Rev World Econ (2013) 149:443–476
DOI 10.1007/s10290-013-0160-7

ORIGINAL PAPER

Trade protection and market power: evidence from US antidumping and countervailing duties

Laura Rovegno

Published online: 30 May 2013

Abstract Contingent protection measures 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. The analysis presented in this paper contributes to the debate by studying the impact of US antidumping (AD) and countervailing (CV) duties on domestic producers' price-cost margins (PCM). To this end, the study takes advantage of a long panel of 4-digit industries in the United States covering 26 years of AD/CV activity, including the periods before and after the changes to AD/CV laws introduced following the Uruguay Round (UR). It finds evidence of a positive effect of AD/CV duties on PCM for the period prior to the UR, but the effect seems to disappear in the years following the UR. 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 · Uruguay Round

JEL Classification C33 · D22 · D43 · F12 · F13

Electronic supplementary material The online version of this article (doi:10.1007/s10290-013-0160-7) contains supplementary material, which is available to authorized users.

L. Rovegno (✉)
University of Luxembourg, Campus Limpertsberg BRC 0.02,
162A avenue de la Faïencerie, 1511 Luxembourg City, Luxembourg
e-mail: laura.rovegno@uni.lu

1 Introduction

As the use of traditional forms of import protection has been limited by multilateral negotiations within the General Agreement on Tariffs and Trade (GATT)/World Trade Organization (WTO), 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 measures 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 or because they were being subsidised by foreign governments. However, given the way in which these policies are designed and implemented, the trade literature tends to view them 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 crucial 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 receiving AD/CV duty protection.

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 theorists: 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.[1] Therefore, we might 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 foreign direct investment (FDI; tariff jumping) this will also limit the ability of incumbent firms to raise markups (Konings and Vandenbussche 2005).

This is not the first attempt 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

[1] A complete treatment is given in Feenstra (2004).

protected firms. The author tests the single difference change in PCM of nine US firms involved in four 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 protected firms' markups. Blonigen et al. (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 increase markups while tariffs, including AD and CV duties, have little effect on market power. Finally, Pierce (2011) studies the impact of AD on US producers using a difference-in-difference approach and 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. It uses information on AD/CV petitions filed in the United States between 1980 and 2005, coming from the World Bank's Temporary Trade Barriers Database (Bown 2010). Crucially, this sample covers two major reforms to AD/CV rules, the 1984 US Trade and Tariff Act and the Uruguay Round (UR) 1995 reform, allowing for a comparison of the effect of AD/CV measures under the different regimes. The length and coverage of the data also give the result more generality by considering all cases affecting manufacturing industries (95 % of total AD/CV cases) in a period of 26 years, therefore, covering a wider spectrum of AD/CV activity in terms of products, periods and targeted countries. Also, while most previous studies focus on AD, here CV duties are taken into account as well.

Markups are approximated by means of observed PCM as discussed by Tybout (2003), using data from 375 manufacturing industries, 176 of which were involved in AD/CV filings. An important advantage of these industry data is that they are annual, allowing the analysis of the changes in markups in a dynamic setting and the use econometric techniques that take advantage of these dynamics. In order to measure the level of AD/CV protection at the industry level, AD/CV duties are weighted by the share of the imports directly concerned by the measures (product and source) on total imports competing with the corresponding industries. This allows consideration of the relative importance of targeted sources on imports of the product, as well as the relevance of the affected product. In order to control for potential endogeneity in AD/CV duties two methods are used, instrumental variables and propensity score matching.

The empirical analysis finds evidence of a positive effect of AD/CV duties on PCM for the period prior to the UR reform. However, it fails to find a statistically significant effect from the post-1995 period. This suggests that the changes introduced to the law following the UR have had important consequences in terms of the use and effect of contingent protection measures. Although it is not possible to test with the data at hand which particular aspect of the reform may be causing this result, it is likely that the limitation in the duration of AD/CV measures to a maximum of 5 years may have affected the ability of domestic producers to use these measures as a means of protecting monopolistic rents.

The paper is organized as follows. The next section presents a brief description of US legislation on AD and CV measures, as well as the reforms to the rules during the period of analysis. The data and empirical methodology are described in Sect. 3. Section 4 presents the results and Sect. 5 concludes.

2 Overview of US legislation on antidumping and countervailing measures

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

According to 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 agencies: the International Trade Commission (ITC) and the International Trade Administration of the 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 at "less than fair value". The DOC is also in charge of determining the level of duties to be opposed on the basis of the "dumping margin" found.

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 the 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 the 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 Subsidies Code (Feinberg and Hirsch 1989).

The 1984 Trade and Tariff Act introduced several changes to the AD/CV laws, the most relevant probably being the introduction of compulsory "cumulation" in the ITC's material injury determination, which was discretionary until then (Hansen and Prusa 1996). This practice consists on aggregating imports from different countries under investigation in order to evaluate if, together, they cause material injury to

domestic producers. Previous research, including Hansen and Prusa (1996) and Tharakan et al. (1998), has shown that cumulation greatly increases the chance of affirmative rulings. Another important modification introduced by the Trade and Tariff Act was the elimination of automatic annual reviews of measures, which were made voluntary and subject to request by an interested party (Blonigen and Park 2004).

AD/CV laws were further modified by the 1995 Uruguay Round Agreements Act. It is arguable that the WTO rules on AD/CV have been much inspired by US law and have, therefore, introduced little changes in US practice. As cited by Feinberg (2005), a US report (U.S. Congressional Budget Office 1994) states that the UR has left "much of current US law and policy intact." Probably the most important change to US AD/CV rules was the introduction of "sunset reviews" to determine if AD/CV orders should be revoked after 5 years. Although AD/CV measures could be adjusted through administrative reviews, the old rules did not impose any explicit limit as to the duration of measures. Under the UR rules, measures can stay in place for a maximum of 5 years after which they must be reviewed or lifted. Only if a new investigation shows that dumping and material injury are still present, can they be renewed for another 5 years. As such, the introduction of sunset reviews changes the nature of AD/CV measures from a potentially permanent form of protection into a temporary one.

Figure 1 presents the evolution of the number of AD/CV petitions in the United States between 1980 and 2005. There is a sharp increase in the number of contingent protection petitions from 1982 onwards, particularly remarkable in the case of CV. However, as the decade advanced there was a clear movement AD and away from CV petitions. The graph also shows a decline in AD/CV activity from 1995 onwards.

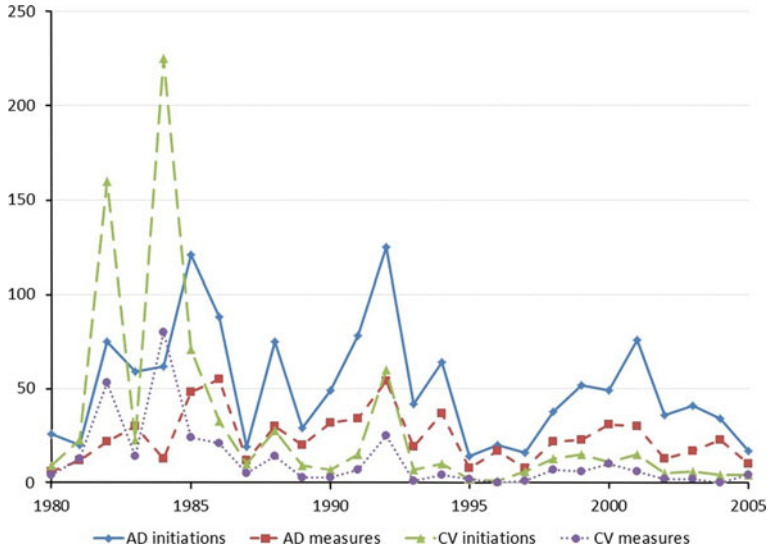

Fig. 1 Number of US antidumping and countervailing petitions involving manufacturing industries between 1980 and 2005, by year of initiation

3 Data and methodology

3.1 Data

The industry data used in this study come from the NBER-CES Manufacturing Industry Database (Becker and Gray 2009).[2] It contains sector-level data from 1958 to 2005 on output, sales, employment, payroll and other input costs, investment and capital stocks. Industries are classified under the 4-digit Standard Industry Classification (SIC) version 1987. Additional information on industry imports and exports was obtained from Schott (2010), who provides data on the value of imports and exports by industry and trade partner from 1972 to 2005.

The information on AD/CV petitions comes from the World Bank Temporary Trade Barriers Database (TTBD, Bown 2010). For the particular case of the United States, it provides detailed information on AD/CV cases from 1979 to 2010, including product descriptions, the names of 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 in 1989 onwards. This study considers all AD/CV cases filed between 1980 and 2005 concerning manufacturing industries.[3]

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 petitioning firms.[4] Out of the original 459 4-digit industries, 84 industries were dropped because they were either excluded from Schott's (2010) trade data or from TS/HS—SIC concordance tables, or because they presented missing or unreasonable values such as negative import penetration. The resulting sample contains 375 industries, including 176 involved in AD/CV petitions, of which 122 were granted AD/CV duty protection at least once between 1980 and 2005.

At this point it should be clarified what is meant by "case". Domestic industries seeking AD/CV protection may—and usually do—file parallel 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 level of duties usually differs from one named country to the other. Therefore, following Sabry (2000), in this study an AD/CV case or petition is a country-product pair (identified in TTBD by a unique "case_id").

