, & Flynn, 1999).

Suspension agreements exist as a non-duty alternative to the imposition of tariffs in the case of affirmative rulings. They are formal agreements negotiated between the DOC and foreign firms named in the case, in which the foreign producers agree to restrict import volumes and to charge minimum prices. Their implementation is similar to that of a tariff since they are monitored and enforced by the DOC. Also like duties, they can be revoked. Therefore, we would expect them to have a similar effect to those of a duty. However, these agreements are accepted by foreign producers, presumably not only because of the capture of tariff rents by the targeted country, but also because they still allow some market access, which may not be the case if the duty imposed is prohibitively high (Mastel, 1998). In that sense, the effects of a suspension agreement on markups may be lower than that of a duty.

Finally, AD/CVD petitions may be withdrawn by the complainant before the final decision, in which case the investigation is terminated. Since no duties or formal agreements are put into place, one would be tempted to expect these cases to have no effects on competition. However, there is one peculiarity of AD/CVD law that can lead to the opposite. Companies involved in AD/CVD petitions are protected by the Noerr-Pennington doctrine from prosecution under US antitrust law. Although direct conversations between parties regarding prices and quantities are not allowed, agreements can be negotiated through government agencies. Therefore, withdrawals may be the result of collusive agreements between domestic and foreign firms leading to quantity restrictions and higher prices (Prusa, 1992; Zanardi, 2004).

Figure 2 presents the distribution of outcomes in AD/CVD cases in manufacturing industries between 1980 and 1994. Suspension agreements are quite rare, especially in the case of AD. However, withdrawals are much more frequent representing 17% of total petitions.

In order to test for the presence of these effects, I estimated equation (2) introducing variables measuring the number of AD/CVD cases initiated in the industry that year, the number of suspension agreements in place, and the number of cases withdrawn, as well as interaction of these variables with AD_CVD. Table 10 presents the results of estimating equation (2) introducing these variables in two versions, first counting the number of cases and secondly weighting each case by the share of TS/HS codes concerned by the case on the total number of TS/HS codes of the industry.

Most coefficients associated with non-duty effects are insignificant. One exception is the interaction of *AD_CVD* and *Initiations*. This means that when duties are in place, the initiation of new cases tends to increase average *PCM* further. A possible explanation for this finding is that in sectors that have successfully obtained AD/CVD protection before, new initiations work as a signal that further duties may be imposed, making foreign exporters react. Another exception is column (6) where I get a surprising significantly negative withdrawal effect, which goes against the previous intuition.

However, these results should be considered with caution for various reasons. Firstly, AD/CVD investigations take place generally within a few months; initiation, preliminary and final decisions may take place in the same year. This is not a problem in what concerns duty effects, since once imposed they stay in place for several years, but it may affect our ability to pick up non-duty effects using yearly data, especially filing effects, which are more short lived[15]. Also, for the particular case of suspension agreements, given their rareness, it may be the case that this variable simply does not have enough variability to allow me to pick up an effect. More generally, non-duty effects if present, are possibly weaker than duty effects, and hence may not be strong enough to be observed at the 4-digit industry level.

5. Conclusion

In this paper I studied the impact of AD/CVD protection on domestic industries' observable price-cost margins (*PCM*) using US 4-digit sector level data. By using industry data, I was able to analyse the net effect of these policy tools on the affected sector as a whole. Also, due to the length of the panel, I was able to look at all petitions involving manufacturing sectors in the US in a period of 15 years and focus not only on AD but I also include CVD. I used different specifications for AD/CVD in order to account for the intensity of AD/CVD protection, and controlled for potential endogeneity in AD/CVD through instrumental variables and propensity score matching. I found evidence of a positive effect of AD/CVD on domestic producers' *PCM*. However, the point estimates are of a small magnitude suggesting a limited effect on sector level *PCM*, specially compared to what has been found using firm level data from the EU.

There are many possible explanations for this finding. Firstly, trade restrictions may have limited effect on market power if foreign firms are able to "jump" these barriers by moving production to the protected market through FDI. Interestingly, Berbados (1997) finds that AD protection increases the probability of FDI by Japanese electronic both in the EU and in the US, but to a larger extend in the EU. However, a study by Blonigen (2002) covering US AD from 1980 to 1990 finds that the impact of AD on FDI is rather limited and that "tariff-jumping is only a realistic option for multinational firms from industrialized countries".

A more likely explanation is the different degree of trade diversion present in the EU and US. In fact, there is empirical literature that point in this direction. For the case of the US, Prusa (1997) finds evidence of significant trade diversion in the presence of AD restrictions, to the extent that the overall level of trade continues to increase even when imports from named sources decrease sharply. On the other hand, Konings, Vandenbussche, & Springael (2002) find trade diversion to be much more limited in the case of the EU. In view of these results, it seems reasonable to assume that the diverse degree of trade diversion may be playing a role in the smaller impact I am finding on US producers' *PCM*.

