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

L. Rovegno

Discussion Paper 2010-43

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

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

Laura Rovegno†

Université catholique de Louvain

IRES Discussion Paper 2010-43

Abstract

Contingent protection measures, such as Antidumping (AD) and Countervailing (CV) duties, were originally intended to protect domestic producers from what were considered to be "unfairly" cheap imports. However, due to the way in which these policies are designed and implemented, they have been heavily criticised for their greatly disruptive effects on markets, and particularly on competition. This paper contributes to the debate by studying the impact of US AD and CV duties on domestic producers' price-cost margins (PCM). Using a long panel of 4-digit industries, it finds evidence of a positive effect of AD/CV duties on PCM. However, the point estimates are small, especially compared to what has previously been found for the EU. This is in line with the existent evidence of larger trade diversion in the US with respect to EU. The analysis accounts for potential endogeneity in AD/CV duties, as well as the intensity of the protection granted.

Keywords: Contingent protection, Antidumping, Countervailing duties, Import tariff, Markup, Price-cost margin, Market power.

JEL Classifications: C33, D22, D43, F12, F13.

*The author especially thanks Hylke Vandenbussche and members of the International Economics Group at UCLouvain and KULeuven. I thank Fabio Mariani for comments and discussion. This paper benefited also from comments by Ron Davies, Gilles Duranton, Joseph Francois, Holger Görg, Beata Javorcik, James Markusen, Peter Neary, Mark Roberts, Maurizio Zanardi, Emanuele Forlani, Joel T. Strange, Ilke Van Beveren and Ziga Zarnic. I also thank members of the Economic Research and Statistics Division at the 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 the Belgian French−speaking Community (convention ARC 09/14 − 019 on "Geographical Mobility of Factors") and the Belgian Federal Government (Grant PAI P6/07 on "Economic Policy and Finance in the Global Economy: Equilibrium Analysis and Social Evaluation").

†*Address for correspondence:* Institut de Recherches Economiques et Sociales, Economics Department, Université catholique de Louvain, Collège Dupriez, Place Montesquieu 3, B-1348 Louvain-la-Neuve, Belgium; email: laura.rovegno@uclouvain.be

1 Introduction

As traditional forms of import protection have been reduced following the GATT/WTO negotiations, governments have turned to alternative means of restricting trade. Particularly relevant among these are contingent protection measures such as Antidumping (AD) and Countervailing (CV) duties. Originally, AD/CV duties 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 subsidised in the case of CV measures. However, given the way in which these policies are designed and implemented, trade literature tends to view them today mostly as industry-policy tools aimed at protecting domestic producers in the face of increasing import competition (Blonigen and Prusa 2003; Konings and Vandenbussche 2005). For this reason, it is key to evaluate their effects on domestic markets, particularly on competition. This paper contributes to the debate by studying the impact of AD/CV duties on domestic producers' market power. In particular, it analyses the changes in observable price-cost margins (PCM) in industries where AD/CV duties are in place.

At first glance, AD/CV duties are just another form of import tariffs. The effect of tariffs on domestic prices has been widely studied by trade theorist: import tariffs increase domestic prices (Helpman and 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/CV duties.

However, there are opposing forces that can offset these effects. Firstly, unlike other forms of trade restrictions, AD/CV duties 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 2011). Additionally, as is the case with any form of import restriction, the effects of AD/CV duties 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 and Vandenbussche 2005).

This is not the first attend 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. The author tests the single difference change in PCM of 9 US firms involved in 4 AD petitions. He finds that protected firms present higher market power after the imposition of AD duties. Konings and 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. Blonigen, Liebman

and 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 CV duties) have little effect on market power. Finally, Pierce (2011) 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, given the length of the panel, it considers all AD/CV petitions involving manufacturing sectors in the US in a period of 15 years. Also, while most previous studies focus on AD, here CV duties are taken into account as well. It is also important to point out that the data used here is defined at the 4-digit industry level. This means that what is observed is the net effect of AD/CV duties on the industry as a whole. This comprises of both the direct effect on the product concerned by the tariff as well as 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.

This paper uses information on AD/CV petitions filed in the US between 1980 and 1994, coming from the Global Antidumping Database (Bown 2010). This period of analysis is chosen since substantial changes were introduced to AD/CV laws both in 1979 and 1995. Markups are approximated 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/CV protection in the period of study. An important advantage of these industry data is that is annual, allowing the analysis of the changes in markups in a more dynamic setting and the use econometric techniques that take advantage of these dynamics. Alternative specifications are used to capture the intensity of AD/CV 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/CV duties, two methods used, instrumental variables and propensity score matching. The empirical analysis finds evidence of a positive effect of AD/CV duties 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. The presence of non-duty effects is also tested for but results are not statistically significant.

The paper is organized as follows. The next section presents a brief description of US legislation on AD and CV measures. The data and empirical methodology are described in section 3. Section 4 presents the results and section 5 concludes.

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/CV measures are allowed under Article VI, which was incorporated into Title VII of US Trade Laws.

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. In these cases, foreign firms 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 CV measures 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/CV 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/CV orders should be revoked after five years. To avoid changes in the legislation affecting the results, the period of study considered ranges 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/CV 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 CV petitions from 1982 onwards, however as the decade advances there is a clear tendency to prefer the use of AD to CV. 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 CV.

3 Methodology and data

3.1 Data

The industry data used in this paper comes from the NBER-CES Manufacturing Industry Database (Bartelsman 1996)[1]. 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.

[1] A more detailed description of the data is presented in appendix B.

Imports and Exports by 4-digit SIC Industry Database from NBER and The Center for International Data at the University of California, Davis. 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/CV petitions comes from Global Antidumping Database (Bown 2010). For the particular case of the US, it provides detailed information on AD/CV cases from 1979 to this day, including product descriptions, domestic and foreign firms involved in each case, 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. This study considers all AD/CV cases filed between 1980 and 1995 concerning manufacturing industries (table 1). There are a total of 735 AD and 408 CV petitions, of which 292 (40%) and 127 (31%) respectively ended in the imposition of import tariffs.