[2] See the online appendix for more detailed information on the data sources and the contraction of the variables used in the analysis.

[3] The study also considers five AD cases initiated in 1979 resulting in measures imposed in 1980.

[4] A detailed explanation of this procedure is presented in the online appendix.

Table 1 Number of US antidumping and countervailing petitions involving manufacturing industries, 1980–2005

SIC[a]	Description	Cases filed			Duties imposed		
		AD	CV	% Total	AD	CV	% Total
33	Primary metal industries	499	289	48.9	207	104	48.1
28	Chemical and allied products	178	41	13.6	78	13	14.1
34	Fabricated metal products	94	37	8.1	45	9	8.4
35	Industrial machinery and equipment	92	13	6.5	42	5	7.3
20	Food and kindred products	38	24	3.9	20	8	4.3
36	Electronic and other electric equipment	37	3	2.5	22	1	3.6
32	Stone, clay and glass products	29	11	2.5	6	5	1.7
23	Apparel and other textile products	13	26	2.4	5	8	2
22	Textile mill products	21	17	2.4	4	7	1.7
30	Rubber and miscellaneous plastics products	25	10	2.2	14	3	2.6
37	Transport equipment	22	8	1.9	6	1	1.1
26	Paper and allied products	19	2	1.3	9	2	1.7
39	Miscellaneous manufacturing industries	16	3	1.2	4	1	0.8
38	Instruments and related products	14	5	1.2	3	0	0.5
27	Printing and publishing	5	3	0.5	5	2	1.1
24	Lumber and wood products	1	7	0.5	1	2	0.5
25	Furniture and fixtures	6	0	0.4	3	0	0.5
29	Petroleum and coal products	2	0	0.1	1	0	0.2

39 cases are duplicated since they concern products matching into more than one 2-digit SIC industry

[a] Standard Industry Classification version 1987

Between 1980 and 2005 a total of 1,091 and 477 AD and CV petitions were filed in the United States respectively. Of these, 461 (42 %) AD and 163 (34 %) CV cases ended in the imposition of import duties.[5] Table 1 presents a summary of AD/CV petitions classified by the corresponding 2-digit SIC industry. There is a striking concentration of AD/CV petitions and duties in metal industries (SICs 33 and 34), which collectively represent almost 60 % of all AD/CV activity. This will be taken into account in the empirical analysis below.

3.2 Measuring antidumping and countervailing protection at the industry level

As described in the previous sections, the empirical analysis presented in this paper relies on matching 4-digit SIC industry data with AD/CV cases. The main concern with this approach is that, while AD/CV filings concern specific product lines, sectors involve several products. This is a problem faced by all researchers trying to analyse the impact of trade measures using production data. Even papers using firm level data have to rely on matching trade classifications with industry or production

[5] An additional 24 (2 %) AD and 38 (8 %) CV petitions resulted in suspension agreements.

classifications. For example, Konings and Vandenbussche (2005, 2008) identify EU firms protected by AD measures on the basis of their 4-digit NACE classification.[6] Pierce (2011), on the other hand, is able to perform a closer matching between AD filings and US plants, by matching trade codes reported in AD cases to plants' 5-digit SIC classification. However, these studies are not able to account for the relative importance that the specific products involved in the petitions have in the firms or plants' product mix.

In this paper, I construct a measure of AD/CV protection at the industry level that aims to account for this difference in aggregation by using detailed import data. I start by calculating the share of imports directly affected by the measures on total imports competing with the industry, as follows:

$$w_{gcit_0} = \frac{m_{gcit_0}}{\sum_{gc} m_{gcit_0}} \tag{1}$$

where m_{gcit} is the CIF value of imports in product g coming from country c and matching to industry i. The subscript t_0 indicates the year before the initiation of the AD/CV petition, usually 2 years before the imposition of final measures. The denominator is the summation of the value of imports of all products and sources competing with industry i, i.e. sector level value of imports from Schott (2010). This measure takes into account, first, the relative importance of the product being affected for the industry as a whole (at least in terms of its exposure to import competition), as well as the relevance of the particular import source being targeted with the measures. More precisely, the share defined in Eq. (1) is composed of two elements:

$$w_{gcit_0} = \frac{m_{gcit_0}}{\sum_{c} m_{gcit_0}} * \frac{\sum_{c} m_{gcit_0}}{\sum_{gc} m_{gcit_0}} \tag{2}$$

The first element of this product is the share of source c on total imports of the affected product g. This is what is generally used for calculating trade-weighted AD duties.[7] The second element corresponds to the share of imports of product g on all imports competing with industry i and is aimed at accounting for the relative importance of the product for the sector.

Table 2 presents descriptive statistics of w_{gcit_0} and its decomposition as presented in Eq. (2). The table first presents the share of the named countries on total imports of the goods affected by the AD/CV petitions. On average, each investigated country represents around 16 % of the import market of the affected product. This average is slightly higher, 20 %, for petitions resulting in the imposition of duties. It is important to bear in mind, however, that the table reports separate shares for different countries. In a given moment a greater part of total imports of a particular product may be affected by AD/CV investigations if simultaneous cases are initiated against different sources. Also, the average hides much heterogeneity among cases, with some sources having a very small import share while others represent almost

[6] Konings and Vandenbussche (2005) also use information on the 7-digit CSO classification but only for large firms.

[7] See for example the effective AD rate used by Pierce (2011).

Table 2 Import shares (%) of products affected by antidumping and countervailing petitions, 1980–2005

	All petitions				Petitions resulting in duties			
	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.
Share of targeted country in imports of affected product								
AD	17.29	21.01	0.00	99.99	21.33	21.02	0.00	99.41
CV	13.23	20.40	0.00	99.55	15.65	22.01	0.00	98.57
Both	16.11	20.91	0.00	99.99	19.90	21.40	0.00	99.41
Share of affected product on total imports of the sector								
AD	16.12	22.65	0.01	100	15.44	22.31	0.01	100
CV	16.01	22.43	0.00	100	16.45	23.48	0.06	100
Both	16.08	22.58	0.00	100	15.69	22.49	0.01	100
Share of imports of affected product from targeted country on total imports of the sector								
AD	2.86	7.42	0.00	92.16	3.33	7.94	0.00	81.12
CV	3.28	11.42	0.00	92.72	4.21	14.28	0.00	89.57
Both	2.98	8.77	0.00	92.72	3.55	9.92	0.00	89.57

All shares are calculated using import values of the year before initiation of the AD/CV petition. Cases matching to more than one industry were averaged across industries before calculating overall descriptive statistics

the totality of imports of the affected products. The second ratio presented in the table is the share of the affected products on total imports competing with the 4-digit SIC industry. This share measures the importance, in terms of competing imports, of the affected products relative to other products of the industry. On average, products involved in AD/CV petitions represent around 16 % of total imports of the industry, but this can vary from almost zero to the totality of imports. The third part of the table shows the share of imports directly concerned on all imports competing with the 4-digit SIC industry used to calculate the measure of AD/CV protection, w_{gcit_0}. Affected imports represent, on average, around 3.0 % of total imports of the industry, 3.6 % for cases ending in duties.

Indexing by k AC/CV duties in place in industry i at time t, the level of AD/CV duty protection is calculated as follows:

$$AD/CVD_{it} = \sum_k twduty^k = \sum_k w^k_{gcit_0} * duty^k \tag{3}$$

This is the sum of all AD/CV duties in place in the industry weighted by the respective share of affected imports on total imports corresponding to the sector. The term $duty^k$ is the level of "all other firm" duties for AD and "all other" rates for CV reported in TTBD. These are the duties payable by foreign firms from the targeted country which 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). Table 3 presents descriptive statistics of $duty^k$ and $twduty^k$. On average AD duties are much higher than CV

Table 3 Antidumping and countervailing duties and trade weighted duties (%), 1980–2005

	Duty levels[a]				Trade weighted duties[b]			
	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.
AD	54.96	62.57	0.65	383.60	1.54	4.76	0.00	59.31
CV	12.40	14.88	0.56	112.34	0.42	2.00	0.00	18.45
Both	44.20	57.63	0.56	383.60	1.26	4.26	0.00	59.31

All duties are expressed in percentage. Cases matching to more than one industry or reporting different duty levels for product lines covered by measures, were averaged across industries before calculating overall descriptive statistics

[a] These are the "all other firms" duties for AD and "all other" rates for CV reported in TTBD

[b] They are calculated using import shares reported in Table 2. See main text for more details

duties, although both present great variability from case to case, ranging from less than 1 to 112 % for the case of CV and 384 % for AD duties.

3.3 Methodology to measure markups

Markups are measured by means of observable PCM. This method is based on the Lerner index, and is calculated as follows:

$$PCM_{it} = \frac{P_{it}Q_{it} - P_{Mit}M_{it} - W_{it}L_{it}}{P_{it}Q_{it}} \tag{4}$$

where $P_{it}Q_{it}$ are total sales of industry i at time t, $P_{Mit}M_{it}$ 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 and that marginal costs can be approximated by labour and material costs, Eq. (4) 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, providing a separate measure of the markup for each observation, and 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 observations, and hence are not 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 the isolation of 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 the separation of the effects on markups and changes in productivity. Therefore, in order to better interpret the results presented below, 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.[8] For that reason, 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 United States, Pierce (2011) finds that the revenue based productivity of protected plants increases with AD protection. However, 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 for the United States will reflect, to a greater extent, changes in markups rather than productivity.