Another possibility is the fact that domestic producers may not able to fully enjoy the benefits of protection if their suppliers are able to capture part of these rents through increases in input prices. Pierce (2009) presents evidence that give some support to this idea. In fact, he finds strong effects on unit prices of protected product following the imposition of AD duties, but a much smaller effect on markups. I believe the analysis of the

[15] Moreover, Staiger *et al.* (1994) use monthly data on products affected by US AD and find evidence of both suspension and filing effects. Also, Krup and Pollard (1996) using monthly product data from US Chemical industry find evidence of a filing effect in US AD, though the responses they find are more heterogeneous that what is predicted by previous intuition.

upstream and downstream effects of contingent protection constitutes an interesting avenue for future research.

Finally, as was explained above, the results on this paper concern the net effect of AD/CVD on industries considered as a whole, while AD/CVD are imposed in specific products. Sectors produce a range of products and the imposition of an AD/CVD on a given product line may have indirect effects on other product lines within the same sector. For example, if foreign producers perceive the duty as a signal of protections tendencies with regard to that sector, they may choose to restrict exports in other products in other to avoid future duties (Vandenbussche & Zanardi (2010) present evidence that points in this direction). This would results in higher average markups at the industry level. However, if foreign producers consider the probability of being targeted with additional duties to be sufficiently low, they may substitute sales of targeted products with sales in this other products, resulting in more competition in the market in those markets and therefore offsetting the effect on industry markups. The study of these spillover effects of product-specific trade instruments such as AD and CVD is in my opinion another promising area for future research.

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Table 1: Number of US Antidumping (AD) and Countervailing duties (CVD) petitions involving manufacturing industries between 1980 and 1994, classified by 2-digit SIC code.

		Petitions			Duties		
SIC	Description	AD	CVD	%Total	AD	CVD	% Total
33	Primary Metal Industries	300	247	48%	121	83	49%
28	Chemical and Allied Products	109	29	12%	50	7	14%
34	Fabricated Metal Products	74	32	9%	34	7	10%
35	Industrial Machinery and Equipment	78	12	8%	35	4	9%
22	Textile Mill Products	19	19	3%	3	9	3%
32	Stone, Clay and Glass Products	26	11	3%	3	5	2%
20	Food and Kindred Products	16	18	3%	3	5	2%
36	Electronic and Other Electric Equipment	27	1	2%	18	0	4%
23	Apparel and Other Textile Products	13	11	2%	5	2	2%
30	Rubber and Miscellaneous Plastics Products	16	7	2%	7	2	2%
37	Transport Equipment	16	7	2%	3	1	1%
38	Instruments and Related Products	14	5	2%	3	0	1%
39	Miscellaneous Manufacturing Industries	11	3	1%	4	1	1%
26	Paper and Allied Products	10	0	1%	0	0	0%
24	Lumber and Wood Products	0	5	0%	0	1	0%
27	Printing and Publishing	2	1	0%	2	0	0%
25	Furniture and Fixtures	2	0	0%	0	0	0%
29	Petroleum and Coal Products	2	0	0%	1	0	0%
		735	408	100%	292	127	100%

Table 2: Summary statistics

	Complete Sample			
Variable	Mean	Std. dev.	Min.	Max.
PCM	0.375	0.114	0.022	0.806
Capital Intensity	0.492	0.292	0.057	2.424
Import Penetration	0.147	0.163	0.000	1.850
TWTS	0.055	0.052	0.000	0.442
Percentage change in shipments	4.775	11.528	-53.746	92.759
Employment (in thousands)	40.235	55.504	0.500	473.200
Percentage change in employment	-1.101	9.481	-55.224	150.980
Value added per worker	70.433	56.740	10.230	976.453
AD_CVD	0.419	2.392	0.000	77.000
AD_CVD_{tshs}	0.061	0.460	0.000	10.647
TWD_{prod}	2.621	26.397	0.000	759.621
TWD_{tcty}	0.508	3.354	0.000	59.880
Initiations	0.204	2.404	0.000	126.000
Suspension agreements	0.060	0.496	0.000	11.000
Withdrawals	0.038	1.060	0.000	64.000
$Initiations_{tshs}$	0.029	0.429	0.000	18.611
$Suspension\ agreements_{tshs}$	0.006	0.062	0.000	1.000
$Withdrawals_{tshs}$	0.003	0.107	0.000	7.500
Number of observations	5736			
Number of industries	383			