At this point it should be clarified what is meant by "case". Domestic industries seeking AD/CV protection may (and usually do) file petitions against various countries in the same product. In these instances, separate investigations 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 and 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 and following Sabry (2000), in this study an AD/CV case or petition is a country-product pair. The same applies when referring to the number of duties.

In order to merge AD/CV and manufacturing data, the relevant 4-digit industry SIC code was assigned to each AD/CV case. This was done through a careful case-by-case analysis using information on TS/HS codes reported in the AD/CV case, product descriptions and information on firms[2]. Following Staiger et al. (1994), out of the original 459 4-digit industries, 73 are dropped out since they are excluded from concordance tables. Three additional sectors were excluded due to missing values. The resulting sample contains 383 sectors, including 139 involved in AD/CV petitions, of which 91 were granted AD/CV 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/CV petitions and duties in metal sectors (SIC 33 and 34), representing around 60% of total AD/CV activity. This will be taken into account in the empirical analysis below.

3.2 Methodology to estimate markups and basic specification

Markups are measured by means of observable price-cost margins (PCM). This method is based on the Lerner index, and is calculated as follows:

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

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

[2]A detailed explanation of this procedure is presented in the data appendix.

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 is directly observable and it provides a separate measure 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, and hence would not be appropriate for this study given the aggregated nature of the data at hand. Additionally, by using PCM, it is possible to apply a panel difference-in-difference specification, which allows to better isolate the effect of AD/CV duties 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/CV duties. As discussed by Pierce (2011), the effect of contingent protection on productivity is a priori ambiguous. On the one hand, an extensive body of both theoretical and empirical literature has shown that trade liberalization has a positive effect on average productivity, either through intra-firm reallocations or within firm productivity improvements[3]. In this sense, it would be expected that import restrictions such as AD/CV duties would have an adverse impact on average productivity.

On the other hand, dynamic models studying the impact of trade policy on technology adoption, have shown that import protection may accelerate the rate of adoption of protected firms increasing their productivity (Miyagiwa and Ohno 1995; Crowley 2006). In fact, Konings and Vandenbussche (2008) find that revenue based 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 (2011) 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/CV protection will reflect to a greater extend changes in markups rather than productivity.

Following Tybout (2003) and Konings and Vandenbussche (2005), the basic specification estimated is give by:

$$PCM_{it} = \alpha_1 PCM_{it-1} + \beta AD/CVD_{it} + \delta X_{it} + \alpha_i + \alpha_t + \epsilon_{it} \tag{2}$$

PCM_{it} is the price-cost margin for sector i in year t as defined in equation (1). AD/CVD_{it} is a set of indicators of AD/CV protection. In the basic specification it measures the number of AD/CV duties 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)[4]. α_i represents industry-fixed

[3]This literature is too extensive to list here but it includes trade models with heterogeneous firms following the seminar papers by Melitz (2003) and Bernard et al. (2003), as well as a rich body of empirical literature including Pavcnik (2002), Bernard et al. (2006a), among many others; and more recently studies on the effects of trade on multiproduct firms, most notably Bernard et al. (2006c).

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

effects, α_t are time effects (full set of year dummies) and ϵ_{it} is the error term. 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/CV duties are functioning as counterfactual.

Given its dynamic structure, equation (2) is estimated using the system generalized method-of-moments estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998). This method controls for the presence of the unobserved individual effect α_i and the endogeneity in the lag of the dependent variables as well as other control variables. Results are robust to estimation using the first difference generalized method-of-moments estimator developed by Arellano and Bond (1991), as well as the first difference two-stage-least-squares estimator proposed Anderson and Hsiao (1982). Results are also maintained if instruments are "collapsed" as proposed by Roodman (2009). In all cases the more efficient two-step estimators is used and standard errors are calculated using the Windmeijer (2005) finite sample correction.

3.3 Controlling for endogeneity

As explained in section 2, AD/CV duties 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/CV duties are not exogenously assigned, which implies that AD/CVD_{it} is potentially endogenous in equation 2.

The sign of the endogeneity bias is a priori ambiguous. If a given sector is experiencing increasing competiton or a downturn in its performance, this would normaly 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/CV duties 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/CV 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 overestimate (underestimate) the effect of AD/CV duties[5].

In order to deal with the bias associated with selection, two alternative approaches are used: instrumental variables and propensity score matching. The first involves estimating (2) considering $AD/ACVD_{it}$ as an endogenous variable and adding additional instruments. These are employment, percentage change in employment and percentage change in shipments, all lagged two periods, as well as the lags of AD/CVD_{it}. The

[5] A possible way of addressing this latter concern is to introduce an additional regressor that measures concentration. 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 the period considered here only data for 82, 87 and 92 is available, and therefore, could not be included in the estimation in first differences. Nontheless, the inclusion of the lag dependent variable, together with the pesence of industry fixed-effects, should greatly reduced any potential bias due to omitted variables. Still, equation (2) was re-estimated using the concentration indexes in a five-year differences specification and a simple IV method instrumenting with 6-year lags. Although estimated coefficients were similar in sign and magnitude, they were not significant. However, this was probably due to the reduced number of observations (from 5736 to 656) as well as the use of a less efficient estimator.

choice of instruments is based on the analysis of the determinants of AD/CV 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/CV protection in a given year. This is done using two alternative specifications. Firstly, following Konings and Vandenbussche (2008), a multinomial logit model is estimated in which the dependent variable take three possible values: "1: no AD/CV petitions filed in the sector that year", "2: one or more petitions were filed in the sector but none ended in tariff protection", and "3: one or more petitions were filed in the sector resulting in tariff protection".

However, this specification is not completely satisfactory for our purposes 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/CV duties be endogenous but also its intensity, resulting in additional bias. For this reason, an alternative specification is used 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: "1: no AD/CV petitions filed in the sector that year", "2: one or more petitions were filed in the sector but none ended in tariff protection", "3: one petition was filed in the sector resulting in tariff protection", "4: two to four petitions were filed resulting in tariff protection", and "5: 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, the model was estimated using an ordered logit specification.