3.4 Basic specification

Following Tybout (2003) and Konings and Vandenbussche (2005), the following specification is estimated:

$$PCM_{it} = \alpha_1 PCM_{it-1} + \cdots + \beta AD/CVD_{it} + \delta X_{it} + \alpha_i + \alpha_t + \epsilon_{it} \qquad (5)$$

PCM_{it} is the price-cost margin of sector i in year t as defined in Eq. (4). AD/CVD_{it} measures industry AD/CV protection presented in Eq. (3). The matrix X_{it} is a group of control variables which include capital intensity (measured as the ratio of capital over sales), import penetration (imports divided by the sum of sales and net imports), and industry trade weighted tariff schedules (TWTS).[9] The term α_i represents industry-fixed effects, α_t are time effects (full set of year dummies) and ϵ_{it} is the error term. Given the inclusion of industry fixed effects and year dummies, Eq. (5) can be interpreted as a panel difference-in-difference specification, where sectors not protected by AD/CV duties are functioning as counterfactuals.

Given its dynamic structure, Eq. (5) is estimated using the system generalized method-of-moments (GMM) 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 GMM estimator developed by Arellano and Bond (1991), as well as the first-difference two-stage-least-squares estimator proposed by Anderson and

[8] 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. (2003a), as well as a rich body of empirical literature including Pavcnik (2002), Bernard et al. (2006b), among many others; and more recently studies on the effects of trade on multiproduct firms, most notably Bernard et al. (2006c).

[9] See the online appendix for a more detailed discussion on how these variables are constructed.

Hsiao (1982).[10] Instrument proliferation is controlled for by "collapsing" instruments as proposed by Roodman (2009).[11] In all cases the more efficient two-step estimators is used and standard errors are calculated using Windmeijer's (2005) finite sample correction. The number of lags of the dependent variable included in the model is chosen after experimenting with different lags and on the basis of their significance as well as tests of autocorrelation of the error term.

3.5 Controlling for endogeneity

As explained in Sect. 2, AD/CV measures 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 Eq. (5).

The sign of the endogeneity bias is a priori ambiguous. If a given sector is experiencing increasing competition or a downturn in its performance, this would normally translate into lower PCM. Additionally, these sectors may be more likely to file for protection and get an affirmative injury ruling by the ITC. This would imply that direct estimation of Eq. (5) 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 Eq. (5) may overestimate (underestimate) the effect of AD/CV duties.

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 (5) considering AD/CVD_{it} as an endogenous variable and adding additional instruments.

The second approach consists of estimating the difference-in-difference specification in Eq. (5) 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 the matching procedure is to estimate the propensity score, i.e. the probability that a given sector receives AD/CV protection in a given year. Usually propensity scores

[10] Arellano–Bond first-difference 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, Arellano–Bond will be preferable to the Arellano–Bover/Blundell–Bond estimator since it makes fewer assumptions. Tentative estimations of Eq. (5) 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 the analysis. For this reason, the Arellano–Bover/Blundell–Bond system estimator is preferred.

[11] A 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 2009). Given the length of the dataset used in this study, even when the number of lags used as instruments is limited to the minimum, the number of instruments is still large. Collapsing instruments allows reducing their number without loss in efficiency.

are calculated using binary choice models, such as probit or logit, as the predicted probability that a give individual is "treated". In our case, treatment is the presence of an AD/CV duty. However, strictly speaking, sectors which do not receive AD/CV duty protection cannot be considered as a group of non-treated sectors. In fact, the dataset includes sectors that, although did not receive duty protection, were involved in petitions resulting in different outcomes. For example, a large number of cases were withdrawn in the period considered. Ignoring this difference could greatly bias the estimation of propensity scores.[12]

For this reason, and following Blonigen and Park (2004) and Konings and Vandenbussche (2008), I use a multinomial specification which allows the separation of the different type of AD/CV activity presented in a sector at a given point in time. The dependent variable in this model takes four possible values: "1: no AD/CV petitions were filed in the sector that year", "2: one or more petitions were filed in the sector but all resulted in negative rulings", "3: one or more petitions were filed resulting in withdrawals or suspension agreements", and "4: one or more petitions were filed resulting in the imposition of duties". Withdrawals and suspension agreements are considered together due to the rarity of the later, which precludes the estimation of a separate effect. Since withdrawals are usually seen as resulting from informal agreements on prices or quantities between plaintiffs, similar to those of suspension agreements, bundling together withdrawals and suspension agreements seems the more natural choice.

The explanatory variables included in the multinomial model are selected following the literature on the determinants of AD/CV petitions and duties.[13] They include, firstly, import penetration, the 3-year percentage change in the value of shipments, employment, value added per worker and the share of workers that are members of a trade union (Feinberg and Hirsch 1989). Additionally, recent literature has highlighted the role of retaliation on AD/CV activity. For example, Blonigen and Bown (2003) and Feinberg and Reynolds (2006) show that the incidence of contingent protection measures may be dampened by the threat of retaliation in export markets. To account for this, the model also includes the industry's export intensity as a measure of its exposure to retaliation threats. A more careful treatment of the role of retaliation is presented in the online appendix. The model also includes the variable of interest, PCM, and its 3-year percentage change in order to control for its pre-treatment level and evolution. All variables are lagged one period.[14] To account for past AD/CV activity in the sector, I consider the number of AD/CV petitions filed in the industry in the three previous years.[15] All

[12] I thank an anonymous referee for pointing this out.

[13] This includes Finger (1981), Finger et al. (1982), Feinberg and Hirsch (1989), Hansen (1990), Baldwin and Steagall (1994), Hansen and Prusa (1996, 1997), Sabry (2000), Knetter and Prusa (2003), Blonigen and Park (2004) and Feinberg (2005). See Blonigen and Prusa (2003) and Nelson (2006) for reviews.

[14] Other variables originally included in the model but dropped due to lack of significance of their coefficients were: the square of import penetration and the 3-year percentage change in employment and value added per worker.

[15] Results do not change if this regressor is substituted by the number of petitions filed in the sector in the previous 5 years. In alternative specifications, the number of AD/CV duties imposed in the last 3 and 5 years were also included but their coefficients were non-significant.

macroeconomic shocks—including changes in the exchange rate (Knetter and Prusa 2003) and GDP growth—are controlled for through a complete set of year dummies. Finally, I also include a dummy variable identifying metal industries (2-digit SIC codes 33 and 34).[16]

4 Results

4.1 Determinants of antidumping and countervailing duties

Table 4 presents the results of estimating the mutinomial logit model described in the previous section.[17] 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 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. The first three columns present the results of the basic specification for the three remaining outcomes. Of particular interests are the results for outcome 4 which compare sectors receiving AD/CV duty protection to those not involved in AD/CV that year.

Most coefficients present the expected sign and are consistent with the previous literature, although some are not statistically significant. The coefficient on import penetration is positive but, surprisingly, not significant. However, this variable is highly correlated with export intensity. If export intensity is dropped from the model, the coefficient of import penetration is positive and significant as usually reported in the literature. The percentage change in the value of shipments presents a negative and significant coefficient but only for outcome 4. This may reflect the fact that industries which are experiencing a downturn are more likely to receive an affirmative material injury ruling. Employment presents a positive and significant coefficient for all three outcomes. This result is line with Moore (1992) and Hansen

[16] Another possible determinant of AD/CV activity is the presence of safeguards. It could be expected that an industry that is already receiving safeguard protection is less likely to request further protection or be granted that protection. At the same time, an industry that requested safeguard protection but was rejected, may try its luck with alternative trade measures. Unfortunately, the TTBD only contains information on safeguards starting from 1995. In the period 1995–2005, the United States initiated 10 safeguard investigations, eight of which concerned manufacturing products. Of these, six cases resulted in the application of safeguard measures. Additionally, the WTO accession protocol for China introduced a new form of safeguard applicable exclusively for imports coming from this country (Spadi 2002). Since China's accession in 2001 and up to 2005, the United States carried out six investigations, all involving manufacturing products, but none resulting in the imposition of measures. I tested whether safeguard petitions affected the probability of AD/CVD activity at the sector level by re-running the multinomial logit model for the period 1995–2005 and introducing two measures of safeguard activity: the number of safeguard measures in place the previous year and the number of safeguard petition rejected the previous year, weighting each case by the share of imports affected on total imports competing with the industry as defined in Eq. (1). Both variables presented non-significant coefficients. Results are available from the author on request.

[17] The model was estimated for the period 1979 to 2005 since some measures imposed in 1980—and considered in the analysis—correspond to cases initiated in 1979.