	Protected sectors			
Variable	Mean	Std. dev.	Min.	Max.
PCM	0.364	0.110	0.074	0.705
Capital Intensity	0.611	0.326	0.107	2.195
Import Penetration	0.176	0.164	0.002	1.145
TWTS	0.052	0.045	0.000	0.272
Percentage change in shipments	4.359	11.412	-53.746	52.415
Employment (in thousands)	50.085	54.874	1.700	454.900
Percentage change in employment	-1.694	8.197	-49.123	52.273
Value added per worker	72.342	44.331	12.600	314.571
AD_CVD	1.764	4.660	0.000	77.000
AD_CVD_{tshs}	0.258	0.917	0.000	10.647
TWD_{prod}	11.028	53.304	0.000	759.621
TWD_{tcty}	2.136	6.624	0.000	59.880
Initiations	0.766	4.853	0.000	126.000
Suspension agreements	0.216	0.983	0.000	11.000
Withdrawals	0.138	2.115	0.000	64.000
$Initiations_{tshs}$	0.093	0.808	0.000	18.611
$Suspension\ agreements_{tshs}$	0.017	0.106	0.000	1.000
$Withdrawals_{tshs}$	0.006	0.056	0.000	1.135
Number of observations	1363			
Number of industries	91			

Table 3: Multinomial and ordered logit estimations of the determinants of AD/CVD

	Multinomial logit[§]		Ordered logit[§§]
	Outcome 2	Outcome 3	
	(1)	(2)	(3)
Import penetration lagged	0.114***	0.0848***	0.0967***
	(0.0245)	(0.0210)	(0.0206)
Import penetration lagged and squared	-0.00218***	-0.00120***	-0.00155***
	(0.000614)	(0.000403)	(0.000444)
Percentage change in shipments lagged	-0.0273***	-0.0350***	-0.0319***
	(0.00885)	(0.0107)	(0.00710)
Employment lagged	0.00556***	0.00503***	0.00540***
	(0.000875)	(0.00128)	(0.000974)
Percentage change in employment lagged	0.0181**	0.0206**	0.0202***
	(0.00832)	(0.00975)	(0.00663)
Value added per worker lagged	0.0266***	0.0261***	0.0273***
	(0.00770)	(0.00839)	(0.00660)
Value added per worker squared lagged and squared	-0.00008**	-0.00007*	-0.00008***
	(0.00003)	(0.00004)	(0.00003)
AD/CVD petitions in the 3 years previous to initiation	0.0814**	0.106***	0.0421*
	(0.0414)	(0.0399)	(0.0220)
PCM lagged	-0.987	-0.720	-0.874
	(0.879)	(1.024)	(0.866)
Metal sectors dummy	0.545*	1.424***	1.159***
	(0.315)	(0.305)	(0.295)
US Real GDP growth rate	-0.191	-0.0589	-0.126
	(0.166)	(0.198)	(0.128)
Constant	-5.193***	-5.845***	
	(0.493)	(0.581)	
cut-off 1			4.876***
			(0.478)
cut-off 2			5.568***
			(0.476)
cut-off 3			6.423***
			(0.458)
cut-off 4			8.110***
			(0.600)
Year dummies	Yes	Yes	Yes
Chi-squared statistic	387.0***		254.8***
Pseudo-R2	0.12		0.10
Observations	6119		6119

Notes: Robust standard errors in parentheses. ***/**/* denotes statistically different from zero at 1/5/10 % levels respectively. [§]The dependent variable in the multinomial logit estimation takes three possible values: "1" if no petitions were filed in the sector that year; "2" if petitions were filed but no tariff protection was granted; and "3" if tariff protection was granted. The omitted base outcome is “1”. Joint significance of each coefficient in the three equations was confirmed using Wald tests. [§§]The dependent variable in the ordered logit estimation takes five possible values: "1" if no petitions were filed in the sector that year; "2" if petitions were filed but no tariff protection was granted; "3" if one petition ended in tariff protection; "4" if two to four petitions ended in tariff protection and "5" if five or more petitions ended in tariff protection.

Table 4: Balancing tests

		t test of equality of means					
	Protected	Control group from multinomial logit			Control group from ordered logit		
	Mean	Mean	|t-Stat|	p-value	Mean	|t-Stat|	p-value
Import penetration (%)	15.44	15.03	0.28	0.78	14.75	-0.51	0.61
Percentage change in shipments	2.40	2.08	0.25	0.80	1.91	-0.38	0.70
Employment	64.45	61.07	-0.39	0.70	67.67	0.35	0.73
Percentage change in employment	-2.20	-1.02	1.11	0.27	-1.45	0.72	0.48
Value added per worker	70.90	80.68	1.84	0.07	70.76	-0.03	0.98
PCM	0.35	0.35	0.12	0.90	0.36	0.57	0.57
Number of observations	165	154			156		
		F-test	p-value	No. of obs	F-test	p-value	No. of obs
Hotteling's F-test		1.08	0.38	319	0.25	0.96	321

Note: All variables refer to year before initiation of AD/CVD petitions as included in the multinomial and ordered logit equations used to estimate the propensity scores.