The explanatory variables included in these models were selected following Blonigen and Park (2004) and earlier literature on the determinants of AD/CV petitions and duties[6]. These variables are the one period lags of import penetration and its square, percentage change in shipments, employment, percentage change in employment, value added per worker and its square, and PCM. They also include the number of AD/CV petitions filed in the industry in the three previous years[7], US Real GDP growth rate and a dummy variable for metal sectors (2-digit SIC codes 33 and 34).

4 Results

4.1 Determinants of AD/CV duties

Table 2 presents the results of estimating the logit models described in the previous section. 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 "1: no AD/CV petitions filed in the sector that year" and therefore the coefficients presented should be interpreted as representing the comparison of the corresponding outcome to the no-petition case. Since significance tests

[6]This includes Hansen (1990), Hansen and Prusa (1996) and (1997), Baldwin and Steagall (1994), Sabry (2000), and Knetter and Prusa (2003). See Blonigen and Prusa (2003) for a review of this literature.

[7]Results do not change if this regressor is substituted by the number of petitions filed in the sector in the previous five years. In alternative specifications, the number of AD/CV duties imposed in the last three and five years were also included as regressors but their coefficient were non-significant.

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 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/CV 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, this variable is kept in the model used for the matching procedure.

The models in table 2 provided the predicted probability that a sector receives AD/CV protection in a given year (outcome "3" for the multinomial logit) or a given level of AD/CV protection (outcomes "3" to "5" for the ordered logit). On the basis of the propensity scores thus calculated, a nearest neighbour matching with replacement was applied[8] year by year. This resulted in control groups of sectors that had the closest predicted probability of being protected but that were not[9]. Table 3 presents balancing tests for the two alternative control groups. For all variables and both control groups, the tests 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.

4.2 Basic specification

Table 4 presents the results of estimating equation (2) using the system generalized method-of-moments estimator (Arellano and Bover 1995; Blundell and Bond 1998). Column (1) shows the estimation of the basic specification on the complete sample. Regarding the variable of interest AD/CVD_{it}, results indicate the presence of a positive and statistically significant effect of AD/CV duties on PCM. Yet, the coefficient is rather small: an additional AD/CVD_{it} tariff increases PCM on average by around 0.085 percentage points, which represents 0.21% of the average PCM. However, usually more than one AD/CV duty is in place in a given point in time. The average number of tariffs in place (when AD/CV duties are present) is 3.29. A change from zero duties 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 and Vandenbussche (2005) find an increase in EU firms' 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/CV than others. As table 1 shows, Primary Metals (SIC 33) represent almost 50% of the AD/CV duties imposed in the period. Moreover, considering also petitions involving Fabricated Metal Products (SIC 34), metal industries alone represent almost 60% of AD/CV filings and duties. In view of these numbers, it should be verified

[8] See Leuven and Sianesi (2003) for details on propensity score matching.

[9] The results presented here were obtained by considering a matched control group drawn from all sectors that did not receive AD/CV 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. A alternative matching was performed in which controls were drawn only from sectors not involved in AD/CV petitions. Although the quality of the matching was lower, the main results and conclusions were unaltered.

whether these industries are driving the results. To this end, equation 2 is re-estimated adding the interaction between AD/CVD_{it} and a dummy indicating whether the 4-digit sector belongs to the 33 and 34 2-digit SIC groups ($AD/CVD_{it} * metal_i$). Results for this alternative specification are presented in column (2). The show that these sectors are affecting the coefficient of AD/CVD_{it} downwards. In fact, the effect of AD/CVD_{it} 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_{it} when tariffs are in place. Although it is more than double the effect found in the basic specification, it is still fairly small[10].

Column (3) presents the results when considering AD/CVD_{it} as endogenous in equation (2) and instrumenting for it (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 (4) and (5). The estimated coefficient for AD/CVD_{it} is again positive and significant, and falls between the basic and IV estimations.

4.3 Weighting by the share of the product codes affected by the duty

When analysing the effects of AD/CV duties, especially when using industry aggregated data, it is important to account for the intensity of protection. In the results presented in the previous section, the intensity of protection was accounted for on one level, the number of country-product pairs in which the sector is being protected. Another dimension in which protection can differ from one case to another is the relative importance of the products affected by the duty within the sector.

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, an alternative approximation is used which accounts for 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, cases are weighted by the share of the number of TS/HS codes named in the AD/CV filing relative to the total number of TS/HS codes corresponding to a given 4-digit-SIC[11] ($AD/CVD_{tshs_{it}}$)[12].

Table 5 shows the results of estimating equation (2) including the new variable. As before, the first column presents the basic results using the complete sample and the alternative estimation methods discussed above. In all cases the coefficient of $AD/CVD_{tshs_{it}}$ is positive and significant and of a larger magnitude than in the previous section. Given the way the $AD/CVD_{tshs_{it}}$ is constructed, interpretation of its coefficient is less straight

[10] Another possible explanation for this result is that the relationship between the dependent variable and AD/CVD_{it} is nonlinear. To check this, equation (2) was estimated introducing the square of the corresponding AD/CV variable. This resulted in non-significant coefficients for the squares, while the levels remained practically unchanged.

[11] This share can differ greatly from one case to another. 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/CV petition is on average 12 codes, but can vary from one to over 64 for AD and from one to more than 500 for CV.

[12] To be consistent to what has been done so far and in order not to lose the country-product dimension, cases involving different countries in the same product line are still considered separately. In consequence, $AD/CVD_{tshs_{it}}$ is not a share taking values between 0 and 1, it still corresponds to the sum of the number of duties, except that now each unit is weighted by the share of codes affected by the duty.

forward. One possible way to interpret it is to say that if a new AD/CV duties 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 $AD/CVD_{tshs_{it}}$. At the average level of protection, the effect is 0.21 percentage points (0.57% of average PCM). At the maximum of $AD/CVD_{tshs_{it}}$, however, PCM increases by 4.69 percentage points (12.51% of average PCM). As before, changes in average industry PCM following the imposition of AD/CV duties are rather small except for extremely high levels of protection.