Table 4 Determinants of antidumping and countervailing petitions, multinomial logit estimation

	(1) Outcome 2	(2) Outcome 3	(3) Outcome 4	(4) Outcome 2	(5) Outcome 3	(6) Outcome 4
Import penetration	0.00500	0.00528	0.00219	0.00447	0.00547	0.00361
	(0.00378)	(0.00512)	(0.00324)	(0.00336)	(0.00553)	(0.00233)
Three-year percentage change in shipments	−0.00020	0.00050	−0.00802**	0.00025	0.00104	−0.00849**
	(0.00345)	(0.00531)	(0.00327)	(0.00332)	(0.00530)	(0.00332)
Employment	0.00504***	0.00594***	0.00532***	0.00491***	0.00589***	0.00535***
	(0.00121)	(0.00117)	(0.00099)	(0.00116)	(0.00119)	(0.00104)
Value added per worker	0.00137*	0.00103	0.00178**	0.00137*	0.00111	0.00169**
	(0.00073)	(0.00115)	(0.00074)	(0.00072)	(0.00113)	(0.00074)
Union membership	0.01642**	0.01109	−0.00336	0.02821***	0.01665	−0.02567**
	(0.00822)	(0.01067)	(0.00893)	(0.01006)	(0.01466)	(0.01261)
Interacted with post-1984 dummy				−0.01991	−0.01394	0.03787***
				(0.01253)	(0.01996)	(0.01321)
Export intensity	0.00450	0.00415	0.00628**	0.00994*	0.00299	0.01330***
	(0.00287)	(0.00458)	(0.00284)	(0.00559)	(0.01079)	(0.00334)
Interacted with post-Uruguay Round dummy				−0.00667	0.00161	−0.00885***
				(0.00576)	(0.01099)	(0.00276)
PCM	0.22796	0.16874	−0.98288	0.13503	0.15724	−0.91790
	(0.87517)	(1.40515)	(1.06619)	(0.86369)	(1.40708)	(1.06472)
Three-year percentage change in PCM	−0.02169***	−0.01096	−0.00504	−0.02061***	−0.01091	−0.00605
	(0.00711)	(0.00907)	(0.00475)	(0.00719)	(0.00919)	(0.00472)
AD/CV initiations three previous years	0.15049***	0.14859***	0.17687***	0.15180***	0.14903***	0.17248***
	(0.03159)	(0.04341)	(0.03961)	(0.03325)	(0.04349)	(0.03953)
Metal industries dummy	0.50260*	−0.00818	0.98921***	0.51849**	−0.01135	0.98386***
	(0.26147)	(0.52092)	(0.26150)	(0.26022)	(0.51691)	(0.26209)

Table 4 continued

	(1) Outcome 2	(2) Outcome 3	(3) Outcome 4	(4) Outcome 2	(5) Outcome 3	(6) Outcome 4
Year dummies	Yes			Yes		
Observations	10,125			10,125		
Chi-squared statistic	130,100***			131,790***		
Pseudo-R2	0.139			0.143		

Robust standard errors in parentheses

***/**/* denotes statistically different from zero at 1/5/10 % levels respectively. The dependent variable takes three possible values: "1: no AD/CV petitions were filed in the sector that year", "2: one or more petitions were filed in the sector but all resulted in negative rulings", "3: one or more petitions were filed resulting in withdrawals or suspension agreements", and "4: one or more petitions were filed resulting in the imposition of duties". The omitted base outcome is "1". Joint significance of each coefficient in the three equations was confirmed using the Wald tests. All regressors are considered one year before initiation of AD/CV filing

and Prusa (1996, 1997) who find that political factors, such as the size of the industry, affect the outcome of AD cases. Also significant are value added per worker and export intensity, although the latter presents the opposite sign of what would be expected according to the threat of retaliation hypothesis. Union membership is significant for outcome 2 but not for the presence of AD/CV protection. 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 not significant for all three outcomes. However, in the interest of caution and since it measures the pre-treatment level of the outcome of interest, it is kept in the model. The percentage change in PCM presents always a negative coefficient but only significant for outcome 2.

As discussed above, the period of study covers two mayor changes in AD/CV legislation. These changes in the rules may have effects on the determinants of AD/CV filings and outcomes. In order to verify how this may affect results, each regressor is interacted with dummies accounting for the period after each reform in AD/CV rules. The first takes the value 1 for all years from 1985 to 2005, while the second dummy takes the value 1 for all years from 1995 to 2005. Therefore, the first interaction tests whether all cases initiated after the 1984 Trade and Tariff Act are different to those in the first 4 years of the dataset, while the second interaction tests whether petitions filed after the UR changes are different to all cases prior to that date. Most interactions were not significant and were progressively dropped from the model. The resulting model is presented in columns (4) to (6).

Only union membership and export intensity present structural breaks in their coefficients. In particular, in what concerns the equation on outcome 3, union membership presents now a negative and significant coefficient for the first 5 years of the sample, while then the effect becomes positive. As for export intensity, the structural break appears after the UR. The interaction presents a negative and strongly significant coefficient. This is may be on account of the fact that it is since the UR that more and more countries, particularly emerging economies like China and India, have started to use contingent measures intensively. Therefore, it is logical that the threat of retaliation has become more of a concern in this period.

On the basis of the propensity scores thus calculated, a nearest neighbour matching with replacement is performed for each year separately,[18] resulting in control groups of sectors that have the closest predicted probability of being protected but that were not. Controls are drawn from three alternative pools of industries. The first included only the 199 industries that were not involved in AD/CV at any point throughout the period of analysis. The second adds to these the 35 that were involved in AD/CV filings which all resulted in negative rulings, while the third also includes an additional 10 industries that were involved in AD/CV filings but which were all either rejected or withdrawn. Sectors presenting suspension agreements were excluded since they also obtain affirmative rulings. The interest of adding sectors involved in AD/CV filings but not receiving protection lies in the idea that these sectors also self-selected into AD/CV petitioning. Therefore, they should represent better controls than industries not involved in AD/CV at all.

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

However, as be discussed below, filings not resulting in protection may have effects on PCM and, therefore, it is important to test the sensitivity of results using alternative control groups. Balancing tests for the three alternative control groups are presented in Table 5. With the exception of union membership in the two first control groups, *t* tests do not reject the null that the means of protected sectors and controls are equal prior to the AD/CV filings. This is also confirmed by Hotteling's joint test.

As discussed above, as an additional approach to control for endogeneity in AD/CV duties, Eq. (5) is also estimated considering AD/CVD_{it} as endogenous and adding additional instrument to the specification. On the basis of the results presented in Table 4, the additional instruments included are the 3-year percentage change in shipments, value added per worker, union membership and export intensity, all lagged two periods. Other determinants of AD/CV duties such as lags of PCM and import penetration are already included as instruments in the original specification of Eq. (5).

4.2 Impact of antidumping and countervailing duties on price-cost margins

Table 6 presents the results of estimating Eq. (5) using the system GMM estimator for the complete sample ranging from 1980 to 2005. The first column presents the estimation using the complete set of 375 industries, while columns (2) to (5) limits the sample to protected industries and the alternative three controls groups presented in the previous section. Column 6 shows the results when instrumenting for AD/CVD_{it}. The equation includes as regressors two lags of the dependent variable. The second lag is not significant in all specifications but its omission causes autocorrelation in the residuals for some specifications. However, the main results are robust to its omission.

In all estimations, the coefficient of AD/CVD_{it} is positive as expected but not significant. This result is at odds with what has previously been found using plant or firm-level data, particularly with the findings by Pierce (2011) for AD measures imposed in the United States between 1988 and 1996. However, the specification in Table 6 assumes that the effect of AD/CV duties is the same throughout the 26-year period. It is likely that the change in AD/CV rules, particularly those introduced following the UR, have had an impact on the effects of AD/CV on market outcomes.

To test how this changes the results, Table 7 present estimations of Eq. (5) splitting the sample in the two sub-periods before and after the UR reform. For brevity, only the estimations using the second control group and instrumenting for AD/CVD_{it} are presented. Results hold for the alternative specifications.

Columns (1) and (2) present the estimations for the period 1980–1994, while columns (3) and (4) show the results for the period 1995–2005. Now a different story emerges. The coefficient of AD/CVD_{it} is positive and significant for the pre-UR period while for the post-UR is of much smaller magnitude and not significant. This suggests that the specific rules in place in each period may play a role in determining the effects of these measures on domestic producers. To check this further, the remaining columns in Table 7 show the results limiting the pre-UR period to the years after 1984. As was discussed in Sect. 2, US AD/CV system also

Table 5 Balancing tests

	Mean		Test of mean equality	
	Treated	Control group	*t*-stat	*p*-value
Control group I				
Import penetration (%)	20.69	20.75	0.02	0.98
Three-year percentage change in shipments	10.21	8.56	−0.71	0.48
Employment	64.9	63.68	−0.15	0.88
Three-year percentage change in employment	−6.56	−6.75	−0.13	0.89
Value added per worker	89.71	109.67	1.04	0.30
Three-year percentage change in value added per worker	0.19	0.16	−0.91	0.37
Price-cost margins	0.35	0.36	1.14	0.25
Three-year percentage change in price-cost margins	2.1	0.24	−1.15	0.25
Union membership	26.59	23.97	−2.03	0.04
Export intensity	19.28	23.21	0.76	0.45
Number of observations	260	210		
Hotteling's *F*-test	*F*-test	*p*-value	No. of obs	
	0.86	0.57	470	
Control group II				
Import penetration (%)	20.69	20.74	0.02	0.99
Three-year percentage change in shipments	10.21	8.28	−0.86	0.39
Employment	64.9	65.99	0.14	0.89
Three-year percentage change in employment	−6.56	−7.5	−0.69	0.49
Value added per worker	89.71	111.8	1.16	0.25
Three-year percentage change in value added per worker	0.19	0.17	−0.52	0.60
Price-cost margins	0.35	0.36	1.19	0.23
Three-year percentage change in price-cost margins	2.1	1.75	−0.21	0.83