Table 5: Impact of AD/CVD on Price-Cost Margins (PCM), basic specification

	Complete sample[§]						Control 1[§§]	Control 2[§§§]
	FDGMM	FDGMM	SGMM	SGMM	SGMM	SGMM IV[#]	SGMM	SGMM
Dependent variable: *PCM*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PCM lagged	0.438***	0.782***	0.743***	0.739***	0.740***	0.794***	0.779***	0.787***
	(0.0846)	(0.188)	(0.0872)	(0.122)	(0.122)	(0.0792)	(0.0983)	(0.0964)
PCM lagged 2 periods			0.172**	0.0854	0.0845	0.163**	0.102	0.0383
			(0.0843)	(0.111)	(0.111)	(0.0751)	(0.101)	(0.0948)
AD_CVD	0.000526**	0.000784**	0.000853**	0.000764***	0.00182**	0.000256*	0.000489*	0.000530*
	(0.000226)	(0.000352)	(0.000344)	(0.000231)	(0.000741)	(0.000143)	(0.000286)	(0.000294)
*AD_CVD*metal*					-0.00130*			
					(0.000772)			
Capital intensity	-0.0313**	0.0261	-0.00557	0.0220*	0.0219*	0.00140	-0.00678	-0.00860
	(0.0126)	(0.0216)	(0.00475)	(0.0126)	(0.0125)	(0.00384)	(0.00570)	(0.00654)
Import penetration	-0.0498	-0.0716	-0.00693	-0.0113	-0.0114	-0.0127**	-0.0118	0.00182
	(0.0419)	(0.0761)	(0.00703)	(0.0114)	(0.0114)	(0.00604)	(0.0123)	(0.0141)
TWTS	-0.0191	0.0285	0.0195	0.0765	0.0766	-0.000832	0.0556	0.0787**
	(0.0645)	(0.0927)	(0.0179)	(0.0637)	(0.0638)	(0.0190)	(0.0386)	(0.0400)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5736	5736	5736	5736	5736	5736	2758	2953
Number of SIC	383	383	383	383	383	383	184	197
Number of instruments	76	26	181	27	28	210	181	181
Instruments collapsed	No	Yes	No	Yes	Yes	No	No	No
A-B AR(2) test (p-value)	0.285	0.119	0.397	0.991	0.986	0.461	0.941	0.572
Sargan/Hansen test (p-value)	0.243	0.475	0.411	0.218	0.226	0.270	0.460	0.129

Notes: Standard errors (in parentheses) were calculated using Windmeijer finite sample correction. ***/**/* denotes statistically different from zero at 1/5/10 % levels respectively. [§]Difference-in-difference estimations using as controls all sectors that did not receive AD/CVD protection. [#]Specification where the corresponding AD/CVD variable is considered as endogenous and instrumented for. [§§]Difference-in-difference estimation using the control group selected on the basis of the multinomial logit. [§§§]Difference-in-difference estimation using the control group selected on the basis of the ordered probit.

Table 6: Impact of AD/CVD on Price-Cost Margins (PCM), weighting cases by share of affected trade codes.

	Complete sample[§]						Control 1[§§]	Control 2[§§§]
	FDGMM	FDGMM	SGMM	SGMM	SGMM	SGMM IV[#]	SGMM	SGMM
Dependent variable: *PCM*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PCM lagged	0.437***	0.784***	0.745***	0.736***	0.736***	0.756***	0.747***	0.756***
	(0.0847)	(0.188)	(0.0863)	(0.122)	(0.122)	(0.0759)	(0.105)	(0.0848)
PCM lagged 2 periods			0.168**	0.0855	0.0852	0.191***	0.125	0.0604
			(0.0833)	(0.110)	(0.111)	(0.0710)	(0.105)	(0.0853)
AD_CVD_tshs	0.00316***	0.00457***	0.00440***	0.00461***	0.00598***	0.00195*	0.00338***	0.00360***
	(0.000674)	(0.00124)	(0.000948)	(0.000840)	(0.00171)	(0.00106)	(0.00101)	(0.00139)
*AD_CVD_tshs*metal*					-0.00351			
					(0.00227)			
Capital intensity	-0.0311**	0.0251	-0.00503	0.0204	0.0202	0.000688	-0.00634	-0.00774
	(0.0125)	(0.0213)	(0.00473)	(0.0124)	(0.0124)	(0.00391)	(0.00568)	(0.00670)
Import penetration	-0.0490	-0.0728	-0.00640	-0.0108	-0.0110	-0.0143**	-0.0124	0.00413
	(0.0418)	(0.0754)	(0.00694)	(0.0114)	(0.0114)	(0.00613)	(0.0134)	(0.0148)
TWTS	-0.0157	0.0292	0.0212	0.0744	0.0741	-0.00933	0.0723*	0.0847**
	(0.0643)	(0.0923)	(0.0179)	(0.0637)	(0.0636)	(0.0210)	(0.0419)	(0.0397)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5736	5736	5736	5736	5736	5736	2758	2953
Number of SIC	383	383	383	383	383	383	184	197
Number of instruments	76	26	181	27	28	222	196	196
Instruments collapsed	No	Yes	No	Yes	Yes	No	No	No
A-B AR(2) test (p-value)	0.286	0.118	0.418	0.994	0.995	0.255	0.901	0.705
Sargan/Hansen test (p-value)	0.236	0.476	0.397	0.215	0.216	0.222	0.721	0.227