Column (2) presents the results of interacting $AD/CVD_{tshs_{it}}$ with the metal industries dummy. As in section (4.2), the coefficient of the AD/CV variable is positive and significant and of a slightly larger magnitude that in the basic specification. Column (3) present the results instrumenting for $AD/CVD_{tshs_{it}}$, while estimations on the subsamples using the constructed control groups are presented in columns (4) and (5). The estimated coefficients for $AD/CVD_{tshs_{it}}$ are positive and significant but of a slightly smaller magnitude than before. They 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.

4.4 Considering trade-weighted duties

The alternative specifications presented in the previous section aimed at accounting more precisely for the intensity of AD/CV protection. However, this is not completely satisfactory since some AD/CV duties may be affecting greater trade flows than others. Additionally, AD/CV duties also differ significantly on the level of the duties imposed, an element that has been neglected so far. This section presents an alternative measure of AD/CV duties that accounts for these two elements.

To illustrate the first issue, table 6 presents three measures of the relative importance of imports affected by AD/CV duties. They were calculated using import data of the year before the initiation of the AD/CV petition. The first part of the table presents the share of the named country on total imports of the affected 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/CV duties 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 6 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/CV duties if simultaneous tariffs are levied against different sources.

The second ratio presented in table 6 is the share of the affected product on total imports competing with the 4-digit SIC industry. 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/CV petition represent around 17% of total imports of the industry, but this can vary between 0.01% and 100%.

Finally, these two ratios are combined obtaining 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. As the last part of table 6 shows, affected imports represent on average around 4% of total imports of the industry, but ranging from almost zero to 90%.

Regarding the level of the duties, table 7 presents descriptive statistics of AD/CV duty levels using information form the Global Antidumping database on "all other firm" duties (AD) and "all other" rates (CV). These are the duties payable by foreign exporters 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(Macrory et al. 1991; Gallaway et al. 1999). As table 7 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 CV duties.

Import shares described above are used to calculate two versions of trade-weighted duties. In the first specification, AD/CV duty levels are weighted by the share of imports in the affected product on total imports of the 4-digit SIC industry ($TWD_{prod_{it}}$); and in the second, duties are weighted by the share of imports from the targeted country in the affected product on total imports of the sector $TWD_{prod\_cty_{it}}$.

Table 8 presents a summary of the results of estimating equation (2) using these two measures alternatively. The coefficients of both $TWD_{prod_{it}}$ and $TWD_{prod\_cty_{it}}$ are positive and significant. Results are similar when controlling for endogeneity of AD/CV duties 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 a change from zero to the sample means of TWD_{prod} and $TWD_{prod\_cty_{it}}$ when tariffs are in place. The coefficient estimated in column (2), for example, implies an 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 $TWD_{prod\_cty_{it}}$, the estimated impact are 5.31 and 3.29 percentage points (14.19% and 8.79% of average PCM).

4.5 Non-duty effects of AD/CV petitions

The previous sections have analysed the effects of AD/CV following the imposition of import tariffs. However, AD/CV petitions may also have "non-duty effects". Staiger et al. (1994) study this phenomena and identify three possible non-duty effects: a "filing effect" 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, usually the difference between the price charged by the foreign firm in the US market and the prices charged in their home market. 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 et al. 1999).

Suspension agreements exist as an 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 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, it would be expected to observe 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, 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/CV petitions may be withdrawn by complainants before the final decision, in which case the investigation is terminated. In these cases no duties or formal agreements are put into place. However, withdrawals may be the result of collusive agreements between domestic and foreign firms leading to quantity restrictions and higher prices (Prusa 1992; Zanardi 2004). In this respect, it is important to recall that companies involved in AD/CV 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.

Figure 2 presents the distribution of outcomes in AD/CV 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, new regressor are introduced to the the model in equation (2) including the number of AD/CV 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_{it}. Two versions are estimated, one simply counting the number of cases, and the second 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. Results are presented in table 9.

Most coefficients associated with non-duty effects are insignificant. One exception is the interaction of AD/CVD_{it} and $Initiations_{it}$. 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/CV protection before, new initiations work as a signal that further duties may be imposed, making foreign exporters react by restricting their export and hence pushing markups up. Another exception is column (6) where withdrawal presents a surprisingly negative effect going against the previous intuition.

However, these results should be considered with caution for various reasons. Firstly, AD/CV 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 the possibility to picking up non-duty effects using yearly data, especially filing effects, which are more short lived [13]. 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 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

[13] Using monthly product data, Staiger et al. (1994) and Krupp and Pollard (1996) find evidence of non-duty effects.

at the 4-digit industry level.

5 Conclusions

This paper studied the impact of AD/CV protection on domestic industries' observable price-cost margins (PCM) using US 4-digit sector level data. It used different specifications for AD/CV duties in order to account for the intensity of AD/CV protection, and controlled for potential endogeneity in AD/CV duties through instrumental variables and propensity score matching. It found evidence of a positive effect of AD/CV duties on domestic producers' PCM. However, the point estimates are of a small magnitude suggesting a limited effect on sector level PCM, especially compared to what has been found for the EU using firm level data.

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, Belderbos (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. Moreover, 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 et al. (2001) 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 found on US producers' PCM.

Another possibility is the fact that domestic producers may not be 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 (2011) 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. In this sense, the analysis of the upstream and downstream effects of contingent protection constitutes an interesting avenue for future research.

Finally, as was explained in the introduction, the results on this paper concern the net effect of AD/CV duties on industries considered as a whole, while AD/CV duties are imposed in specific products. Sectors produce a range of products and the imposition of an AD/CV duties 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 protectionist tendencies with regard to that sector, they may choose to restrict exports in other products in other to avoid future duties (Vandenbussche and 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 other products, resulting in more competition in the market in those products and therefore offsetting the effect on industry markups. The

aggregated data used in this paper did not allow testing for such spillover effects. However, they constitute a promising area for future research.

References

Anderson, T.W. and Cheng Hsiao, "Formulation and estimation of dynamic models using panel data," *Journal of Econometrics*, 1982, *18* (1), 47 – 82.

Arellano, M. and S. Bond, "Some tests of specification for panel data: Monte Carlo evidence and application to employment equations," *The Review of Economic Studies*, 1991, *58* (2), 277–297.