Table 5 continued

	Mean		Test of mean equality	
	Treated	Control group	*t*-stat	*p*-value
Union membership	26.59	24.27	−1.81	0.07
Export intensity	19.28	23.63	0.85	0.40
Number of observations	260	215		
Hotteling's *F*-test	*F*-test	*p*-value	No. of obs	
	0.63	0.79	475	
Control group III				
Import penetration (%)	20.69	21.06	0.12	0.91
Three-year percentage change in shipments	10.21	8.68	−0.69	0.49
Employment	64.9	67.07	0.27	0.79
Three-year percentage change in employment	−6.56	−7.5	−0.71	0.48
Value added per worker	89.71	111.53	1.16	0.25
Three-year percentage change in value added per worker	0.19	0.18	−0.34	0.73
Price-cost margins	0.35	0.36	0.99	0.33
Three-year percentage change in price-cost margins	2.1	1.85	−0.16	0.88
Union membership	26.59	24.7	−1.46	0.14
Export intensity	19.28	23.28	0.79	0.43
Number of observations	260	218		
Hotteling's *F*-test	*F*-test	*p*-value	No. of obs	
	0.49	0.89	478	

All variables refer to the year before initiation of AD/CV petitions as included in the multinomial logit equation presented in Table 4

Table 6 Impact of antidumping and countervailing duties on price-cost margins, basic specification 1980–2005

Dependent variable	Basic[a]	Control group I[b]	Control group II[c]	Control group III[d]	IV[e]
PCM	(1)	(2)	(3)	(4)	(5)
PCM_{t-1}	0.71970***	0.72896***	0.77964***	0.76558***	0.70568***
	(0.08319)	(0.10061)	(0.10683)	(0.10387)	(0.03949)
PCM_{t-2}	0.03965	0.02450	−0.00666	0.00400	0.07183**
	(0.06279)	(0.07927)	(0.08055)	(0.07876)	(0.03117)
AD/CVD	0.00030	0.00030	0.00032	0.00032	0.00020
	(0.00025)	(0.00026)	(0.00028)	(0.00028)	(0.00029)
Capital intensity	0.01496	0.02122	0.02978	0.02883	−0.00590
	(0.01290)	(0.01733)	(0.01920)	(0.01868)	(0.01033)
Import penetration	−0.00001	0.00002	−0.00004	−0.00003	0.00010
	(0.00007)	(0.00010)	(0.00010)	(0.00010)	(0.00007)
TWTS	−0.03953	−0.06249	−0.05689	−0.05999	−0.00577
	(0.03878)	(0.05402)	(0.05473)	(0.05301)	(0.03593)
Year dummies	Yes	Yes	Yes	Yes	Yes
Observations	9,439	5,791	6,134	6,264	9,439
Number of SIC	375	230	243	248	375
AR(2) test (*p*-value)	0.992	0.866	0.303	0.307	0.296
Hansen test (*p*-value)	0.593	0.706	0.615	0.575	0.257

Standard errors (in parentheses) were calculated using Windmeijer's (2005) 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] Difference-in-difference estimation using a control group selected on the basis of a nearest neighbour matching, where propensity scores were obtained from the multinomial logit model presented in Table 4 and controls drawn from industries that were not involved in AD/CV filings between 1980 and 2005

[c] Idem as b but where controls were drawn from industries that were not involved in AD/CV affirmative filings between 1980 and 2005

[d] Idem as b but where controls were drawn from industries that did not receive AD/CV duty protection between 1980 and 2005

[e] Specification instrumenting for AD/CVD

saw important changes with the 1984 Trade and Tariff Act, particularly the introduction of "cumulation". Cumulation makes it easier to target small import sources by considering them together when evaluating the presence of injury. This could have consequences for the impact of AD/CV on market power since the presence of cumulation could limit the possibility of trade diversion (more sources can be now targeted), facilitating the capture of monopolistic rents by domestic producers.[19] As the table shows, the coefficient of AD/CVD_{it} is still statistically

[19] I thank Thomas Prusa for pointing this out.

Table 7 Impact of antidumping and countervailing duties on price-cost margins by periods

Dependent variable	Period 1980–1994		Period 1995–2005		Period 1984–1994	
	Control group II[a]	IV[b]	Control group II[a]	IV[b]	Control group II[a]	IV[b]
PCM	(1)	(2)	(3)	(4)	(5)	(6)
PCM_{t-1}	0.76200***	0.75578***	0.73458***	0.67765***	0.68674***	0.79970***
	(0.10018)	(0.06308)	(0.13983)	(0.05060)	(0.12921)	(0.06698)
PCM_{t-2}	−0.01871	0.05523	0.04691	0.08189**	0.02386	0.02717
	(0.08050)	(0.05190)	(0.10337)	(0.03753)	(0.09939)	(0.05761)
AD/CVD	0.00047*	0.00044**	0.00018	−0.00027	0.00053**	0.00037**
	(0.00027)	(0.00019)	(0.00035)	(0.00067)	(0.00026)	(0.00019)
Capital intensity	−0.00037	−0.02111**	0.02093	0.02373	−0.01169	−0.01574
	(0.01049)	(0.00975)	(0.01438)	(0.01516)	(0.01916)	(0.01500)
Import penetration	0.00007	−0.00025	−0.00015	−0.00015	0.00008	−0.00031
	(0.00025)	(0.00020)	(0.00012)	(0.00009)	(0.00026)	(0.00023)
TWTS	−0.04750	−0.00294	−0.01277	−0.00908	0.12885	0.04625
	(0.06689)	(0.05393)	(0.06417)	(0.05583)	(0.11929)	(0.06772)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,608	5,558	2,526	3,881	2,413	3,721
Number of SIC	243	375	243	375	243	375
AR(2) test (*p*-value)	0.179	0.938	0.872	0.341	0.617	0.552
Hansen test (*p*-value)	0.851	0.833	0.672	0.532	0.824	0.957

Standard errors (in parentheses) were calculated using Windmeijer's (2005) finite sample correction

***/**/* denotes statistically different from zero at 1/5/10 % levels respectively

[a] Difference-in-difference estimation using a control group selected on the basis of a nearest neighbour matching, where propensity scores were obtained from the multinomial logit model presented in Table 4 and controls drawn from industries that were not involved in AD/CV filings between 1980 and 2005

[b] Specification instrumenting for AD/CVD

significant and of similar magnitude than before, confirming that results are driven by the inter-reform period.[20]

In conclusion, the results presented suggest that, since the 1995 UR reform, contingent protection measures have become a less effective way of protecting domestic monopolistic rents. A possible explanation for this finding it the introduction of sunset reviews. As discussed in Sect. 2, before 1995 AD/CV measures in the United States did not have a predetermined duration. They could stay in place indefinitely until an administrative review resulted in their revocation.

[20] Results for the sub-period 1980–1984, not reported here, are sensitive to the specification chosen. This is probably due to the great reduction in the number of observations which is likely to affect the performance of the GMM estimators, making it difficult to draw conclusions.

Table 8 Duration of antidumping and countervailing duties by year of imposition, 1980–2005

Period of Imposition	Antidumping duties			Countervailing duties		
	Average duration	Number of duties	Duration >5 years	Average duration	Number of duties	Duration >5 years
1980–1984	11.73	55	34 (62 %)	5.43	47	16 (34 %)
1985–1994	13.37	227	208 (92 %)	9.56	88	73 (83 %)
1995–2005	8.55	200	145 (73 %)	7.74	38	24 (63 %)

Duration is calculated using information on revocation updated until the last quarter of 2010. The duration of duties still in place in 2010 is calculated up to that date.

However, since 1995, WTO rules on AD/CV state that measures can stay in place for a maximum of 5 years, after which they have to be revoked unless a review shows that revocation of the measures could lead to reappearance or continuation of material injury.

To illustrate how this has affected the use of AD/CV in practice, Table 8 presents descriptive information regarding the duration of AD/CV duties imposed between 1980 and 2005. The table presents the average number of years AD/CV duties were in place and the number of measures with duration exceeding the 5-year limit.[21] The sample is split in three sub-periods: the 5 years before the 1984 Trade and Tariff Act, the period between this and the UR reforms, and the years after the UR. Duties imposed between 1985 and 1994 were in place for an average of 13 years for AD and 10 years for CV, much longer than duties imposed after the UR which present averages of 9 and 8 approximately. Moreover, around 92 % of AD and 83 % respectively of CV duties imposed before the UR reform were in place for more than 5 years, as compared to 73 and 63 % for those imposed after the UR.

Duties imposed between 1984 and 1994 also present a much longer average duration with respect to those imposed before 1984. As was mentioned in the Sect. 2, the 1984 Trade and Tariff Act also changed the procedure of revision of AD/CV measures by eliminating automatic annual reviews. In conclusion, these numbers suggest that, although the majority of duties still exceed the 5-year limit, the presence of mandatory reviews may have an effect in limiting their duration.[22]

It could be argued that limiting the duration of measures changed the logic of AD/CV from a permanent or long term form of protection into a transitory one, making these tools a less effective way of safeguarding monopolistic rents.[23] AD/CV measures may have become more of an instrument to "gain time" in order to

[21] The average duration of duties imposed after 1995 is underestimated since a larger number of these duties were still in place when the data for the current version of TTBD was collected. However, they all had reached the 5-year limit by that time.