Notes: Standard errors (in parentheses) were calculated using Windmeijer finite sample correction. ***/**/* denotes statistically different from zero at 1/5/10 % levels respectively. [§]Difference-in-difference estimations using as controls all sectors that did not receive AD/CVD protection. [#]Specification where the corresponding AD/CVD variable is considered as endogenous and instrumented for. [§§]Difference-in-difference estimation using the control group selected on the basis of the multinomial logit. [§§§]Difference-in-difference estimation using the control group selected on the basis of the ordered probit.

Table 7: Import shares of products affected by AD/CVD

Imports of affected product from targeted country/Total imports of affected product

	Mean	St.dv.	Min.	Max.
AD	25,22%	23,86%	0,02%	99,41%
CVD	18,22%	23,91%	0,02%	98,57%
Both	23,26%	24,06%	0,02%	99,41%

Total imports of affected product/Total imports of sector:

	Mean	St.dv.	Min.	Max.
AD	17,59%	21,96%	0,01%	94,82%
CVD	16,75%	24,42%	0,04%	100,00%
Both	17,35%	22,65%	0,01%	100,00%

Imports of affected product from targeted country /Total imports of sector:

	Mean	St.dv.	Min.	Max.
AD	3,96%	7,84%	0,00%	56,50%
CVD	4,30%	13,81%	0,00%	89,97%
Both	4,06%	9,86%	0,00%	89,97%

Note: All shares are calculated using import values of the year before initiation of the AD/CVD petition.

Table 8: Duty levels and trade weighted duties (in %)

"All other firms" duties

	Mean	St.dv.	Min.	Max.
AD	42,4609	44,9998	0,6500	259,1700
CVD	12,1159	15,3662	0,0221	112,34
Both	34,0006	41,3537	0,0221	259,17

Trade weighted duties (using total imports of affected product):

	Mean	St.dv.	Min.	Max.
AD	7,1633	15,2706	0,0007	131,0634
CVD	1,3222	3,1328	0,0014	25,10756
Both	5,5348	13,3275	0,0007	131,0634

Trade weighted duties (using imports of affected product from targeted country):

	Mean	St.dv.	Min.	Max.
AD	1,3170	2,9803	0,0000	26,7256
CVD	0,3459	1,7868	0,0000	18,4530
Both	1,0450	2,7328	0,0000	26,7256

Note: See main text for details on how these duties were calculated.

Table 9: Impact of AD/CVD on Price-Cost Margins (PCM), using trade weighted duties

	Complete sample§				**Control 1**§§		**Control 2**§§§	
	FDGMM	SGMM	SGMM	SGMM IV#	SGMM	SGMM	SGMM	SGMM
Dependent variable: *PCM*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TWD_{prod}	0.00007***	0.00007***	0.00007***	0.00002*	0.00006***	0.00006***	0.00006**	0.00006***
	(0.00003)	(0.00002)	(0.00002)	(0.00001)	(0.00002)	(0.00002)	(0.00002)	(0.00002)
TWD_{prod}*metal			-0.00009			-0.000173		-0.000238
			(0.00016)			(0.000205)		(0.000206)
A-B AR(2) test (p-value)	0.120	0.975	0.966	0.173	0.769	0.741	0.481	0.451
Sargan/Hansen Test (p-value)	0.476	0.218	0.218	0.283	0.236	0.238	0.271	0.281
TWD_{tcty}	0.000586*	0.000546**	0.000693***	0.000183	0.000447	0.000609**	0.000429	0.000582**
	(0.000333)	(0.000268)	(0.000263)	(0.000137)	(0.000293)	(0.000287)	(0.000295)	(0.000277)
TWD_{tcty}*metal			-0.00140**			-0.00149**		-0.00168**
			(0.000599)			(0.000727)		(0.000712)
A-B AR(2) test (p-value)	0.119	0.975	0.982	0.138	0.768	0.769	0.478	0.488
Sargan/Hansen test (p-value)	0.476	0.220	0.218	0.316	0.242	0.241	0.278	0.277