Arellano, Manuel and Olympia Bover, "Another look at the instrumental variable estimation of error-components models," *Journal of Econometrics*, 1995, *68* (1), 29 – 51.

Baldwin, Robert and Jeffrey Steagall, "An analysis of ITC decisions in antidumping, countervailing duty and safeguard cases," *Review of World Economics*, 1994, *130*, 290–308.

Bartelsman, E.J., "The NBER Manufacturing Productivity Database," Working Paper 205, National Bureau of Economic Research 1996.

Belderbos, R. A., "Antidumping and tariff Jumping: Japanese firms' DFI in the European union and the United States," *Review of World Economics*, 1997, *133*, 419–457.

Bernard, A. B., J. B. Jensen, and P. K. Schott, "Trade costs, firms and productivity," *Journal of Monetary Economics*, 2006, *53*, pp. 917–937.

Bernard, Andrew B., J. Bradford Jensen, and Peter K. Schott, "Survival of the best fit: Exposure to low-wage countries and the (uneven) growth of U.S. manufacturing plants," *Journal of International Economics*, 2006, *68* (1), 219 – 237.

_ **, Jonathan Eaton, J. Bradford Jensen, and Samuel Kortum**, "Plants and Productivity in International Trade," *The American Economic Review*, 2003, *93* (4), pp. 1268–1290.

_ **, Stephen J. Redding, and Peter K. Schott**, "Multi-Product Firms and Trade Liberalization," Working Paper 12782, National Bureau of Economic Research 2006.

Blonigen, Bruce A, "Tariff-jumping antidumping duties," *Journal of International Economics*, 2002, *57* (1), 31 – 49.

Blonigen, Bruce A. and Jee-Hyeong Park, "Dynamic Pricing in the Presence of Antidumping Policy: Theory and Evidence," *The American Economic Review*, 2004, *94* (1), pp. 134–154.

_ **and Thomas J. Prusa**, *Antidumping*, Handbook of International Trade, Blackwell Publishing Ltd,

_ **, Benjamin H. Liebman, and Wesley W. Wilson**, "Trade Policy and Market Power: The Case of the US Steel Industry," Working Paper 13671, National Bureau of Economic Research December 2007.

Blundell, Richard and Stephen Bond, "Initial conditions and moment restrictions in dynamic panel data models," *Journal of Econometrics*, 1998, *87* (1), 115 – 143.

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

Crowley, Meredith A., "Do safeguard tariffs and antidumping duties open or close technology gaps?," *Journal of International Economics*, 2006, *68* (2), 469 – 484.

Feenstra, Robert, *Advanced International Trade: Theory and Evidence*, Princeton University Press, 2004.

Feenstra, Robert C., "U.S. Imports, 1972-1994: Data and Concordances," Working Paper 5515, National Bureau of Economic Research 1996.

_ , John Romalis, and Peter K. Schott, "U.S. Imports, Exports, and Tariff Data, 1989-2001," Working Paper 9387, National Bureau of Economic Research 2002.

Gallaway, Michael P., Bruce A. Blonigen, and Joseph E. Flynn, "Welfare costs of the U.S. antidumping and countervailing duty laws," *Journal of International Economics*, 1999, *49* (2), 211 – 244.

Hansen, Wendy L., "The International Trade Commission and the Politics of Protectionism," *The American Political Science Review*, 1990, *84* (1), pp. 21–46.

_ and Thomas J. Prusa, "Cumulation and ITC decision-making: the sum of the parts is greater than the whole," *Economic Inquiry*, 1996, *34* (4), 746–769.

_ and _ , "The Economics and Politics of Trade Policy: An Empirical Analysis of ITC Decision Making," *Review of International Economics*, 1997, *5* (2), 230–245.

Helpman, E. and P. Krugman, *Trade Policy and Market Structure*, Cambridge: MIT Press, 1989.

Knetter, Michael M. and Thomas J. Prusa, "Macroeconomic factors and antidumping filings: evidence from four countries," *Journal of International Economics*, 2003, *61* (1), 1 – 17.

Konings, Jozef and Hylke Vandenbussche, "Antidumping Protection and Markups of Domestic Firms: Evidence from Firm Level Data," *Journal of International Economics*, 2005, *vol. 65 Issue 1*, p.151–165.

_ and _ , "Heterogeneous responses of firms to trade protection," *Journal of International Economics*, 2008, *76* (2), 371 – 383.

_ , _ , and Linda Springael, "Import Diversion under European Antidumping Policy," *Journal of Industry, Competition and Trade*, 2001, *1*, 283–299.

Krupp, Corinne M. and Patricia S. Pollard, "Market Responses to Antidumping Laws: Some Evidence from the U.S. Chemical Industry," *The Canadian Journal of Economics / Revue canadienne d'Economique*, 1996, *29* (1), pp. 199–227.

Leuven, E. and B. Sianesi, "PSMATCH2: Stata module to perform full Mahalanobis and propensity score matching, common support graphing, and covariate imbalance testing.," 2003.

Macrory, Patrick F.J., Endwin A. Vermulst, and Paul P. Waer, "United States and European Community Antidumping Law: Similarities and Differences," *University of Miami Yearbook of International Law*, 1991, *74*, 74–142.

Mastel, Greg, *Antidumping Laws and the US Economy*, Economic Strategy Institute. Armonk, NY: M. E. Sharpe, 1998.

Melitz, Marc J., "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity," *Econometrica*, 2003, *71* (6), pp. 1695–1725.

Miyagiwa, Kaz and Yuka Ohno, "Closing the Technology Gap Under Protection," *The American Economic Review*, 1995, *85* (4), pp. 755–770.

Nieberding, James F., "The Effect of U.S. Antidumping Law on Firms' Market Power: An Empirical Test," *Review of Industrial Organization*, 1999, *14*, 65–84.

Pavcnik, N., "Trade Liberalization, Exit, and Productivity Improvements: Evidence from Chilean Plants," *The Review of Economic Studies*, 2002, *69* (1), pp. 245–276.

Pierce, J., "Plant-Level Responses to Antidumping Duties: Evidence from U.S. Manufacturers," *Journal of International Economics, forthcoming*, 2011.