[22] However, it should be pointed out that a cross-country study by Cadot et al. (2007) using data from 1979 to 2005 finds no evidence that the introduction of sunset reviews had an impact the duration of AD duties in the United States. However, the study does not split the pre-UR period according to the 1984 Trade and Tariff Act.

[23] It should be noted that Feinberg and Hirsch (1989) already found that contingent protection in the United States seems more related to the maintenance of "quasi-rents accruing to capital and labor, rather than protection of monopoly returns".

adapt to new import competition, rather than a tool to permanently maintain domestic producers' market power.

An important issue to mention is that, as was discussed in Sect. 3.3, the measure of market power used in this paper, PCM, does not control for changes in productivity. In consequence, the different outcomes seen for the pre and post-UR may be driven by a different impact on domestic producers' productivity. Intuitively one could be tempted to think that temporary protection should incentivise firms to accelerate their rate of innovation, since they will have to face import competition in the future. If this were the case, it might be expected that the period post-UR would be characterised by higher innovation and productivity gains. This should translate into higher effects on PCM, the reverse of what it is observed in the data. However, a series of theoretical contributions have shown that the link between technology adoption and the duration of tariff protection is not so straight forward.

For example, Miyagiwa and Ohno (1995) show that temporary protection which stays in place until innovations are adopted causes delays in the adoption of new technology by domestic firms, while permanent tariff protection speeds up adoption. What is crucial is whether or not the duration of the protection endogenous to the firm's decision to adopt the new technology. In a related paper, Miyagiwa and Ohno (1999) show that an import tariff which is imposed for a fixed period of time, like in the post-1995 AD/CV system, increases the rate of R&D investment if the revocation of the protection is independent of whether the domestic firm adopts the new technology. However, this result is reversed if the domestic firm believes that technology adoption would advance the date of revocation or impede its renovation for an extra period. As such, a perception that AD/CV measures may never be reviewed could lead firms to innovate at a higher rate than in a system with limited duration and mandatory revision.[24] If this were the case, then the pre-UR system would lead to higher technology adoption than the new system, translating in higher productivity and hence higher observed PCMs.

Although the results presented in Table 7 do not allow the separation of the specific mechanism leading to the observed higher PCM under the old AD/CV rules, they illustrate that the 1995 reform in contingent protection rules has had important consequences for their effects on domestic firms and markets. However, it is important to note that although statistically significant, the estimated effect for the pre-UR period is rather small in magnitude. Consider, for example, a change from zero to the sample mean of AD/CVD_{it} (conditional on duties being in place), which equals 3.47 % for the 1980–1994 period. The coefficient estimated in column (2), implies an increase in industry PCM of about 0.0015 (0.41 % of average PCM). This is small compared to previous studies. For example, Konings and Vandenbussche (2005) find an average effect of AD duties on EU firms' PCM (measured through a dummy) equal to 0.04. A possible explanation for this difference is the greater degree of trade diversion present in the United States compared to the EU as reported by Prusa (1997) and Konings et al. (2001), limiting the possibility of domestic producers in the United States to exercise greater market power under AD/

[24] Here is worth mentioning the study by Crowley (2006) which shows that permanent country-specific tariff protection like AD/CV duties leads to increased technology adoption by domestic firms.

CV protection. It would be interesting to see whether the different impact found for the pre and post- UR periods is linked to a change in the degree of trade diversion. This is outside the scope of this paper, but it represents and interesting question for future research on the matter.

The next section presents some robustness checks and extensions to the results presented above.

4.3 Extensions and robustness checks

4.3.1 Controlling for steel and other metal industries

One concern regarding the result presented above is the fact that some industries are heavier users of AD/CV than others. As discussed above, almost half of all AD/CV petitions and measures involve SIC 33 primary metal industries (Table 1). Moreover, considering also petitions concerning SIC 34 fabricated metal products, metal industries alone account for almost 60 % of all AD/CV activity. Therefore, it is important to consider whether these industries are driving the results. To this end, Eq. (5) was re-estimated adding the interaction between AD/CVD_{it} and a dummy indicating whether the 4-digit sector belongs to the 33 or 34 2-digit SIC groups. Results for this alternative specification are presented in columns (1) to (4) of Table 9. As before, only estimations using the second control group and instrumenting for AD/CVD_{it} are reported, but the results hold for the alternative specifications.

The first two columns report results for the pre-UR period, 1980–1994. Similar results are obtained if the first 5 years are dropped. The coefficient of the interaction is negative and significant, suggesting that metal sectors are affecting the coefficient of AD/CVD_{it} downwards. This result is consistent with Blonigen et al. (2007) who find no market power of US steel producers protected by import tariffs. In fact, considering the sample mean of AD/CVD_{it} (conditional on duties being in place) for all non-metal sectors (3.61 %), a change in AD/CVD_{it} from zero to that level of duties is associated with an increase in PCM of 0.0021 (or 0.55 % of average PCM of non-metal industries). Although it is larger than the effect found in the basic specification, it is still fairly small. Columns (3) and (4) repeat the exercise for the post-UR years. Both AD/CVD_{it} and its interaction with the metal industries dummy are not significant.

4.3.2 Estimating the average effect of duties

Many earlier empirical studies have tested the effects of AD/CV measures as average effects using dummies to identify the presence of these measures. To test whether such an effect is present here, Eq. (5) is re-estimated adding a dummy identifying the presence of AD/CV duties. The estimations for the 1980–1994 period using the second control group are reported in the last two columns of Table 9. They are robust to using the other control groups, instrumenting for AD/CVD_{it} and restricting the period of analysis to 1985–1994 . The estimated average effect is not statistically different from zero while the coefficient of AD/CVD_{it} is still

Table 9 Impact of antidumping and countervailing duties on price-cost margins, robustness checks

Dependent variable	Controlling for metal industries				Average effect	
	Period 1980–1994		Period 1995–2005		Period 1980–1994	
PCM	Control group II[a] (1)	IV[b] (2)	Control group II[a] (3)	IV[b] (4)	Control group II[a] (5)	IV[b] (6)
PCM_{t-1}	0.75906***	0.82016***	0.73354***	0.70308***	0.76358***	0.75323***
	(0.10027)	(0.06780)	(0.13952)	(0.06109)	(0.10001)	(0.09788)
PCM_{t-2}	−0.01672	0.00638	0.04634	0.09252**	−0.01930	−0.01427
	(0.08070)	(0.05455)	(0.10338)	(0.04047)	(0.08044)	(0.07995)
AD/CVD	0.00057**	0.00058***	0.00022	0.00048	0.00056**	0.00060**
	(0.00027)	(0.00015)	(0.00037)	(0.00114)	(0.00028)	(0.00028)
AD/CVD*metal	−0.00130**	−0.00163***	−0.00090	−0.00246		−0.00077
	(0.00053)	(0.00056)	(0.00146)	(0.00189)		(0.00063)
Average effect					−0.00236	−0.00109
					(0.00315)	(0.00351)
Average effect*metal						−0.00870
						(0.00707)
Capital intensity	−0.00118	−0.02356***	0.02006	0.01092	−0.00070	−0.00167
	(0.01047)	(0.00845)	(0.01473)	(0.01342)	(0.01055)	(0.01061)
Import penetration	0.00007	−0.00003	−0.00014	−0.00003	0.00007	0.00006
	(0.00025)	(0.00020)	(0.00013)	(0.00012)	(0.00025)	(0.00024)
TWTS	−0.04530	−0.00954	−0.01364	0.00606	−0.05068	−0.04556
	(0.06725)	(0.05461)	(0.06405)	(0.04311)	(0.06764)	(0.06851)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,608	5,558	2,526	3,881	3,608	3,608
Number of SIC	243	375	243	375	243	243
AR(2) test (*p*-value)	0.188	0.424	0.868	0.267	0.178	0.196
Hansen test (*p*-value)	0.858	0.717	0.665	0.367	0.855	0.851

Standard errors (in parentheses) were calculated using Windmeijer's (2005) finite sample correction

***/**/* denotes statistically different from zero at 1/5/10 % levels respectively

[a] Difference-in-difference estimation using a control group selected on the basis of a nearest neighbour matching, where propensity scores were obtained from the multinomial logit model presented in Table 4 and controls drawn from industries that were not involved in AD/CV filings between 1980 and 2005

[b] Specification instrumenting for AD/CVD

positive and significant. This result is consistent with that of Pierce (2011) using plant-level data and a static specification. Results also hold if AD/CVD_{it} and the average effect indicator are interacted with the metal industries dummy, as shown in the last column of Table 9. For the post-UR period, omitted here for brevity, all effects are not significant.