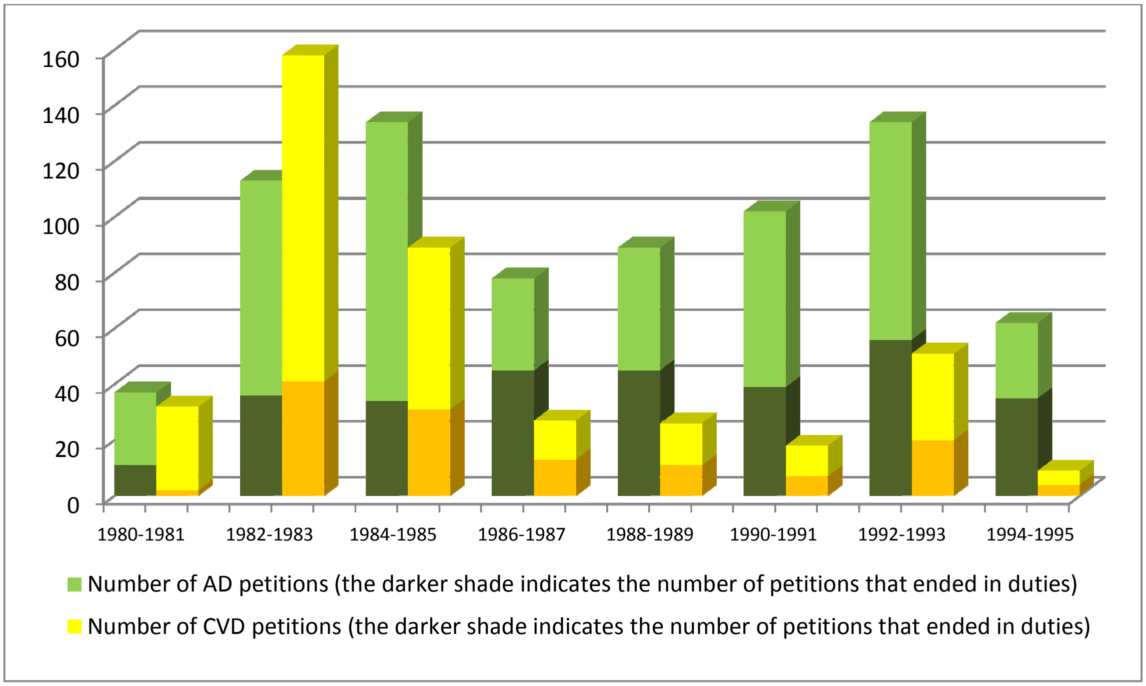
Notes: Difference-in-difference estimations using each measure of TWD alternatively. Control variables omitted. Standard errors (in parentheses) were calculated using Windmeijer finite sample correction. ***/**/* denotes statistically different from zero at 1/5/10 % levels respectively. §Difference-in-difference estimations using as controls all sectors that did not receive AD/CVD protection. #Specification where the corresponding AD/CVD variable is considered as endogenous and instrumented for. §§ Difference-in-difference estimations using the control group selected on the basis of the multinomial logit. §§§Difference-in-difference estimations using the control group selected on the basis of the ordered probit.

Table 10: Non-duty effects of AD/CVD petitions on Price-Cost margins (PCM)

	Basic specification			**Weighting cases by share of TS/HS codes**[§]		
	SGMM	SGMM	SGMM	SGMM	SGMM	SGMM
Dependent variable: *PCM*	(1)	(2)	(3)	(4)	(5)	(6)
AD_CVD	0.000703*	0.000587	0.000710*	0.00498***	0.00429***	0.00440***
	(0.000379)	(0.000481)	(0.000379)	(0.00166)	(0.000921)	(0.000966)
Initiations	-0.000228			0.000126		
	(0.000182)			(0.000865)		
*AD_CVD*Initiations*	0.000016*			0.000376***		
	(0.000009)			(0.000130)		
Suspension agreements		-0.00180			0.0149	
		(0.00210)			(0.0645)	
*AD_CVD*Suspension agreements*		0.00095			0.000948	
		(0.08270)			(0.0827)	
Withdrawals			-0.000485			-0.00618***
			(0.000582)			(0.000886)
*AD_CVD*Withdrawals*			0.00001			0.00124
			(0.000033)			(0.00814)
A-B AR(2) test (p-value)	0.409	0.408	0.411	0.406	0.428	0.403
Sargan/Hansen test (p-value)	0.416	0.432	0.426	0.395	0.377	0.396