Prusa, T. J., *The trade effects of U.S. antidumping actions*, Effects of U.S. Trade Protection and Promotion Policies. Chicago: University of Chicago Press, 1997.

Prusa, Thomas J., "Why are so many antidumping petitions withdrawn?," *Journal of International Economics*, 1992, *33* (1-2), 1 – 20.

Roeger, Werner, "Can Imperfect Competition Explain the Difference between Primal and Dual Productivity Measures? Estimates for U.S. Manufacturing," *Journal of Political Economy*, 1995, *103* (2), pp. 316–330.

Roodman, D., "How to do xtabond2: An introduction to difference and system GMM in Stata," *Stata Journal*, 2009, *9* (1), 86–136(51).

Sabry, F., "An Analysis of the Decision to File, the Dumping Estimates, and the Outcome of Antidumping Petitions," *The International Trade Journal*, 2000, *14*, 109–145.

Staiger, Robert W., Frank A. Wolak, Robert E. Litan, Michael L. Katz, and Leonard Waverman, "Measuring Industry-Specific Protection: Antidumping in the United States," *Brookings Papers on Economic Activity. Microeconomics*, 1994, *1994*, pp. 51–118.

Tybout, James, *Plant - and Firm - Level Evidence on "New" Trade Theories*, Handbook of International Trade, Blackwell Publishing Ltd,

Vandenbussche, Hylke and Maurizio Zanardi, "The chilling trade effects of antidumping proliferation," *European Economic Review*, 2010, *54* (6), 760 – 777.

Windmeijer, Frank, "A finite sample correction for the variance of linear efficient two-step GMM estimators," *Journal of Econometrics*, 2005, *126* (1), 25 – 51.

Zanardi, Maurizio, "Antidumping Law as a Collusive Device," *The Canadian Journal of Economics / Revue canadienne d'Economique*, 2004, *37* (1), pp. 95–122.

A Appendix: Figures and tables

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

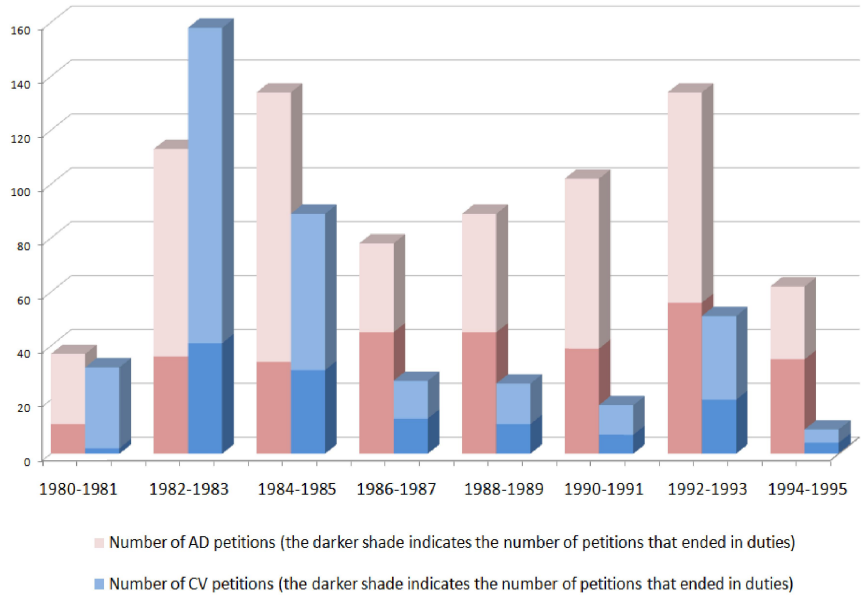

Figure 2: Number of US Antidumping and Countervailing duties petitions involving manufacturing industries between 1980 and 1994, classified by outcome.

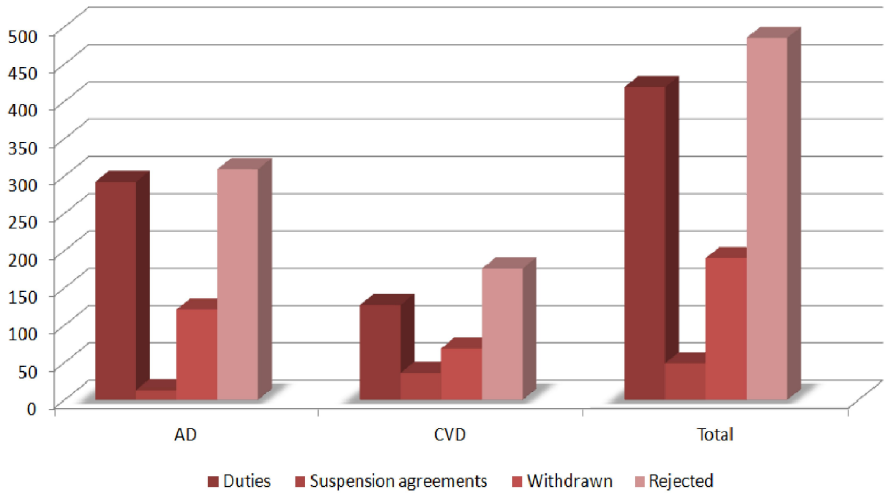

Table 1: Number of US Antidumping and Countervailing duties petitions involving manufacturing industries between 1980 and 1994, classified by 2-digit SIC code.

		Cases filed			Duties imposed		
SIC	Description	AD	CV	% Total	AD	CV	% 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		292	127	

Table 2: Determinants of AD/CV petitions

	Multinomial logit[a]		Ordered logit[b]
	(1)	(2)	(3)
	Outcome 2	Outcome 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 lagged and squared	-0.00008**	-0.00007*	-0.00008***
	(0.00003)	(0.00004)	(0.00003)
AD/CV petitions 3 previous years	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.

[a] The dependent variable takes three possible values: "1: no AD/CV petitions filed in the sector that year", "2: one or more petitions were filed in the sector but none ended in tariff protection", and "3: one or more petitions were filed in the sector resulting in tariff protection". The omitted base outcome is "1". Joint significance of each coefficient in the three equations was confirmed using the Wald tests.