4.3.3 Non-duty effects

The previous sections have analysed the effects of AD/CV following the imposition of import duties. However, AD/CV petitions may also have effects even if no duties are imposed. Staiger and Wolak (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 export prices during the period of the investigation. This would lead to a drop in imports, restricting competition in the market, and allow domestic producers to increase markups. An additional reason for finding a filing effect in both AD and CV petitions is the imposition of preliminary duties. As discussed in Sect. 2, before reaching a final decision, the DOC and ITC 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 duties 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

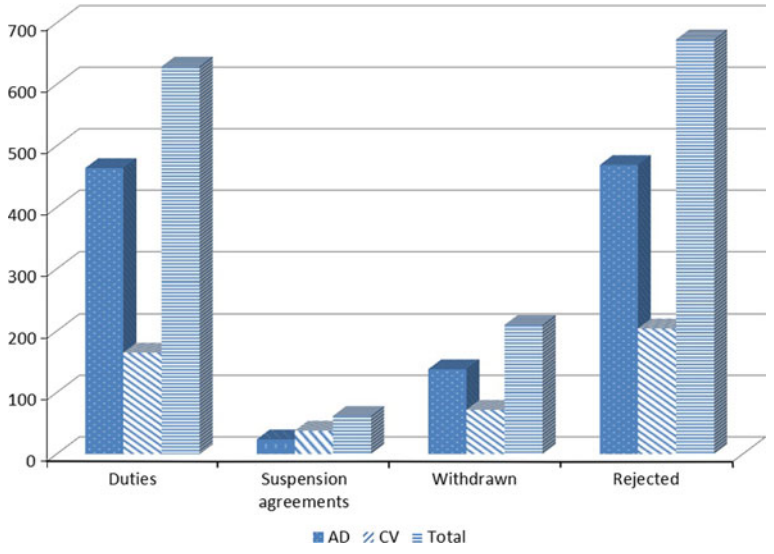

Fig. 2 US antidumping and countervailing duties petitions involving manufacturing industries classified by outcome, 1980–2005

Table 10 The non-duty effects of antidumping and countervailing petitions

Dependent variable	Period 1980–1994			Period 1995–2005		
PCM	(1)	(2)	(3)	(4)	(5)	(6)
PCM_{t-1}	0.75896***	0.74581***	0.74499***	0.69873***	0.68558***	0.65522***
	(0.06111)	(0.06230)	(0.06387)	(0.05109)	(0.04999)	(0.05452)
PCM_{t-2}	0.06367	0.06857	0.06047	0.08206**	0.08122**	0.09059**
	(0.05075)	(0.04981)	(0.05201)	(0.03854)	(0.03887)	(0.04187)
AD/CVD	0.00048***	0.00035**	0.00044**	−0.00044	−0.00022	−0.00028
	(0.00017)	(0.00017)	(0.00019)	(0.00074)	(0.00065)	(0.00065)
Initiations	−0.00231			−0.01412		
	(0.00731)			(0.01615)		
Suspension agreements		0.00902			0.05052*	
		(0.01525)			(0.03043)	
Withdrawals			−0.01439			0.01645
			(0.02035)			(0.30135)
Capital intensity	−0.02306**	−0.01889*	−0.02035**	0.02049	0.02829*	0.01996
	(0.00948)	(0.00989)	(0.00957)	(0.01492)	(0.01504)	(0.01358)
Import penetration	−0.00030	−0.00024	−0.00022	−0.00014	−0.00019**	−0.00013
	(0.00020)	(0.00020)	(0.00018)	(0.00009)	(0.00009)	(0.00011)
TWTS	−0.00061	0.00398	0.00070	0.00090	−0.00595	0.01726
	(0.05430)	(0.05124)	(0.05265)	(0.04816)	(0.05323)	(0.05156)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,558	5,558	5,558	3,881	3,881	3,881
Number of SIC	375	375	375	375	375	375
AR(2) test (*p*-value)	0.969	0.855	0.954	0.384	0.412	0.326
Hansen test (*p*-value)	0.885	0.883	0.845	0.433	0.741	0.597

Standard errors (in parentheses) were calculated using Windmeijer's (2005) finite sample correction

***/**/* denotes statistically different from zero at 1/5/10 % levels respectively. Estimations instrumenting for all AD/CV related variables

restrict import volumes or to charge minimum prices. Their implementation is similar to that of a duty since they are monitored and enforced by the DOC. Also, like duties, they may be reviewed and revoked. Therefore, one might expect a similar effect as that of duties. 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 case, the effects of a suspension agreement on markups may be lower than that of a duty.

Finally, AD/CV petitions can be withdrawn by complainants before a final decision is reached. 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 2005. Around 40 % of petitions result in negative rulings, while the vast majority of those obtaining affirmative rulings result in the imposition of duties. Suspension agreements are quite rare (4 %), especially in the case of AD. However, withdrawals are much more frequent representing 13 % of total petitions.

In order to test for the presence of non-duty effects, new regressors are introduced to the model in Eq. (5). These include the number of AD/CV cases initiated in the industry in that particular year, the number of suspension agreements in place and the number of cases withdrawn. In order to account for the relative importance of the affected imports, each case is weighted by the share of the imports directly affected by the AD/CV filing on total imports competing with the industry, that is, the same shares used to construct trade-weighted duties presented in Table 2.

Results are presented in Table 10. For brevity only the instrumental variable estimations are presented. As before, the dataset is split between the pre and post-UR periods. Most coefficients associated with non-duty effects are insignificant. This is consistent with Konings and Vandenbussche (2005), who find no filing effects for EU firms affected by AD petitions. The only exception is the coefficient of suspension agreements for the post-1995 period, which presents the expected positive sign.

However, these results should be considered with caution and not be interpreted as necessarily reflecting the absence of non-duty effects. AD/CV investigations generally take place within a few months; initiation, preliminary and final decisions may take place in the same year. This is not a problem in relation to the effects of final measures, since once protection is granted, measures are not revoked for several years. However, it may affect the possibility of picking up non-duty effects using annual data, especially filing effects, which are more short-lived.[25] Moreover, 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 Conclusions

This paper studied the impact of AD and CV protection on domestic industries' observable PCM. The analysis takes advantage of a long industry panel covering 26 years of AD/CV activity in the United States. Product-country trade data are used to construct a measure of AD/CV protection that accounts for the relative

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

importance of the affected products and import sources. The analysis controls for potential endogeneity in AD/CV duties through instrumental variables and propensity score matching.

The study presents evidence of a positive effect of AD/CV duties on industry PCM for the period prior to 1995, when the UR reforms to AD/CV rules were introduced. However, no statistically significant effect is found for the post-UR period. A possible explanation of this finding is the introduction of compulsory sunset reviews, which has limited the duration of these measures. This limitation has transformed AD/CV from a permanent to a temporary form of protection, making it a less effective instrument to protect monopolistic rents in the long run.

Although statically significant, the point estimates for the pre-UR period are small in magnitude, especially compared to what has been found for the EU. This is consistent with literature showing a greater degree of trade diversion in the United States than in the EU. For the case of the United States, 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 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 gives some support to this idea. In fact, he finds strong effects on unit prices of protected products following the imposition of AD duties, but a much smaller effect on markups. As such, the analysis of the upstream and downstream effects of contingent protection constitutes an interesting avenue for future research.

Also, 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 United States, but to a larger extent in the EU. However, a study by Blonigen and Haynes (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".

Finally, the results presented in this paper concern the net effect of AD/CV duties on industries considered as a whole, while AD/CV duties are imposed on 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 study did not allow testing for such spillover effects. However, they constitute a promising area for future research.

Acknowledgments I especially thank Hylke Vandenbussche, Florian Mayneris, Thomas Prusa, Maurizio Zanardi, Fabio Mariani and members of the International Economics Group at UCLouvain and KULeuven. I also thank two anonymous referees whose suggestions have greatly improved the quality of the paper. This paper also benefited from comments by Ron Davies, Gilles Duranton, Joseph Francois, Holger Görg, Beata Javorcik, James Markusen, Peter Neary, Mark Roberts, 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. I am 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").

References

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

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics, 68*(1), 29–51.

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

Baldwin, R., & Steagall, J. (1994). An analysis of ITC decisions in antidumping, countervailing duty and safeguard cases. *Review of World Economics/Weltwirtschaftliches Archiv, 130*(2), 290–308.

Bartelsman, E. J. (1996). *The NBER manufacturing productivity database* (NBER Working Paper No. 205). Cambridge, MA: National Bureau of Economic Research.

Becker, R. A., & Gray, W. B. (2009). *NBER-CES manufacturing industry database*. NBER and U.S. Census Bureau's Center for Economic Studies.

Belderbos, R. A. (1997). Antidumping and tariff jumping: Japanese firms' DFI in the European Union and the United States. *Review of World Economics/Weltwirtschaftliches Archiv, 133*(3), 419–457.

Bernard, A. B., Eaton, J., Jensen, J. B., & Kortum, S. (2003a). Plants and productivity in international trade. *The American Economic Review, 93*(4), 1268–1290.

Bernard, A. B., Jensen, J. B., & Schott, P. K. (2003b). *Falling trade costs, heterogeneous firms, and industry dynamics* (NBER Working Paper No. 9639). Cambridge MA: National Bureau of Economic Research.

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

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

Bernard, A. B., Redding, S. J., & Schott, P. K. (2006c). *Multi-product firms and trade liberalization* (NBER Working Paper No. 12782). Cambridge, MA: National Bureau of Economic Research.