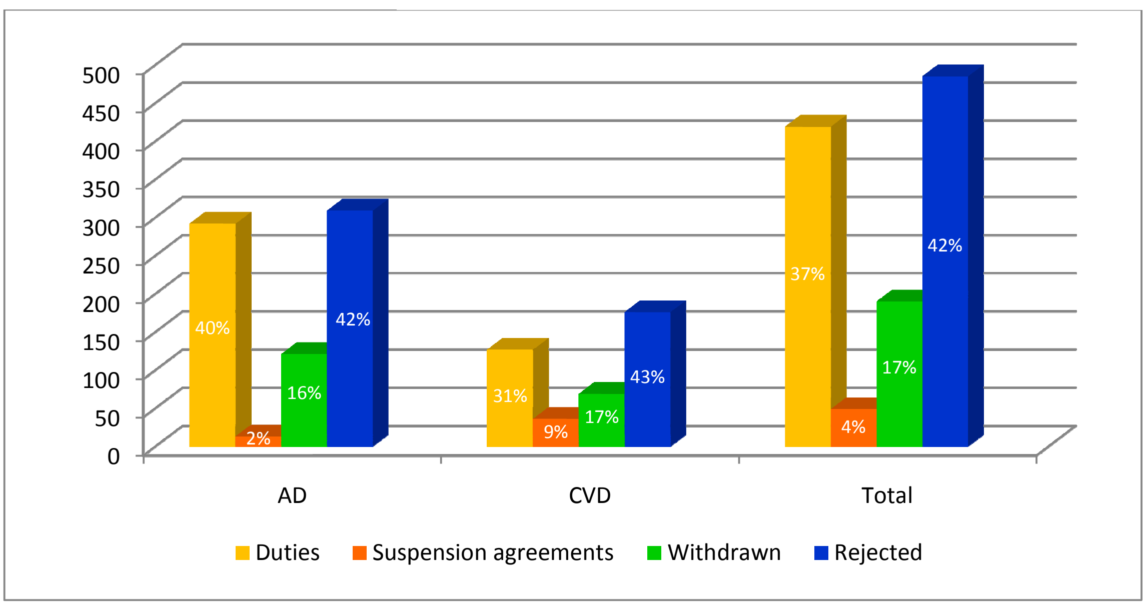
Notes: Control variables omitted. Standard errors (in parentheses) were calculated using Windmeijer finite sample correction. ***/**/* denotes statistically different from zero at 1/5/10 % levels respectively. [§]For this specifications, each regressor *X* listed refers to X_{tshs}.

Figure 1: Number of US Antidumping (AD) and Countervailing duties (CVD) petitions involving manufacturing industries between 1980 and 1995, classified by year of initiation.



Source: Own calculations using data from Global Antidumping database, version 3.0, June 2007.

Figure 2: Number of US Antidumping (AD) and Countervailing duties (CVD) petitions involving manufacturing industries between 1980 and 1994, classified by outcome



Source: Own calculations using data from Global Antidumping database, version 3.0, June 2007.

Data appendix

Matching HS and TS trade codes to SIC industry codes

A sensitive issue in the construction of the database used in this paper is the correct identification of the domestic import competing industry corresponding to each AD/CVD petition. Products in AD/CVD petitions are classified under the Tariff Schedule for The United States (TS) for cases initiated before 1989, and the Harmonized Commodity Description and Coding System (HS) for petitions initiated after 1989. Therefore, the starting point was concordance tables between the HS/TS and 4-digit SIC codes obtained from Feenstra (1996) and Feenstra, Romalis, & Schott (2002).

However, trade codes cannot always be assigned to a unique 4-digit SIC code due to the fact that industry classifications are based both on product characteristics and production process, while trade codes are based only on product description. For this reason, concordance tables between trade codes and SIC are constructed using import-based SIC codes, which assign all the corresponding trade codes to one of the relevant industries, and leave out the rest. For example, all codes referring to products produced by both SICs 3312 and 3317 are assigned to 3312, while 3317 is excluded from the concordance table. One possible way of dealing with this problem is to sum up data for these industries and consider them as one larger industry. However, the match between excluded and included industries is not always one to one, products from excluded industries may be bundled into various other industries, and also products from many excluded industries are sometimes bundled into one industry. Therefore, one may end up summing up several industries together. As indicated in the main text, to avoid this problem I follow Staiger *et al.* (1994) and simply drop out of the sample those industries to which no TS/HS codes are assigned.

For the concordance table linking HS and SIC classification, a list of excluded industries is included in Feenstra, Romalis, & Schott (2002) and from the US Census Bureaus' at http://www.census.gov/epcd/www/intronet.html. For the concordance table between TS and SIC classifications not such list was available. However, I compared the two concordance tables and verified that excluded industries are basically the same in both.

Additionally, AD/CVD cases may map into more than one "non-excluded" industry basically for two reasons: 1) the AD/CVD case file reports various trade codes mapping into different industries; and 2) the reported codes are more aggregated than the 7-digit-TS or 10-digit HS for which concordance tables are constructed, for example a 4-digit trade code, which corresponds to various 7/10-digit codes mapping into different sectors. For these cases, a detailed case by case analysis was carried out on the basis of the following criteria:

1. A comparison of the product description reported in the AD/CVD case with the descriptions of the SIC industry codes matched.
2. A comparison of the product description reported in the AD/CVD case with the descriptions of the reported TS/HS trade codes to select the relevant one.

3. Online firm databases where I could verify the SIC industry classification of petitioners and named foreign firms.
4. An analysis of trade flows where I checked which product lines had larger trade flows and for which the targeted country had a greater share.

An extensive report on this case-by-case analysis is available on request to the author.