[b] The dependent variable takes five possible values: "1: no AD/CV petitions filed in the sector that year", "2: one or more petitions were filed in the sector but none ended in tariff protection", "3: one petition was filed in the sector resulting in tariff protection", "4: two to four petitions were filed resulting in tariff protection", and "5: five or more petitions were filed resulting in duties".

Table 3: Balancing tests

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

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

Table 4: Impact of AD/CV duties on price-cost margins (PCM), basic specification

	Basic[a]		IV[b]	Control 1[c]	Control 2[d]
Dependent variable: *PCM*	(1)	(2)	(3)	(4)	(5)
PCM lagged	0.743***	0.740***	0.794***	0.779***	0.787***
	(0.0872)	(0.122)	(0.0792)	(0.0983)	(0.0964)
PCM lagged 2 periods	0.172**	0.0845	0.163**	0.102	0.0383
	(0.0843)	(0.111)	(0.0751)	(0.101)	(0.0948)
AD/CVD	0.00085**	0.00182**	0.00026*	0.00049*	0.00053*
	(0.00034)	(0.00074)	(0.00014)	(0.00029)	(0.00029)
AD/CVD ∗ metal		-0.00130*			
		(0.00077)			
Capital intensity	-0.00557	0.0219*	0.00140	-0.00678	-0.00860
	(0.00475)	(0.0125)	(0.00384)	(0.00570)	(0.00654)
Import penetration	-0.00693	-0.0114	-0.0127**	-0.0118	0.00182
	(0.00703)	(0.0114)	(0.00604)	(0.0123)	(0.0141)
TWTS	0.0195	0.0766	-0.000832	0.0556	0.0787**
	(0.0179)	(0.0638)	(0.0190)	(0.0386)	(0.0400)
Year dummies	Yes	Yes	Yes	Yes	Yes
Observations	5736	5736	5736	2758	2953
Number of SIC	383	383	383	184	197
AR(2) test (p-value)	0.397	0.986	0.461	0.941	0.572
Sargan/Hansen test (p-value)	0.411	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.

[a] Difference-in-difference estimations using as controls all sectors that did not receive AD/CV protection.

[b] Specification instrumenting for *AD/CVD*.

[c] Difference-in-difference estimation using the control group selected on the basis of the multinomial logit.

[d] Difference-in-difference estimations using the control group selected on the basis of the ordered probit.

Table 5: Impact of AD/CV duties on price-cost margins (PCM), weighting cases by share of affected trade codes.

	Basic[a]		IV[b]	Control 1[c]	Control 2[d]
Dependent variable: PCM	(1)	(2)	(3)	(4)	(5)
PCM *lagged*	0.745***	0.736***	0.756***	0.747***	0.756***
	(0.0863)	(0.122)	(0.0759)	(0.105)	(0.0848)
PCM *lagged* 2 *periods*	0.168**	0.0852	0.191***	0.125	0.0604
	(0.0833)	(0.111)	(0.0710)	(0.105)	(0.0853)
AD_CVD_{tshs}	0.00440***	0.00598***	0.00195*	0.00338***	0.00360***
	(0.000948)	(0.00171)	(0.00106)	(0.00101)	(0.00139)
$AD\_CVD_{tshs} * metal$		-0.00351			
		(0.00227)			
Capital intensity	-0.00503	0.0202	0.000688	-0.00634	-0.00774
	(0.00473)	(0.0124)	(0.00391)	(0.00568)	(0.00670)
Import penetration	-0.00640	-0.0110	-0.0143**	-0.0124	0.00413
	(0.00694)	(0.0114)	(0.00613)	(0.0134)	(0.0148)
$TWTS$	0.0212	0.0741	-0.00933	0.0723*	0.0847**
	(0.0179)	(0.0636)	(0.0210)	(0.0419)	(0.0397)
Year dummies	Yes	Yes	Yes	Yes	Yes
Observations	5736	5736	5736	2758	2953
Number of SIC	383	383	383	184	197
AR(2) test (p-value)	0.418	0.995	0.255	0.901	0.705
Sargan/Hansen test (p-value)	0.397	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.
[a] Difference-in-difference estimations using as controls all sectors that did not receive AD/CV protection.
[b] Specification instrumenting for AD/CVD.
[c] Difference-in-difference estimation using the control group selected on the basis of the multinomial logit.
[d] Difference-in-difference estimations using the control group selected on the basis of the ordered probit.

Table 6: Import shares of products affected by AD/CV duties

Share of targeted country in imports of affected product				
	Mean	St.dv.	Min.	Max.
AD	25.22%	23.86%	0.02%	99.41%
CV	18.22%	23.91%	0.02%	98.57%
Both	23.26%	24.06%	0.02%	99.41%
Share of affected product on total imports of the sector				
	Mean	St.dv.	Min.	Max.
AD	17.59%	21.96%	0.01%	94.82%
CV	16.75%	24.42%	0.04%	100.00%
Both	17.35%	22.65%	0.01%	100.00%
Share of imports of affected product from targeted country on total imports of the sector				
	Mean	St.dv.	Min.	Max.
AD	3.96 %	7.84 %	0.00 %	56.50 %
CV	4.30 %	13.81 %	0.00 %	89.97 %
Both	4.06 %	9.86 %	0.00 %	89.97 %

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

Table 7: Duty levels and trade weighted duties (in %)

"All other firms" duties				
	Mean	St.dv.	Min.	Max.
AD	42.46	45.00	0.65	259.17
CV	12.12	15.37	0.02	112.34
Both	34.00	41.35	0.02	259.17
Duties weighted by share of affected product on total imports of the sector				
	Mean	St.dv.	Min.	Max.
AD	7.16	15.27	0.00	131.06
CV	1.32	3.13	0.00	25.11
Both	5.53	13.33	0.00	131.06
Duties weighted by share of imports of affected product from targeted country on total imports of the sector				
	Mean	St.dv.	Min.	Max.
AD	1.32	2.98	0.00	26.73
CV	0.35	1.79	0.00	18.45
Both	1.05	2.73	0.00	26.73

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

Table 8: Impact of AD/CV duties on price-cost margins (PCM), using trade weighted duties.