Blonigen, B. A., & Bown, C. (2003). Antidumping and retaliation threats. *Journal of International Economics, 60*, 249–273.

Blonigen, B. A., & Hayes, S. E. (2002). Antidumping investigations and the pass-through of antidumping duties and exchange rates. *The American Economic Review, 92*(4), 1044–1061.

Blonigen, B. A., & Park, J.-H. (2004). Dynamic pricing in the presence of antidumping policy: Theory and evidence. *The American Economic Review, 94*(1), 134–154.

Blonigen, B. A., & Prusa, J. T. (2003). Antidumping. In E. K. Choi & J. C. Hartigan (Eds.), *Handbook of international trade* (pp. 251–284). Cambridge: Blackwell Publishing Ltd.

Blonigen, B. A., Liebman, B. H., & Wilson, W. W. (2007). *Trade policy and market power: The case of the US steel industry* (NBER Working Paper No. 13671). Cambridge, MA: National Bureau of Economic Research.

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

Bond, S. R. (2002). Dynamic panel data models: A guide to micro data methods and practice. *Portuguese Economic Journal, 1*, 141–162.

Bown, C. P. (2010). *Global antidumping database*. Available at http://econ.worldbank.org/ttbd/gad/.

Bown, C. P., & Crowley, M. A. (2006). Policy externalities: How US antidumping affects Japanese exports to the EU. *European Journal of Political Economy 22*(3), 696–714.

Cadot, O., de Melo, J., & Tumurchudur, B. (2007). *Anti-dumping sunset reviews: The uneven reach of WTO disciplines* (CEPR Discussion Paper No. 6502). London: Centre for Economic Policy Research.

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

Feenstra, R. C. (1996). *U.S. imports, 1972–1994: Data and concordances* (NBER Working Paper No. 5515). Cambridge, MA: National Bureau of Economic Research.

Feenstra, R. C. (1997). *U.S. exports, 1972–1994: Data and concordances* (NBER Working Paper No. 5990). Cambridge, MA: National Bureau of Economic Research.

Feenstra, R. C. (2004). *Advanced international trade: Theory and evidence*. Princeton: Princeton University Press

Feenstra, R. C., Romalis, J., & Schott, P. K. (2002). *U.S. imports, exports, and tariff data, 1989–2001* (NBER Working Paper No. 9387). Cambridge, MA: National Bureau of Economic Research.

Feinberg, R. M. (2005) U.S. antidumping enforcement and macroeconomic indicators revisited: Do petitioners learn? *Review of World Economics/Weltwirtschaftliches Archiv, 141*(4), 612–622.

Feinberg, R. M., & Hirsch, B. T. (1989). Industry rent seeking and the filing of unfair trade complaints. *International Journal of Industrial Organization, 7*(3), 325–340.

Feinberg, R. M., & Reynolds, K. M. (2006). The spread of antidumping regimes and the role of retaliation in filings. *Southern Economic Journal, 72*(4), 877–890.

Finger, M. J. (1981). The industry-country incidence of 'less than fair value' cases in US import trade. *Quarterly Review of Economics and Business, 21*, 260–279.

Finger, M. J., Keith, H. H., Nelson, D. R. (1982). The political economy of administered protection. *The American Economic Review, 72*(3), 452–466.

Gallaway, M. P., Blonigen, B. A., & Flynn, J. E. (1999). Welfare costs of the U.S. antidumping and countervailing duty laws. *Journal of International Economics, 49*(2), 211–244.

Hansen, W. L. (1990). The international trade commission and the politics of protectionism. *The American Political Science Review, 84*(1), 21–46.

Hansen, W. L., & Prusa, T. J. (1996). Cumulation and ITC decision-making: The sum of the parts is greater than the whole. *Economic Inquiry, 34*(4), 746–769.

Hansen, W. L., & Prusa, T. J. (1997). The economics and politics of trade policy: An empirical analysis of ITC decision making. *Review of International Economics, 5*(2), 230–245.

Helpman, E., & Krugman, P. (1989). *Trade policy and market structure*. Cambridge, MA: MIT Press.

Hirsch, B. T., & Macpherson, D. A. (2003). Union membership and coverage database from the current population survey: Note. *Industrial and Labor Relations Review, 56*(2), 349–354.

Knetter, M. M., & Prusa, T. J. (2003). Macroeconomic factors and antidumping filings: Evidence from four countries. *Journal of International Economics, 61*(1), 1–17.

Kokkelenberg, E. C., & Sockell, D. R. (1985). Union membership in the United States, 1973–1981. *Industrial and Labor Relations Review, 38*(4), 497–543.

Konings, J., & Vandenbussche, H. (2005). Antidumping protection and markups of domestic firms: Evidence from firm level data. *Journal of International Economics, 65*(1), 151–165.

Konings, J., & Vandenbussche, H. (2008). Heterogeneous responses of firms to trade protection. *Journal of International Economics, 76*(2), 371–383.

Konings, J., Vandenbussche, H., & Springael, L. (2001). Import diversion under European antidumping policy. *Journal of Industry, Competition and Trade 1*, 283–299.

Krupp, C. M., & Pollard, P. S. (1996). Market responses to antidumping laws: Some evidence from the U.S. chemical industry. *The Canadian Journal of Economics/Revue canadienne d'Economique, 29*(1), 199–227.

Leuven, E., & Sianesi, B. (2003). *PSMATCH2: Stata module to perform full Mahalanobis and propensity score matching, common support graphing, and covariate imbalance tesing*. Handle: RePEc:boc: bocode:s432001.

Macrory, P. F. J., Vermulst, E. A., & Waer, P. P. (1991). United States and European community antidumping law: Similarities and differences. *University of Miami Yearbook of International Law, 74*, 74–142.

Mastel, G. (1998). *Antidumping Laws and the US economy, economic strategy institute*. Armonk, NY: M.E. Sharpe.

Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica, 71*(6), 1695–1725.

Miyagiwa, K., & Ohno, Y. (1995). Closing the technology gap under protection. *The American Economic Review, 85*(4), 755–770.

Miyagiwa, K., & Ohno, Y. (1999). Credibility of protection and incentives to innovate. *International Economic Review, 40*(1), 143–163.

Moore, M. O. (1992). Rules or politics? An empirical analysis of ITC Anti-dumping decisions. *Economic Inquiry, 30*(3), 449–466.

Nelson, D. (2006). The political economy of antidumping: A survey. *European Journal of Political Economy, 22*(3), 554–590.

Nieberding, J. F. (1999). The effect of U.S. antidumping law on firms' market power: An empirical test. *Review of Industrial Organization, 14*, 65–84.

Pavcnik, N. (2002). Trade liberalization, exit, and productivity improvements: Evidence from Chilean plants. *The Review of Economic Studies, 69*(1), 245–276.

Pierce, J. R. (2011). Plant-level responses to antidumping duties: Evidence from U.S. manufacturers. *Journal of International Economics, 85*(2), 222–233.

Pierce, J. R., & Schott, P. K. (2009). *A concordance between ten-digit U.S. harmonized system codes and SIC/NAICS product classes and industries* (NBER Working Paper 15548). Cambridge, MA: National Bureau of Economic Research.

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

Prusa, T. J. (1997). The trade effects of U.S. antidumping actions. In R. C. Feenstra (Eds.), *The effects of U.S. trade protection and promotion policies*. Chicago: University of Chicago Press.

Prusa, T. J., & Skeath, S. (2002). The economic and strategic motives for antidumping filings. *Review of World Economics/Weltwirtschaftliches Archiv, 138*(3), 389–413.

Roeger, W. (1995). Can imperfect competition explain the difference between primal and dual productivity measures? Estimates for U.S. manufacturing. *The Journal of Political Economy, 103*(2), 316–330.

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

Sabry, F. (2000). An analysis of the decision to file, the dumping estimates, and the outcome of antidumping petitions. *The International Trade Journal, 14*, 109–145.

Schott, P. K. (2010). U.S. manufacturing exports and imports by SIC or NAICS category and partner country, 1972 to 2005. Yale School of Management and NBER.

Spadi, F. (2002). Discriminatory safeguards in the light of the admission of the People's Republic of China to the World Trade Organization. *Journal of International Economic Law, 5*(2), 421–443.

Staiger, R. W., & Wolak, F. A. (1994). Measuring industry-specific protection: Antidumping in the United States. *Brookings Papers on Economic Activity: Microeconomics*, 51–118.

Tharakan, P. K. M., Greenaway, D., & Tharakan, J. (1998). Cumulation and injury determination of the European community in antidumping cases. *Review of World Economics/Weltwirtschaftliches Archiv, 134*(2), 320–39.

Tybout, J. (2003). Plant- and firm-level evidence on "new" trade theories. In C. E. Kwan & J. C. Hartigan (Eds.), *Handbook of international trade* (pp. 388–415). Oxford: Blackwell Publishing Ltd.

U.S. Congressional Budget Office (1994). *How the GATT affects U.S. antidumping and countervailing-duty policy*. Washington, D.C.: U.S. Government.

Vandenbussche, H., & Zanardi, M. (2010). The chilling trade effects of antidumping proliferation. *European Economic Review, 54*(6), 760–777.

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

Zanardi, M. (2004). Antidumping law as a collusive device. *The Canadian Journal of Economics/Revue canadienne d'Economique, 37*(1), 95–122.