Description of variables and data sources

The data used in this paper comes from three main sources:

(A) NBER-CES Manufacturing Industry Database. This dataset is available at http://www.nber.org/nberces/nbprod96.htm. A description can be found in Bartelsman (1996).

(B) U.S. Imports and Exports by 4-digit SIC Industry Database from NBER and The Center for International Data at the University of California, Davis available at http://www.nber.org/pub/feenstra/. For a description see Feenstra (1996).

(C) Global Antidumping database, version 3.0, June 2007, available at http://people.brandeis.edu/~cbown/global_ad/. A description of the data can be found in Bown (2007).

The following variables were calculated using industry data mostly from sources (A) and (B), aggregated at the 4-digit SIC classification:

Price-cost margins: calculated as indicated in equation (2) of the main text. The series used were: total value of shipments (sales), total cost of materials and total payroll (labour costs). The three series were taken from source (A).

Capital intensity: this variable is calculated as the ratio of total capital stock and sales. Both series were obtained from source (A).

Import penetration: this variable is calculated as a ratio where the numerator is imports and the denominator is the size of the domestic market (sales plus imports minus exports). The series used were CIF import value and export value from source (B), and total value of shipment from (A). Since industries in (B) are classified using the 1972 SIC classification, a concordance table available from (A) was used to transform the series into the 1987 SIC classification.

Trade weighted tariff schedules ($TWTS$): these series were obtained from Bernard, Jensen, & Schott (2006b), available at
http://www.som.yale.edu/faculty/pks4/sub_international.htm

Employment: Total employment obtained from (A)

Value added per worker: Total value added divided by total employment. Both series were obtained from (A).

US Real GDP growth rate: Growth Rate of Real GDP per capita (Constant Prices: Chain series) from Penn Tables, University of Pennsylvania.

The following measures of AD/CVD activity were calculated using information on AD/CVD petitions from source (C). The relevant SIC industry for AD/CVD petition was determined as indicated in the first part of this appendix:

AD_CVD: the number of Antidumping (AD) and Countervailing duties (CVD) in place in the 4-digit SIC industry. A duty was considered as being in place from the year of its imposition to the year before its revocation.

AD_CVD_tshs: this variable is calculated as the weighted sum of the number of AD/CVD in place in the 4-digit SIC industry, where each duty is weighted by the number of TS/HS trade codes reported for the case divided by the number of TS/HS codes corresponding to each industry. The number of TS/HS codes reported for each case comes from source (C), while the number of TS/HS codes for each 4-digit SIC industry was taken from the concordance tables obtained from Feenstra (1996) and Feenstra, Romalis, & Schott (2002). Until 1988 the US used TS coding to classify import and exports disaggregated up to 7-digit, while from 1989 onwards the HS classification was adopted going up to 10-digit. This posed a problem in the comparison of the two coding systems since 10-digits HS codes are in general more detailed than 7-digit TS codes, with the consequence that the number of 10-digit HS codes assigned to each 4-digit sector is much larger. For this reason, I chose to count the number of 8-digit HS codes instead, which is more comparable to the 7-digit TS classification.

Trade weighted duties: 1) TWD_{prod} is calculated as the weighted sum of duty levels of all AD/CVD in place in the 4-digit SIC industry, where weights are given by the share of imports of the affected product on total imports competing with the 4-digit SIC industry; 2) TWD_{tcty} is the same as 1) except that now duties are weighted by the share of imports from the targeted country in the affected product on total imports competing with the industry. Information on duty levels is obtained from "all other firms" duties reported in (C). All AD/CVD in the sample used here correspond to *ad valorem* tariffs, except three CVD in which specific tariffs were imposed. For these cases I calculated the equivalent *ad valorem* tariff as (import value/import quantity)*(specific tariff), using imports of the targeted country in the affected product one year prior to the initiation of the case. Product level imports are the CIF value of imports of the year before initiation of the AD/CVD petition, coming from U.S. Import and Export Data of the Center of International Data, University of California, Davis (available at http://cid.econ.ucdavis.edu/data/sasstata/usiss.html). Since AD/CVD in some cases report TS/HS at greater level of aggregation, a detailed case by case analysis was performed to determine for each case which were the relevant 7-digit TS or 10-digit HS codes according to the product description reported in (C).

Suspension agreements: the number of AD/CVD suspension agreements in place in the 4-digit SIC industry. A suspension agreement was considered as being in place from the year of its imposition to the year before its revocation.

Withdrawals: number of cases withdrawn in the 4-digit SIC industry in that year.

Initiations: number of AD/CVD initiated in the 4-digit SIC industry in that year.

Like it was the case with AD_CVD, for these last three variables two versions were considered, one where cases simply counted, and one where each case is weighted by the number of TS/HS trade codes reported for the case divided by the number of TS/HS codes corresponding to each industry.

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ISSN 1379-244X D/2010/3082/043