	Basic[a]		IV[b]	Control 1[c]	Control 2[d]
Dependent variable: PCM	(1)	(2)	(3)	(4)	(5)
TWD_{prod}	0.00007***	0.00007***	0.00002*	0.00006***	0.00006***
	(0.00002)	(0.00002)	(0.00001)	(0.00002)	(0.00002)
$TWD_{prod} * metal$		-0.00009		-0.000173	-0.000238
		(0.00016)		(0.000205)	(0.000206)
AR(2) test (p-value)	0.975	0.966	0.173	0.741	0.451
Sargan/Hansen test (p-value)	0.218	0.218	0.283	0.238	0.281
TWD_{prod_cty}	0.000546**	0.000693***	0.000183	0.000609**	0.000582**
	(0.000268)	(0.000263)	(0.000137)	(0.000287)	(0.000277)
$TWD_{prod\_cty} * metal$		-0.00140**		-0.00149**	-0.00168**
		(0.000599)		(0.000727)	(0.000712)
AR(2) test (p-value)	0.975	0.982	0.138	0.769	0.488
Sargan/Hansen test (p-value)	0.220	0.218	0.316	0.241	0.277

Notes: Standard errors (in parentheses) were calculated using Windmeijer finite sample correction.
***/**/* denotes statistically different from zero at 1/5/10 % levels respectively.
[a] Difference-in-difference estimations using as controls all sectors that did not receive AD/CV protection.
[b] Specification instrumenting for AD/CVD.
[c] Difference-in-difference estimation using the control group selected on the basis of the multinomial logit.
[d] Difference-in-difference estimations using the control group selected on the basis of the ordered probit.

Table 9: Non-duty effects of AD/CV petitions on price-cost margins (PCM)

	Basic specification			Weighting cases by share of TS/HS codes[a]		
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)	
$AD/CVD * Suspensionagreements$		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)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5736	5736	5736	5736	5736	5736
Number of SIC	383	383	383	383	383	383
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: Standard errors (in parentheses) were calculated using Windmeijer finite sample correction. ***/**/* denotes statistically different from zero at 1/5/10 % levels respectively.

[a] For these specifications, each regressor X listed refers to X_{tshs}

B Appendix: data

B.1 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/CV petition. While industries are classified under the Standard Industrial Classification (SIC), products in AD/CV petitions are classified using trade codes - 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, identifying the relevant industry for AD/CV petitions requires merging this two classifications.

The starting point was concordance tables between the HS/TS and 4-digit SIC codes obtained from Feenstra (1996) and Feenstra et al. (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 characteristics. 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. Following Staiger et al. (1994), this problem is avoided by dropping out of the sample those industries to which no TS/HS codes are assigned.

Additionally, AD/CV cases may map into more than one "non-excluded" industry basically for two reasons: 1) the AD/CV 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/CV case with the descriptions of the SIC industry codes matched.

2. A comparison of the product description reported in the AD/CV case with the descriptions of the reported TS/HS trade codes to select the relevant one.

3. Online information on petitioners and named firms.

4. An analysis of trade flows to check which product lines had larger trade flows and for which the targeted country had a greater share.

The list of industries assigned to each case as well as an extensive report on this case-by-case analysis is available from the author on request.

B.2 Description of variables and data sources

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

(a) NBER-CES Manufacturing Industry Database (Bartelsman 1996). This dataset is available at http://www.nber.org/nberces/nbprod96.htm.

(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 (Feenstra 1996), available at http://www.nber.org/pub/feenstra/.

(c) Global Antidumping database, version 3.0, June 2007, funded by the World Bank and Brandeis University(Bown 2010). The latest version of the database is available at http://econ.worldbank.org/ttbd/.

Industry variables. The following variables were calculated using industry data aggregated at the 4-digit SIC classification:

- *Price-cost margins* is calculated as indicated in equation (1) 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 dataset (a).
- *Capital intensity* is calculated as the ratio of total capital stock and sales from source (a).
- *Import penetration* is the ratio of imports and total domestic sales (sales plus imports minus exports). The series used were CIF import and export values 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* ($TWTS$) obtained from Bernard et al. (2006b) and available at http://www.som.yale.edu/faculty/pks4/sub_international.htm.
- *Employment* is total employment obtained from source (a).
- *Value added per worker* is total value added divided by total employment. Both series were obtained from source(a).

Macroeconomic variables.

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

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

- AD/CVD is the number of AD and CV duties 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} is calculated as the weighted sum of the number of AD/CV duties 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 the 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 et al. (2002). Until 1988, the US used TS coding which is 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, 8-digit HS codes were used instead, which are more comparable to the 7-digit TS classification.

- *Trade weighted duties.* Two versions of this variable were calculated:

  1. TWD_{prod} is calculated as the weighted sum of duty levels of all AD/CV duties 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_{prod_cty} 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 firm" duties (AD) and "all other" rates (CV) reported in source (c). All AD/CV duties in the sample used here correspond to ad valorem tariffs, except three CV duties in which specific tariffs were imposed. For these cases the equivalent ad valorem tariff was calculated as the specific tariff divided by the average unit value, 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/CV 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/CV petitions report sometimes 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 for the case.

- *Suspension agreements* is the number of AD/CV 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* is the number of cases withdrawn in the 4-digit SIC industry in that particular year.

- *Initiations* is the number of AD/CV cases initiated in the 4-digit SIC industry in that particular year.

  Like with AD/CVD, for these last three variables two versions were considered, one where cases were simply counted, and another where each case was 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.

Table B.1 presents summary statistics of all variables used in the analysis.

Table B.1: Summary statistics

		Complete sample		
Variable	Mean	St.dv.	Min.	Max.
Price − cost margins (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_{prod_cty}	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	St.dv.	Min.	Max.
Price-cost margins (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_{prod_cty}	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			

Institut de Recherches Économiques et Sociales
Université catholique de Louvain

Place Montesquieu, 3
1348 Louvain-la-Neuve, Belgique

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